Williams Ohio Valley Midstream LLC
100 Teletech Drive
Moundsville, WV 26041
(304) 843-3125
(304) 843-3196 fax

December 10, 2015

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

Subject: Application for NSR Modification Permit (R13-2826I)
Williams Ohio Valley Midstream LLC
FORT BEELER GAS PROCESSING PLANT
Cameron, Marshall County, West Virginia

Dear Ms. McKeone:

Williams Ohio Valley Midstream LLC (OVM), is submitting this Application to Modify Permit R13-2826I, issued 05/26/15, for the Fort Beeler Gas Processing Plant, located approximately 3.8 miles N-NW of Cameron in Marshall County, West Virginia.

This application has been prepared and submitted to request the following modifications to the facility's current air quality permit (R13-2826I, issued 05/26/15):

- Increase Throughput Limitations on the Process Flares -
  - FL-01/17E from 5.00 MMscf/yr to 25.00 MMscf/yr;
  - FL-02/18E from 59.21 MMscf/yr to 90.00 MMscf/yr;
- Improved Emission Estimating Protocols for HAP Speciation; and
- Updated Gas Analysis Data and Assumptions.

A summary of changes to the facility-wide potential to emit are provided as an attachment to this cover letter.

(Note: the Groves triethylene glycol dehydrator and associated equipment, located adjacent to the Fort Beeler Gas Plant, are covered under a separate permit (R13-3212, issued 12/16/14). The proposed modifications to the Fort Beeler Gas Plant do not affect the Groves Dehydration Station operations or its permit.)

If you have any questions concerning this submittal or need additional information, please contact me at (304) 843-3125 or dave.morris@williams.com.

Sincerely,

Dave Morris
Environmental Specialist

Enclosures:

- Emissions Summary Sheet
- Application for NSR Permit Modification
- Attachments A through S
- Check for Application Fee

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

EMISSIONS SUMMARY SHEET

Facility-Wide Emissions Summary [Tons per Year]			
Criteria Pollutants	**Potential Emissions**		
	Current Permit	**Change**	**Proposed Permit**
Nitrogen Oxides (NOX)	91.25	2.15	**93.40**
Carbon Monoxide (CO)	86.14	7.37	**93.51**
Point - Volatile Organic Compounds (VOC)	97.21	10.82	**108.02**
Fugitive - Volatile Organic Compounds (VOC)	58.67	12.10	**70.76**
Total - Volatile Organic Compounds (VOC)	155.87	22.92	**178.79**
Sulfur Dioxide (SO2)	0.45	0.02	**0.47**
Particulate Matter (PM10/2.5)	6.96	0.24	**7.20**
Lead (Pb)	---	---	**---**
Hazardous Air Pollutants (HAP)	**Potential Emissions (Including Fugitives)**		
	Current Permit	**Change**	**Proposed Permit**
Acetaldehyde (C2H4O)	---	1.47	**1.47**
Acrolein (C3H4O)	---	0.92	**0.92**
Benzene (C6H6)	3.08	(1.81)	**1.27**
Ethylbenzene (C8H10)	2.68	(1.82)	**0.86**
Formaldehyde (HCHO)	4.54	2.4E-03	**4.54**
n-Hexane (C6H14)	3.76	2.50	**6.26**
Methanol (CH40)	---	0.47	**0.47**
Toluene (C7H8)	4.08	(1.81)	**2.27**
2,2,4-Trimethylpentane (C8H18)	---	0.54	**0.54**
Xylenes (C8H10)	6.98	(1.81)	**5.17**
Other HAP	3.04	(2.87)	**0.17**
Total HAP	21.85	2.11	**23.96**
Greenhouse Gases (GHG)	**Potential Emissions (Including Fugitives)**		
	Current Permit	**Change**	**Proposed Permit**
Carbon Dioxide (CO2)	94,915	3,855	**98,770**
Methane (CH4)	1,029	22	**1,051**
Nitrous Oxide (N2O)	0.20	0.01	**0.21**
Total - CO2 Equivalent (CO2e)	120,685	4,430	**125,115**

The increases in Criteria Pollutants, GHG, and Total HAP emissions are due to:
1) An increase in waste gas thru-put in the Flares (FL-01/17E and FL-02/18E), and
2) More conservative gas characteristic assumptions (SSM/6E, RPC/7E, and FUG/21E).

The changes in speciated HAP emissions are due to:
1) Improvements in estimating protocols, and
2) More conservative gas characteristic assumptions (SSM/6E, RPC/7E, and FUG/21E).

APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
MODIFICATION PERMIT

For the:

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Cameron, Marshall County, West Virginia

Submitted to:

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

Submitted by:

Williams Ohio Valley Midstream LLC
100 Teletech Drive, Suite 2
Moundsville, WV 26041

Prepared by:

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

December 2015

APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
MODIFICATION PERMIT

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PLANT

Cameron, Marshall County, West Virginia

TABLE OF CONTENTS

APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
MODIFICATION PERMIT

- **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 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

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

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

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

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

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION** ☐ **NOT APPLICABLE**

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):*
WILLIAMS OHIO VALLEY MIDSTREAM LLC (OVM)

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

3. Name of facility *(if different from above):*
FORT BEELER GAS PROCESSING PLANT (GP)

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

5A. Applicant's mailing address:
WILLIAMS OHIO VALLEY MIDSTREAM LLC (OVM)
100 TELETECH DRIVE, SUITE 2
MOUNDSVILLE, WV 26041

5B. Facility's present physical address:
FORT BEELER GAS PROCESSING PLANT
0.2 MI WEST OF US HWY 250/WAYNESBURG PIKE
0.6 MI SE OF COUNTY RD 34//MIDDLE GRAVE CREEK RD
CAMERON, WV 26033

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**

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

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: **THE WILLIAMS COMPANIES, INC**

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

- If **YES,** please explain: **APPLICANT LEASES THE SITE**
- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.):
NATURAL GAS PROCESSING PLANT

10. North American Industry Classification System **(NAICS)** code for the facility:
211112 - NATURAL GAS LIQUID EXTRACTION

11A. DAQ Plant ID No. (for existing facilities only):
0 5 1 – 0 0 1 2 7

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-2826I – FORT BEELER GAS PLANT, ISSUED 05/26/15
R13-3212- GROVES DEHYDRATOR, ISSUED 12/16/14

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

12A. Directions to the facility

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

FROM JEFFERSON AVE IN MOUNDSVILLE:

1) HEAD EAST ON 1ST ST ~0.8MI; 2) TURN LEFT ONTO TO CONTINUE ON US-250/WAYNESBURG PIKE ~11.7 MI; 3) CONTINUE ON US-250 PAST CO RD 34/MIDDLE GRAVE CREEK RD ~0.6 MI; 4) TURN RIGHT ONTO GRAVEL ACCESS ROAD ~0.2 MI; 5) ENTRANCE TO SITE IS STRAIGHT AHEAD.

FROM MAIN ST IN CAMERON:

1) HEAD NORTH ON US-250/WAYNESBURG PIKE ~3.7MI; 2) TURN LEFT TO CONTINUE ON US-250/ WAYNESBURG PIKE ~2.5 MI; 3) TURN LEFT ONTO GRAVEL ACCESS ROAD ~0.2 MI; 4) ENTRANCE TO SITE IS STRAIGHT AHEAD.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
0.2 MI WEST OF US HWY 250/WAYNESBURG PIKE **0.6 MI SE OF COUNTY RD 34//MIDDLE GRAVE CREEK RD**	**CAMERON**	**MARSHALL**

12.E. UTM Northing (KM):	12F. UTM Easting (KM):	12G. UTM Zone:
4,414.35	**535.00**	**17S**

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

- **Increase Throughput Limitations on the Process Flares -**
  - **FL-01/17E from 5.00 MMscf/yr to 25.00 MMscf/yr;**
  - **FL-02/18E from 59.21 MMscf/yr to 90.00 MMscf/yr;**
- **Improve Emission Estimating Protocols for HAP Speciation; and**
- **Update Gas Analysis Data and Assumptions.**

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

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

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

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

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

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents

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

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

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance*****).**
   - Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

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

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

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

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:

☒ **Bulk Liquid Transfer (TLO/20E)**	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ Storage Tanks **(T-03/22E and T-04/23E)**
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify:
NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEETS (CE-01/1E thru CE-05/5E and GE-01/8E)
NATURAL GAS FIRED HEATERS/BOILERS (H-01/9E thru H-06/14E)
DEHYDRATOR AND REBOILER (DH-01/15E and BLR-01/16E)
Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L**

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

☐ Absorption Systems	☐ Baghouse	☒ **Flare (FL-01/17E and FL-02/18E)**
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☒ Other Collectors, specify :
NON-SELECTIVE CATALYTIC REDUCTION (NSCR) AND OXIDATION CATALYST (OXCAT)
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:

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

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

All 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 Paul Hunter *(Please use blue ink)* DATE: 12/11/15 *(Please use blue ink)*

35B. Printed name of signee: **PAUL HUNTER**		35C. Title: **GENERAL MANAGER OHIO RIVER SUPPLY HUB**
35D. E-mail: **PAULV.HUNTER@WILLIAMS.COM**	36E. Phone: **(412) 787-5561**	36F. FAX: **(412) 787-6002**
36A. Printed name of contact person (if different from above): **DAVE MORRIS**		36B. Title: **ENVIRONMENTAL SPECIALIST**
36C. E-mail: **DAVE.MORRIS@WILLIAMS.COM**	36D. Phone: **(304) 843-3125**	36E. FAX: **(304) 843-3196**

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- ☒ **Attachment A: Business Certificate**
- ☒ **Attachment B: Map(s)**
- ☒ **Attachment C: Install/Startup Schedule**
- ☒ **Attachment D: Regulatory Discussion**
- ☒ **Attachment E: Plot Plan**
- ☒ **Attachment F: Detailed Process Flow Diagram(s)**
- ☒ **Attachment G: Process Description**
- ☒ **Attachment H: Material Safety Data Sheets (MSDS)**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☒ **Attachment K: Fugitive Emissions Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☒ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☐ **Attachment Q: Business Confidential Claims (Not Applicable)**
- ☐ **Attachment R: Authority Forms (Not Applicable)**
- ☐ **Attachment S: Title V Permit Revision Information (Not Applicable)**
- ☒ **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

State of West Virginia

Certificate

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

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

CAIMAN EASTERN MIDSTREAM, LLC

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

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

WILLIAMS OHIO VALLEY MIDSTREAM LLC

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

Natalie E Tennant

Secretary of State

State of West Virginia

Certificate

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

CAIMAN EASTERN MIDSTREAM, LLC

Control Number: 99GIS

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

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

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

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

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

Natalie E. Tennant

Secretary of State

ATTACHMENT B

Map(s)

"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."

- **Location:**
  Cameron, Marshall County, WV 26033

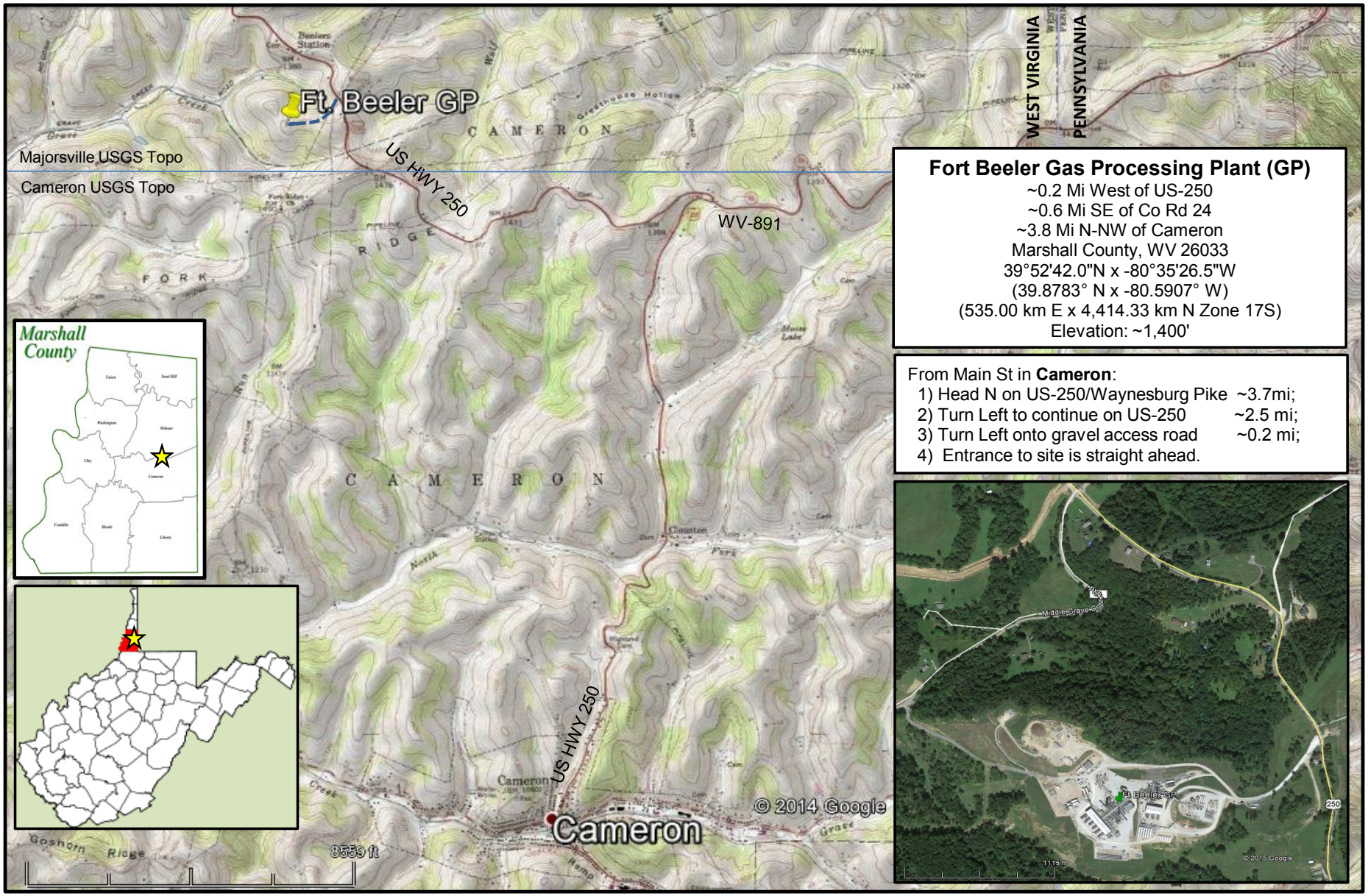
- **Latitude and Longitude:**
  39°52'42.0"N x -80°35'26.5"W
  (39.8783°N x -80.5907°W)

- **UTM:**
  4,414.313 km Northing x 535.00 km Easting x Zone 17S

- **Elevation:**
  ~1,400'

- **Directions:**
  From Main St in **Cameron**:
  1) Head N on US-250/Waynesburg Pike ~3.7mi;
  2) Turn Left to continue on US-250 ~2.5 mi;
  3) Turn Left onto gravel access road ~0.2 mi;
  4) Entrance to site is straight ahead.

Attachment B - Area (Topographic) Map



Fort Beeler Gas Processing Plant (GP)
~0.2 Mi West of US-250
~0.6 Mi SE of Co Rd 24
~3.8 Mi N-NW of Cameron
Marshall County, WV 26033
39°52'42.0"N x -80°35'26.5"W
(39.8783° N x -80.5907° W)
(535.00 km E x 4,414.33 km N Zone 17S)
Elevation: ~1,400'

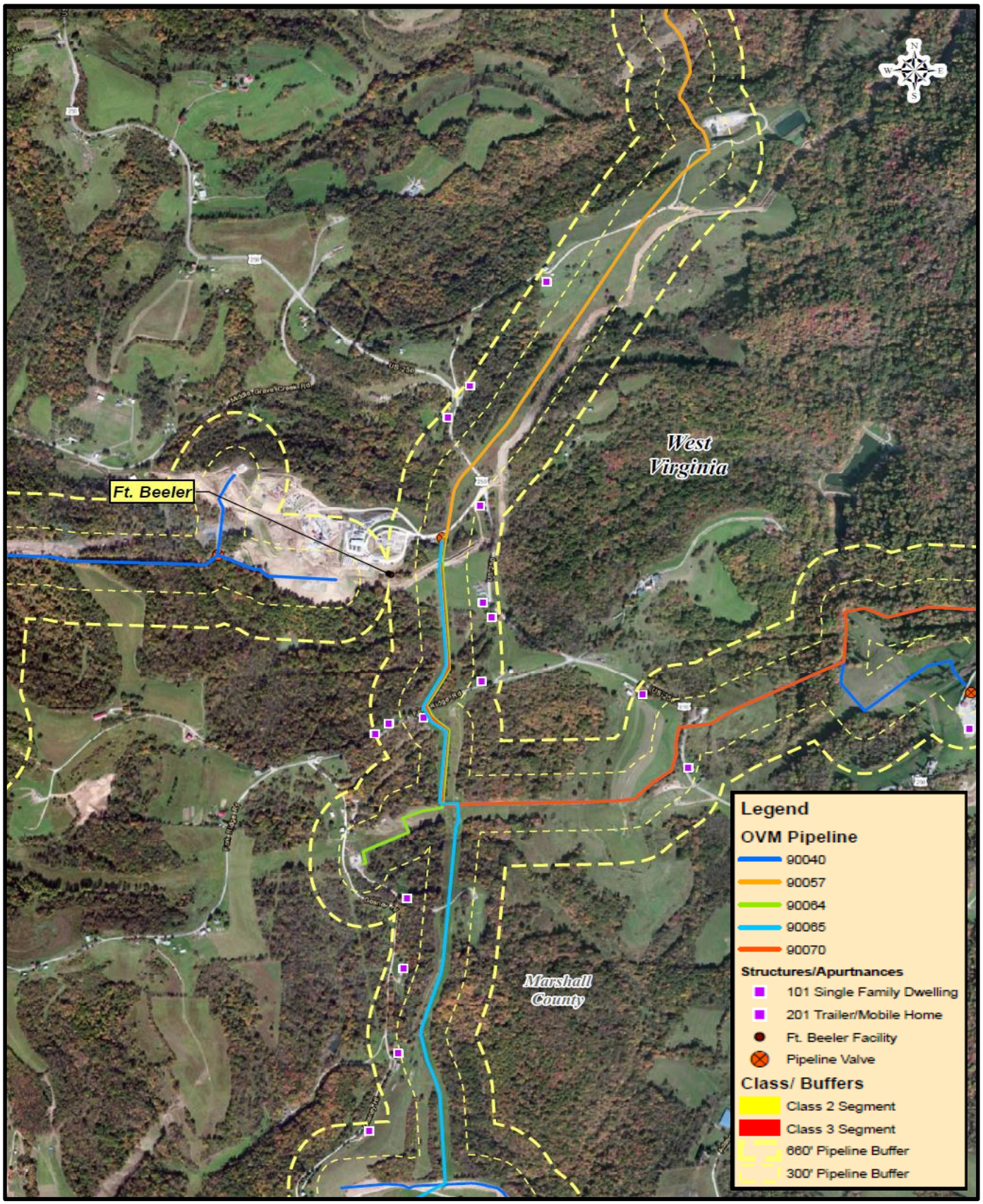
From Main St in **Cameron**:
1) Head N on US-250/Waynesburg Pike ~3.7mi;
2) Turn Left to continue on US-250 ~2.5 mi;
3) Turn Left onto gravel access road ~0.2 mi;
4) Entrance to site is straight ahead.

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 Modification Permit

Attachment B' - Pipeline Map



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 Fort Beeler Gas Plant is an existing operation. The facility modifications are scheduled to be implemented upon receipt of the NSR Modification Permit.

ATTACHMENT D

Regulatory Discussion

"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."

- **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

FORT BEELER GAS PLANT

Application for 45CSR13 NSR 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 processing plants. Applicability to the facility has been determined as follows:

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

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

- NOx: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Synthetic Minor Source with Controlled PTE < 250 tpy
- VOC: PSD Synthetic Minor Source with Controlled PTE < 250 tpy
- SO2: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- PM10/2.5: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO2e: Not Applicable - Facility is NOT PSD Major for any other pollutant

2. Nonattainment New Source Review (NNSR) [Not Applicable]

This rule does not apply. The facility is in a county that is classified as Non-Attainment for Sulfur Dioxide (SO2) and as Attainment/Unclassified/Maintenance for all other criteria pollutants. (As of 10/01/15, see - http://www3.epa.gov/airquality/greenbook/ancl.html.) With the requested Federally Enforceable Limits (FEL) the facility qualifies as an "NNSR Minor Source" as follows:

- SO2: 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. With the requested Federally Enforceable Limits (FEL), the facility qualifies as a "HAP Area Source" as follows:

- Each HAP: HAP Area Source with Controlled Formaldehyde (HCHO) PTE < 10 tpy
- Total HAPs: HAP Area Source with Controlled Total of All HAPs PTE < 25 tpy

4. Title V Operating Permit [Applicable]

This rule does apply. With the requested Federally Enforceable Limits (FEL), the facility is subject to "Title V Operating Permit" requirements as follows:

- VOC: Controlled PTE > 100 tpy
- CO2e: Controlled PTE > 100,000 tpy

B. Applicability of Federal Regulations

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

1. NSPS A, General Provisions

40CFR§60.1-§60.16 [Applicable]

This rule does apply to Heaters (H-01/9E, H-05/13E and H-06/14E), Compressors (RPC/7E), Engine (GE-01/8E), and Fugitives (FUG/21E) because they are each subject to various NSPS requirements.

2. NSPS Dc, Steam Generating Units

40CFR§60.40c-§60.48c [Applicable]

This rule does apply to the 10.0 MMBtu/hr Hot Oil Heater and 21.22 MMBtu/hr Heat Medium Heaters (H-01/9E, H-05/13E and H-06/14E) because each has a maximum design heat input capacity ≥ 10 MMBtu/hr and ≤ 100 MMBtu/hr (§60.40c(a)).

Requirements include recording and maintaining records of the amount of each fuel combusted during each calendar month (§60.48c(g)(2)).

3. NSPS Kb, Volatile Organic Liquid Storage Vessels

40CFR§60.110b-§60.117b [Not Applicable]

This rule does not apply because each tank either has a design capacity < 75 m3 (19,813 gal, 472 bbl) (§60.110b(a)) and/or has a design capacity less than 1,589.874 m3 (420,000 gal, 10,000 bbl) and the liquids are stored prior to custody transfer (§60.110b(d)(4).

4. 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).

5. NSPS KKK, Leaks from Natural Gas Processing Plants

40CFR§60.630-§60.636 [Applicable]

This rule does apply because the facility is a natural gas processing plant (FUG/21E) that is engaged in the extraction of natural gas liquids from field gas (§60.630(e)).

Requirements include Leak Detection and Repair (LDAR) monitoring (§60.632), recordkeeping (§60.635), and reporting requirements (§60.636).

6. NSPS LLL, Onshore Natural Gas Processing: SO2 Emissions

40CFR§60.640-§60.648 [Not Applicable]

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

7. 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)).

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

40CFR§60.4230-§60.4248 [Applicable]

This rule does not apply to the 3,550 bhp Caterpillar G3612LE compressor engines (CE-03 thru CE-05) because they are lean burn with bhp ≥ 1,350 and were manufactured before 07/01/07 (§60.4230(a)(4)(i)).

This rule does apply to the Emergency Generator Engine (GE-01/8E). Compliance is achieved by purchasing an EPA Certified Engine and operating the engine in accordance with the manufacturer's emission-related written instructions.

This rule does not apply to the Caterpillar G342NA (CE-01/1E) or Caterpillar G398TA (CE-02/2E) engines because they commenced construction before June 12, 2006 (§60.4230(a)(5)).

9. 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).

10. NSPS OOOO, Crude Oil and Natural Gas Production
40CFR§60.5360-§60.5430 [Applicable]

This rule does apply to the electric motor driven Columbia gas compressor (CM-01) because it was constructed after 08/23/11 (§60.5360 and §60.5365(c)). Requirements include replacing rod packing systems on a specified schedule (§60.5385(a)) and notification, monitoring, recordkeeping and reporting (§60.5410(c), §60.5415(c), §60.5420(b)(1) and §60.5420(b)(4)).

This rule does apply to the produced water tanks (T-03/22E and T-04/23E) because they are located in the oil and natural gas production segment and were constructed after 08/23/11 (§60.5360 and §60.5365(e)). However, because the tanks do not have the potential to emit VOC ≥ 6 tpy there are no emission standard, or emission control (§60.5395), notification, monitoring or reporting requirements. The only requirement is to maintain documentation that the VOC emission rate is < 6 tpy (§60.5420(b)(6)(ii) and (§60.5420 (c)(5)(ii)).

This rule does apply to the group of all equipment, except compressors, within a process unit (§60.5365(f)). The equipment leak standards are specified in §60.5400.

This rule does not apply to the pneumatic controllers because they use compressed air rather than natural gas for actuation (§60.5365(c)(3)).

11. NESHAP A, General Provisions

40CFR§63.1-§63.16 [Applicable]

This rule does apply to the Dehydrator (DH-01/15E) and natural gas-fired compressor engines (CE-01/01 thru CE-05/5E) because they are subject to NESHAP Subpart HH and NESHAP ZZZZ respectively.

12. NESHAP HH, Oil and Natural Gas Production Facilities

40CFR§63.760-§63.779 [Applicable]

This rule does apply to the Groves 5.0 MMscfd TEG Dehydrator (DH-01/15E); however, this unit is permitted separately under R13-3212, issued 12/16/14. This unit is not affected by this application for modification permit.

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.

13. 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)).

14. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175 [Not Applicable]

This rule does not apply because there is no stationary combustion turbine at the facility (§68.6080).

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

40CFR§63.6580-§63.6675 [Applicable]

This rule does apply to all of the natural gas-fired compressor engines (CE-01/01 thru CE-05/5E).

This rule does apply to the 225 bhp Caterpillar G342NA (4SRB) engine (CE-01/1E) because it is an “existing engine”; i.e., commenced construction before 06/12/06 (§63.6590(a)(1)(iii)). Compliance is required no later than 10/19/13 (§63.6595(a)).

Because it is an existing, non-emergency, rich burn, remote stationary RICE ≤ 500 hp, the requirements include work practice standards ((§63.6625 and Table 2d), notifications, reports and records (§63.6640 - §63.6660).

This rule does apply to the 625 bhp Caterpillar G398TA (4SRB) engine (CE-02/2E) because it is an “existing engine”; i.e., commenced construction before 06/12/06 (§63.6590(a)(1)(iii)). Compliance is required no later than 10/19/13 (§63.6595(a)).

Because it is an existing, non-emergency, rich burn, remote stationary RICE > 500 hp, the requirements include work practice standards ((§63.6625 and Table 2d), notifications, reports and records (§63.6640 - §63.6660).

This rule does apply to the Caterpillar G3612LE engines (CE-03 thru CE-05) because they are "existing engines"; i.e., commenced construction before 06/12/06 (§63.6590(a)(1)(iii)).

Because they are existing, non-emergency, lean burn, remote stationary RICE > 500 hp, the requirements include work practice standards ((§63.6625 and Table 2d), notifications, reports and records (§63.6640 - §63.6660).

This rule does apply to the Olympian G70LG emergency generator engine (GE-01/8E) because it is a "new engine"; i.e., commenced construction after 06/12/06 (§63.6590(a)(2)(iii)). In accordance with §63.6590(c)(1)(i), compliance with NESHAP Subpart ZZZZ is achieved by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for the emergency generator engine under NESHAP Subpart ZZZZ.

The determination that each engine at Fort Beeler Gas Plant meets the definition of "remote stationary RICE" is based on the Department of Transportation (DOT) pipeline classification. 49 CFR Part 192 at §192.5 defines various class locations and the pipeline segment at Fort Beeler meets the definition of Class 1. As found in §192.5, Class 1 is "any class location unit that has 10 or fewer buildings intended for human occupancy" and a class location unit is "an onshore area that extends 220 yards (200 meters) on either side of the centerline of any continuous 1- mile (1.6 kilometers) length of pipeline." Note the definition of "remote stationary RICE" in 40 CFR Part 63 Subpart ZZZZ is based on the Class 1 definition found in 49 CFR Part 192.

The pipeline map in Attachment B demonstrates the presence of a Class 1 pipeline at Fort Beeler Gas Plant and thus an engine classification of "remote stationary RICE" under NESHAP Subpart ZZZZ.

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

40CFR§63.7480 – §63.7575 [Not Applicable]

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

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

40CFR§63.11193 – §63.11237 [Not Applicable]

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

18. Chemical Accident Prevention Provisions

40CFR§68.1-§68.220 [Applicable]

This rule does apply because the facility stores more than a threshold quantity of a regulated substance in a process (§68.115).

19. 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.

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

This rule potentially applies because the facility has the PTE ≥ 25,000 metric ton (MT) (27,558 ton) per year of Carbon Dioxide Equivalent (CO2e) emissions.

The actual GHG emissions will be reported if CO2e emissions from stationary combustion sources exceed the 25,000 MT per year threshold (§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 will operate under SIC code 1321 (Natural Gas Liquids Extraction). The upstream gas production wells will operate under SIC code 1311 (Crude Petroleum and Natural Gas). Therefore, the subject facility shares the same two-digit major SIC code of 13 as the upstream gas production wells.

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 Fort Beeler Processing Plant processes gas produced from multiple upstream production wells located in northern West Virginia and Eastern Ohio. The subject facility is located on a parcel that is directly adjacent to a single upstream production wellpad operated by TransEnergy (the “TransEnergy Wellpad”) and is located less than half a mile from that wellpad. Other upstream production wells from which gas is processed at the Fort Beeler Processing Plant are located further from the facility.

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 TransEnergy Wellpad in order to operate properly. Indeed, the TransEnergy Wellpad does not produce a substantial portion of the gas processed at the Fort Beeler Processing Plant and the subject facility is located further from other upstream production wells even though those wells provide a larger volume of the gas that is processed at the facility. Had suitable land been available elsewhere, the subject facility could have been located further from the TransEnergy Wellpad and could theoretically be moved further from this wellpad without affecting operations. Therefore, despite the fact that the subject facility is located in close proximity to one of many upstream production sources, aggregation of the Fort Beeler Processing Plant with this single upstream production wellpad 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 Whipkey compressor station, which is located approximately 0.9 miles away. The production wells, including the TransEnergy 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 TransEnergy wellpad or in any other production well 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.

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 processing plants. Applicability to the facility has been determined as follows:

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

The rule does apply to the gas-fueled heaters (9E-14E); limiting opacity to 10% based on a six minute block average.

Any fuel burning unit with a heat input ≥ 10 MMBtu/hr (9E, 13E and 14E) is also subject to Sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions).

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]

The 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 [Applicable]

The rule does apply as 45CSR6 establishes emission standards for particulate matter and requirements for activities involving incineration of refuse. As the flare is required to be smokeless except for periods not to exceed a total of 5 minutes during any 2 consecutive hours, particulate matter emissions should be negligible and the flare will comply with the applicable emission standard. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the flare and the hours of operation. The facility will also monitor the flare pilot flame and record any malfunctions that may cause no flame to be present during facility operation.

4. **Prevent and Control Air Pollution from the Emission of Sulfur Oxides**
   45CSR10 [Applicable]

The rule does apply to the gas-fueled heaters (9E-14E); in-stack sulfur dioxide concentration to 2,000 parts per million by volume.

Any fuel burning unit with a heat input ≥ 10 MMBtu/hr (9E, 13E and 14E) is also subject to Sections 3 (weight emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting).

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

The rule does apply as Williams is seeking a NSR Modification Permit to an existing permit. Williams has published the required Class I legal advertisement notifying the public of their permit application, and paid the appropriate application fee (modification).

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

The rule does not apply because the proposed changes do not trigger major modification thresholds.

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

The rule does apply to this source by reference of §40CFR60, Subparts Dc, KKK, JJJJ, and OOOO. Williams is subject to the monitoring and recordkeeping requirements of these Subparts.

8. **Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment**
   45CSR19 [Not Applicable]

The rule does not apply. Facility-wide emissions are below the nonattainment New Source Review thresholds of 100 TPY SO2 emissions.

9. **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.

10. 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).

11. 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.

12. Emission Statements for VOC and NOX
45CSR29 [Not Applicable]

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

13. Requirements for Operating Permits
45CSR30 [Applicable]

This rule does apply as the facility is a major source of VOC and CO2e pollutants.

14. Emission Standards for Hazardous Air Pollutants (HAP)
45CSR34 [Not Applicable]

This rule does not apply because the provisions under Subpart HH of 40 CFR Part 63 which apply to non-major area sources of hazardous air pollutants are excluded.

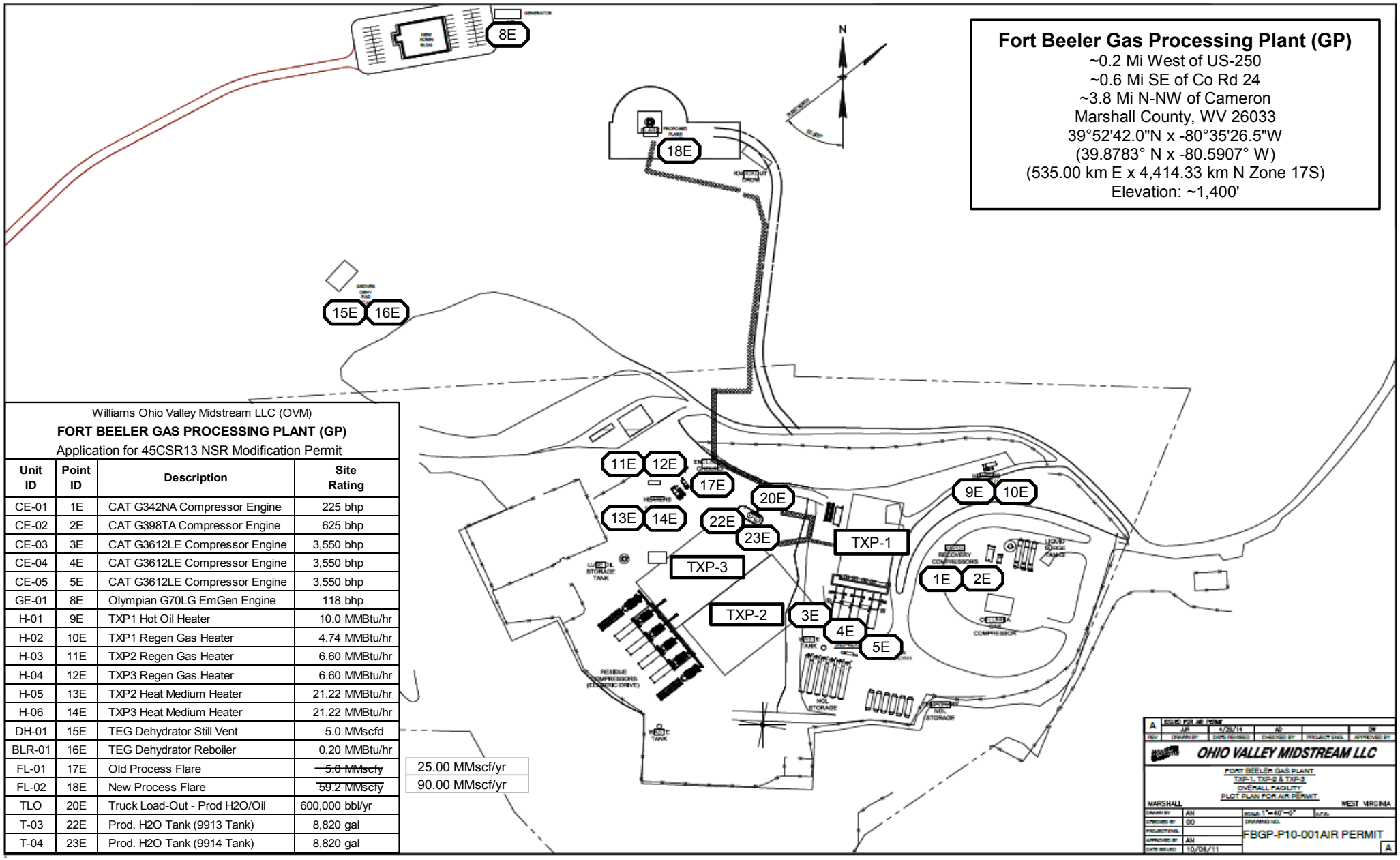
ATTACHMENT E

Plot Plan

"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."

- Plot Plan – Fort Beeler Gas Plant

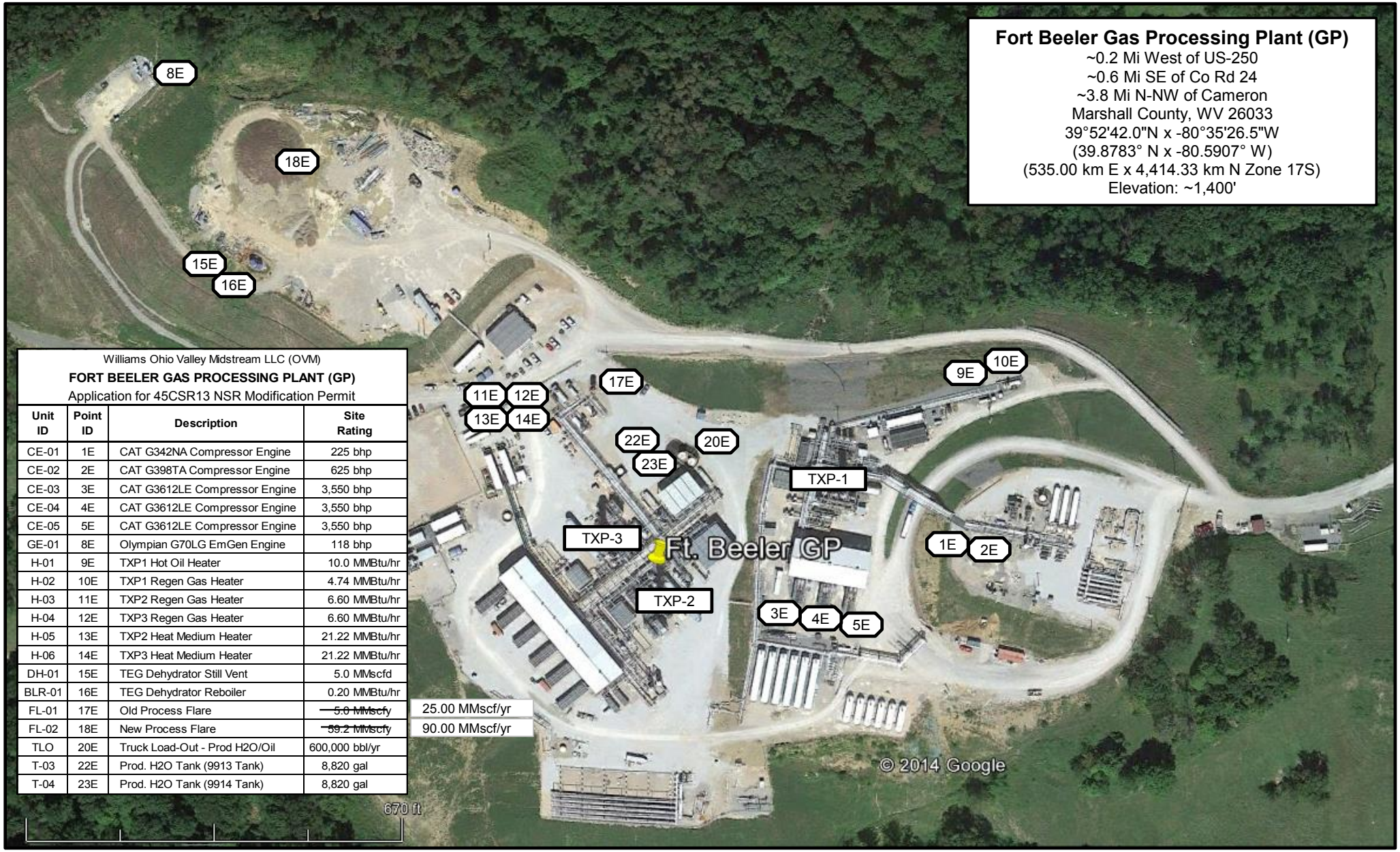
Attachment E - Plot Plan



Williams Ohio Valley Midstream LLC (OVM)
FORT BEELER GAS PROCESSING PLANT (GP)
Application for 45CSR13 NSR Modification Permit

Unit ID	Point ID	Description	Site Rating
CE-01	1E	CAT G342NA Compressor Engine	225 bhp
CE-02	2E	CAT G398TA Compressor Engine	625 bhp
CE-03	3E	CAT G3612LE Compressor Engine	3,550 bhp
CE-04	4E	CAT G3612LE Compressor Engine	3,550 bhp
CE-05	5E	CAT G3612LE Compressor Engine	3,550 bhp
GE-01	8E	Olympian G70LG EmGen Engine	118 bhp
H-01	9E	TXP1 Hot Oil Heater	10.0 MMBtu/hr
H-02	10E	TXP1 Regen Gas Heater	4.74 MMBtu/hr
H-03	11E	TXP2 Regen Gas Heater	6.60 MMBtu/hr
H-04	12E	TXP3 Regen Gas Heater	6.60 MMBtu/hr
H-05	13E	TXP2 Heat Medium Heater	21.22 MMBtu/hr
H-06	14E	TXP3 Heat Medium Heater	21.22 MMBtu/hr
DH-01	15E	TEG Dehydrator Still Vent	5.0 MMscfd
BLR-01	16E	TEG Dehydrator Reboiler	0.20 MMBtu/hr
FL-01	17E	Old Process Flare	~~5.0 MMscfy~~
FL-02	18E	New Process Flare	~~59.2 MMscfy~~
TLO	20E	Truck Load-Out - Prod H2O/Oil	600,000 bbl/yr
T-03	22E	Prod. H2O Tank (9913 Tank)	8,820 gal
T-04	23E	Prod. H2O Tank (9914 Tank)	8,820 gal

Attachment E' - Aerial View



Williams Ohio Valley Midstream LLC (OVM)
FORT BEELER GAS PROCESSING PLANT (GP)
Application for 45CSR13 NSR Modification Permit

Unit ID	Point ID	Description	Site Rating
CE-01	1E	CAT G342NA Compressor Engine	225 bhp
CE-02	2E	CAT G398TA Compressor Engine	625 bhp
CE-03	3E	CAT G3612LE Compressor Engine	3,550 bhp
CE-04	4E	CAT G3612LE Compressor Engine	3,550 bhp
CE-05	5E	CAT G3612LE Compressor Engine	3,550 bhp
GE-01	8E	Olympian G70LG EmGen Engine	118 bhp
H-01	9E	TXP1 Hot Oil Heater	10.0 MMBtu/hr
H-02	10E	TXP1 Regen Gas Heater	4.74 MMBtu/hr
H-03	11E	TXP2 Regen Gas Heater	6.60 MMBtu/hr
H-04	12E	TXP3 Regen Gas Heater	6.60 MMBtu/hr
H-05	13E	TXP2 Heat Medium Heater	21.22 MMBtu/hr
H-06	14E	TXP3 Heat Medium Heater	21.22 MMBtu/hr
DH-01	15E	TEG Dehydrator Still Vent	5.0 MMscfd
BLR-01	16E	TEG Dehydrator Reboiler	0.20 MMBtu/hr
FL-01	17E	Old Process Flare	~~5.0 MMscfy~~ 25.00 MMscf/yr
FL-02	18E	New Process Flare	~~39.2 MMscfy~~ 90.00 MMscf/yr
TLO	20E	Truck Load-Out - Prod H2O/Oil	600,000 bbl/yr
T-03	22E	Prod. H2O Tank (9913 Tank)	8,820 gal
T-04	23E	Prod. H2O Tank (9914 Tank)	8,820 gal

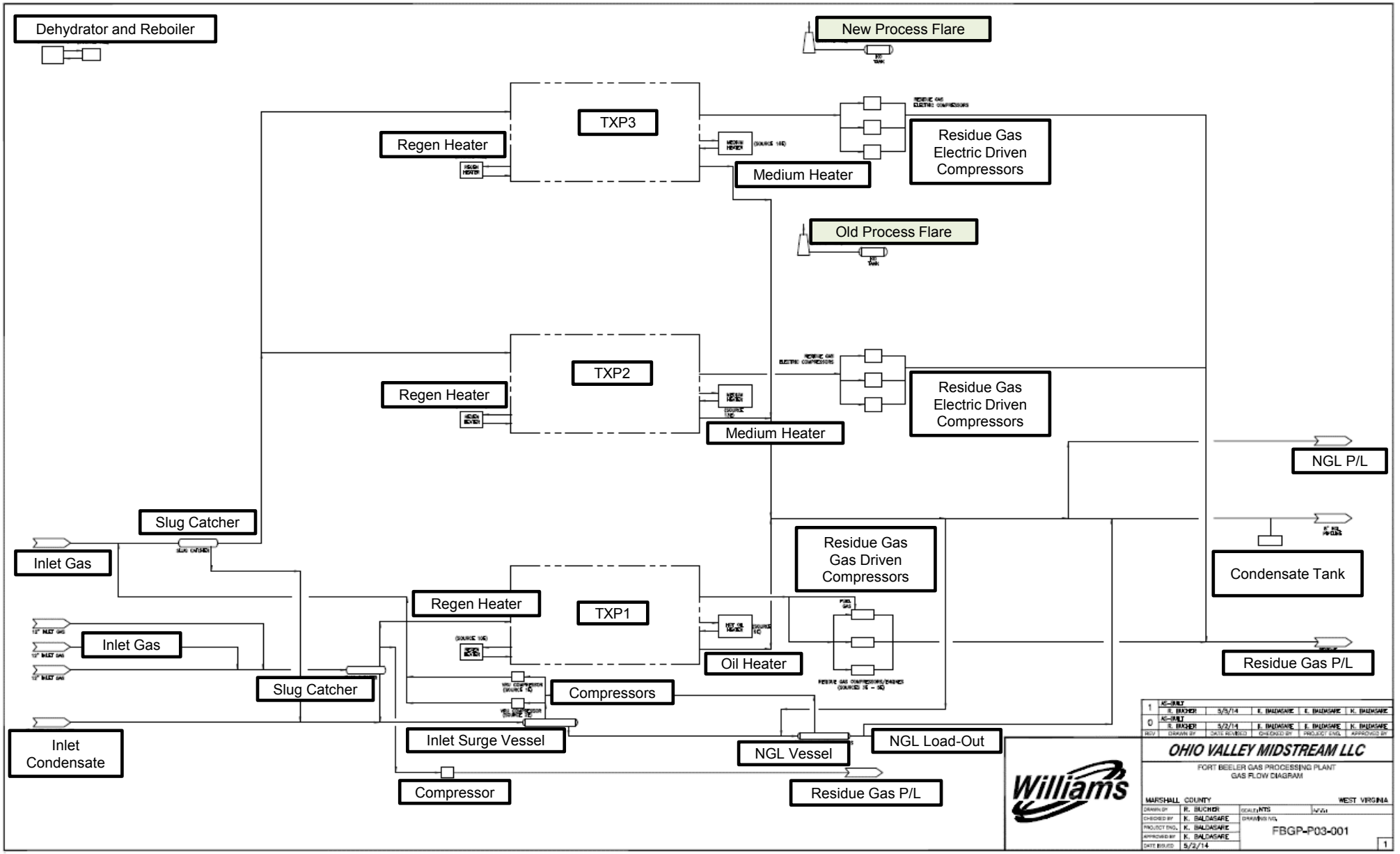
ATTACHMENT F

Detailed Process Flow Diagram(s) (PFD)

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

- Process Flow Diagram (PFD) – Fort Beeler Gas Plant

Attachment F - Process Flow Diagram (PFD)



ATTACHMENT G

Process Description

"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). "

- **Process Description**

A. Project Overview

B. Cryogenic Process (Fugitives) (FUG (21E))

C. Compressor Engines (CE-01 (1E) thru CE-05 (5E)

D. Startup/Shutdown/Maintenance (including Blowdown) (SSM (6E))

E. Compressor Rod Packing and Engine Crankcase Leaks (RPC (7E))

F. Emergency Generator Engine (GE (8E))

G. Heaters (H-01 (9E) thru H-06 (14E))

H. Triethylene Glycol (TEG) Dehydrator (DH-01 (15E) and BLR-01 (16E))

I. **Process Flares (FL-01 (17E) and -02 (18E)) (MODIFIED)**

J. Truck Load-Out (TLO (20E))

K. Storage Tanks (T-03 (22E) and T-04 (23E))

ATTACHMENT G
Process Description

Williams Ohio Valley Midstream LLC (OVM)
FORT BEELER GAS PROCESSING PLANT (GP)
Application for 45CSR13 NSR Modification Permit

A. Project Overview

Williams Ohio Valley Midstream LLC owns and operates the Fort Beeler Gas Processing Plant (facility) located along US Route 250 in Marshall County (See Appendix B – Site Location Map). The facility currently receives natural gas from local production wells and processes this gas through cryogenic processes, removing natural gas liquids from the Inlet Gas. The facility operates under Permit R13-2826I. The facility has the capacity to process 520 MMscfd of raw natural gas through one (1) 120 MMscfd cryogenic turbo-expansion plant (TXP1) and two (2) 200 MMscfd cryogenic turbo-expansion plants (TXP2 and TXP3).

This Application for NSR Permit Modification has been prepared and submitted to accomplish the following objectives:

- Increase waste gas flow rates to each Flare:
  - Old Process Flare (FL-01/17E) from 5.00 MMscf/yr to 25.00 MMscf/yr
  - New Process Flare (FL-02/18E) from 59.21 MMscf/yr to 90.00 MMscf/yr.

B. Cryogenic Process (Fugitives) (FUG/21E)

The cryogenic process utilizes an expansion turbine to drop the temperature of the Inlet Gas to approximately minus 120 degrees Fahrenheit. This rapid temperature drop condenses much of the ethane (C2H6) and most of the other hydrocarbons (primarily propane (C3H8) and butane (C4H10), with de-minimis hexane, benzene, toluene, ethyl-benzene, xylene, etc. (together C5+)), while maintaining methane (CH4) in gaseous form.

As this is a totally enclosed system, the only emissions are fugitives from piping and equipment. These emissions are controlled by implementation of a leak detection and repair (LDAR) program.

C. Compressor Engines (CE-01/1E thru CE-05/5E)

Five (5) natural gas-fueled compressor engines are utilized in the plant processes. Each of these engines is equipped with emission control technology applicable to the operation. The rich-burn engines (CE-01/1E and CE-02/2E) utilize non-selective catalytic reduction (NSCR) and the lean-burn engines (CE-03/3E thru CE-05/5E) utilize catalytic oxidation (OxCat).

D. Startup/Shutdown/Maintenance (including Blowdown) (SSM/6E)

Start/Stop/Maintenance (SSM/6E) emissions are the sum of unburned fuel resulting from "cold-start" of idle gas-fired engines and natural gas that is purged (aka blowdown) from the compressors and associated piping and equipment. The blowdown gas from the compressors driven by electric motors is routed to the Old Process Flare (FL-01/17E).

E. Compressor Rod Packing and Engine Crankcase Leaks (RPC/7E)

Compressor rod packing generate gas leaks from the wear of mechanical joints, seals, and rotating surfaces. Similarly, exhaust gases leak from the crankcases of reciprocating engines.

F. Emergency Generator Engine (GE-01/8E)

One (1) emergency generator engine is used to provide electrical power for various activities at the site in the event of loss of purchase power. The emergency generator engine will burn either natural gas or propane fuel.

G. Heaters (H-01/9E thru H-06/14E)

Six (6) natural gas-fueled heaters are used at the facility. The regen heaters (H-02/10E thru H-04/12E) are used to regenerate the mole-sieves necessary to further dry the inlet gas and the hot oil heater (H-01/9E) and heat medium heaters (H-05/13E and H-06/14E) are used on the NGL de-methanizers.

H. Triethylene Glycol (TEG) Dehydrator (DH-01/15E and BLR-01/16E)

One (1) glycol dehydrator (and associated reboiler) is used to dehydrate a portion of the inlet gas coming into the facility from the Lucey line.

I. Process Flares (FL-01/17E and -02/18E)

Two process flares are used at the facility to safely combust natural gas and NGL during routine operation. The old process flare (FL-01/17E) will primarily be used to combust natural gas released during general maintenance activities (e.g., blowdowns of the six electrically driven residue gas compressors) and it is estimated that up ~~5.0 MMscf/yr~~ **25.0 MMscf/yr** is combusted during these routine events.

The new process flare (FL-02/18E) is used to combust natural gas and NGL released from numerous sources and it is estimated up to ~~59.2 MMscf/yr~~ **90.0 MMscf/yr** is combusted over the course of a year. During normal operating conditions, gas sent to the new flare (FL-02/17E) is associated with maintenance activities. The top five non-emergency streams routed to the vents to the new process flare (FL-01/17E) include the TXP1 Inlet Gas Separator (V-410, TXP2 Product Surge Tank (V-2404), TXP1 Product Surge Tank (V-404), TXP1 Cold Separator (V-402) and TXP1 Inlet Filter (F-441). The new process flare (FL-02/18E) will also be used to control emissions in the event of an upset.

The amount of gas routed to each flare during a given event will vary widely and combustion is anticipated to be a minimum of 98% efficient.

J. Truck Load-Out (TLO/20E)

There are emissions from the truck loading of produced water/oil (TLO/20E). Loading of NGLs is accomplished under pressure resulting in no emissions to the atmosphere.

K. Storage Tanks (T-03/22E and T-04/23E)

There are numerous tanks at the facility used to store various materials such as produced water, condensate, NGLs, lube oil, glycol, etc. The only storage tanks with significant emissions to the atmosphere are the produced water tanks (T-03/22E and T-04/23E). All other storage tanks at the site have de-minimis emissions. Note there are no emissions from the fourteen (14) pressure vessels during normal operation.

ATTACHMENT H

Material Safety Data Sheets (MSDS)
(And Representative Gas Analysis)

"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."

- **STREAM COMPOSITION**
  - Inlet Natural Gas Composition
  - Residue Natural Gas Composition
  - Natural Gas Liquids (NGL) Composition
  - Extended Gas Analysis Summary
  - Dehydrator Inlet Gas Composition
  - Dehydrator Extended Gas Analysis
  - Waste Gas Composition - Old Process Flare
  - Btu Analysis - Old Process Flare
  - Waste Gas Composition - New Process Flare
  - Btu Analysis - New Process Flare
- **MATERIAL SAFETY DATA SHEETS (MSDS):**
  - Wellhead Natural Gas
  - Residue Natural Gas
  - Natural Gas Liquids (NGL)
  - Natural Gasoline
  - Condensate
  - Triethylene Glycol (TEG)
  - Lube Oil

Inlet Gas Composition

Representative Inlet Gas Composition (11/01/13) http://www.chemindustry.com/apps/chemicals

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fract (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.4955	0.004955	0.1388	0.6466	365.79
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1887	0.001887	0.0830	0.3869	218.85
Methane*	75-82-8	CH4	16.042	73.4443	0.734463	11.7826	54.8851	31,049.14
Ethane*	74-84-0	C2H6	30.069	17.2512	0.172517	5.1874	24.1638	13,669.71
Propane**	74-98-6	C3H8	44.096	6.0946	0.060948	2.6875	12.5189	7,082.09
i-Butane**	75-28-5	C4H10	58.122	0.5849	0.005849	0.3400	1.5836	895.87
n-Butane**	106-97-8	C4H10	58.122	1.3036	0.013036	0.7577	3.5295	1,996.67
Cyclopentane**	287-92-3	C5H10	70.100	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.149	0.2148	0.002148	0.1550	0.7219	408.40
n-Pentane**	109-66-0	C5H12	72.149	0.2357	0.002357	0.1701	0.7922	448.14
Cyclohexane**	110-82-7	C6H12	84.159	0.0112	0.000112	0.0094	0.0439	24.84
Other Hexanes**	varies	C6H14	86.175	0.0750	0.000750	0.0646	0.3011	170.32
Methylcyclohexane**	varies	C7H14	98.186	0.0062	0.000062	0.0061	0.0284	16.04
Heptanes**	varies	C7H16	100.202	0.0287	0.000287	0.0288	0.1340	75.78
C8+ Heavies**	varies	C8+	114.229	0.0087	0.000087	0.0099	0.0463	26.19
n-Hexane***	110-54-3	C6H14	86.175	0.0518	0.000518	0.0446	0.2079	117.63
Benzene***	71-43-2	C6H6	78.112	0.0008	0.000008	0.0006	0.0029	1.65
Toluene***	108-88-3	C7H8	92.138	0.0013	0.000013	0.0012	0.0056	3.16
Ethylbenzene***	100-41-4	C8H10	106.165	0.0001	0.000001	0.0001	0.0005	0.28
Xylenes***	1330-20-7	C8H10	106.165	0.0001	0.000001	0.0001	0.0005	0.28
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0001	0.000001	0.0001	0.0005	0.30
Totals:				**100.00**	**1.0000**	**21.4677**	**100.00**	**56,571.12**
THC:				**99.31**	**0.9932**	**21.2459**	**98.97**	**55,986.49**
Total VOC:				**8.62**	**0.0862**	**4.2759**	**19.92**	**11,267.63**
Total HAP:				**0.05**	**0.0005**	**0.0468**	**0.22**	**123.30**

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

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

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.189	0.387	218.85	0.431	0.884	500.00
Methane	75-82-8	CH4	73.444	54.885	31,049.14	88.230	75.000	37,300.00
Ethane	74-84-0	CH5	17.251	24.164	13,669.71	17.289	25.000	13,700.00
VOC (Propane)	74-98-6	C3H8	8.618	19.918	11,267.63	17.285	39.950	22,600.00
n-Hexane	110-54-3	C6H14	0.0518	0.2079	117.63	0.4403	1.7677	1,000.00
Benzene	71-43-2	C6H6	0.0008	0.0029	1.65	0.0243	0.0884	50.00
Toluene	108-88-3	C7H8	0.0013	0.0056	3.16	0.0412	0.1768	100.00
Ethylbenzene	100-41-4	C8H10	0.0001	0.0005	0.28	0.0089	0.0442	25.00
Xylenes	1330-20-7	C8H10	0.0001	0.0005	0.28	0.0089	0.0442	25.00
2,2,4-Trimethylpentane	540-84-1	C8H18	0.0001	0.0005	0.30	0.0083	0.0442	25.00
Total HAP:	Various	C6 thru C8	0.0542	0.2180	123.30	0.5320	2.1654	1,225.00

Residue Gas Composition

Residue Gas Composition (2012) http://www.chemindustry.com/apps/chemicals

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fract (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.4052	0.004052	0.1135	0.6200	299.10
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1754	0.001754	0.0772	0.4216	203.37
Methane*	75-82-8	CH4	16.042	84.6798	0.846798	13.5847	74.2120	35,798.08
Ethane*	74-84-0	C2H6	30.069	14.0913	0.140913	4.2371	23.1470	11,165.57
Propane**	74-98-6	C3H8	44.096	0.6174	0.006174	0.2722	1.4873	717.42
i-Butane**	75-28-5	C4H10	58.122	0.0100	0.000100	0.0058	0.0318	15.32
n-Butane**	106-97-8	C4H10	58.122	0.0112	0.000112	0.0065	0.0357	17.23
Cyclopentane**	287-92-3	C5H10	70.100	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.149	0.0007	0.000007	0.0005	0.0029	1.39
n-Pentane**	109-66-0	C5H12	72.149	0.0008	0.000008	0.0006	0.0031	1.49
Cyclohexane**	110-82-7	C6H12	84.159	---	---	---	---	---
Other Hexanes**	varies	C6H14	86.175	---	---	---	---	---
Methylcyclohexane**	varies	C7H14	98.186	---	---	---	---	---
Heptanes**	varies	C7H16	100.202	---	---	---	---	---
C8+ Heavies**	varies	C8+	114.229	---	---	---	---	---
n-Hexane***	110-54-3	C6H14	86.175	0.0076	0.000076	0.0066	0.0359	17.34
Benzene***	71-43-2	C6H6	78.112	0.0001	0.000001	0.0001	0.0004	0.21
Toluene***	108-88-3	C7H8	92.138	0.0001	0.000001	0.0001	0.0005	0.24
Ethylbenzene***	100-41-4	C8H10	106.165	0.0001	0.000001	0.0001	0.0006	0.28
Xylenes***	1330-20-7	C8H10	106.165	0.0001	0.000001	0.0001	0.0006	0.28
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0001	0.000001	0.0001	0.0006	0.30
Totals:				**100.00**	**1.0000**	**18.3053**	**100.00**	**48,237.61**
THC:				**99.42**	**0.9942**	**18.1146**	**98.96**	**47,735.14**
Total VOC:				**0.65**	**0.0065**	**0.2928**	**1.60**	**771.50**
Total HAP:				**0.01**	**0.0001**	**0.0071**	**0.04**	**18.65**

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

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

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.175	0.422	203.37	0.431	1.037	500.00
Methane	75-82-8	CH4	84.680	74.212	35,798.08	100.000	100.000	42,275.00
Ethane	74-84-0	C2H6	14.091	23.147	11,165.57	14.135	23.218	11,200.00
VOC (Propane)	74-98-6	C3H8	0.648	1.599	771.50	1.345	3.317	1,600.00
n-Hexane	110-54-3	C6H14	0.0076	0.0359	17.34	0.1321	0.6219	300.00
Benzene	71-43-2	C6H6	0.0001	0.0004	0.21	0.0121	0.0518	25.00
Toluene	108-88-3	C7H8	0.0001	0.0005	0.24	0.0103	0.0518	25.00
Ethylbenzene	100-41-4	C8H10	0.0001	0.0006	0.28	0.0089	0.0518	25.00
Xylenes	1330-20-7	C8H10	0.0001	0.0006	0.28	0.0089	0.0518	25.00
2,2,4-Trimethylpentane	540-84-1	C8H18	0.0001	0.0006	0.30	0.0083	0.0518	25.00
Total HAP:	Various	C6 thru C8	0.0081	0.0387	18.65	0.1807	0.8811	425.00

Natural Gas Liquid (NGL) Composition

NGL Composition (04/15/14) http://www.chemindustry.com/apps/chemicals

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	---	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	---	---	---	---	---
Methane*	75-82-8	CH4	16.042	---	---	---	---	---
Ethane*	74-84-0	C2H6	30.069	1.3372	0.013372	0.4021	0.7830	1,059.53
Propane**	74-98-6	C3H8	44.096	62.5289	0.625274	27.5718	53.6920	72,656.53
i-Butane**	75-28-5	C4H10	58.122	7.8072	0.078070	4.5376	8.8363	11,957.37
n-Butane**	106-97-8	C4H10	58.122	16.5929	0.165925	9.6439	18.7801	25,413.40
Cyclopentane**	287-92-3	C5H10	70.100	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.149	3.7435	0.037434	2.7008	5.2594	7,117.14
n-Pentane**	109-66-0	C5H12	72.149	3.9706	0.039705	2.8647	5.5785	7,548.90
Cyclohexane**	110-82-7	C6H12	84.159	0.2330	0.002330	0.1961	0.3818	516.72
Other Hexanes**	varies	C6H14	86.175	1.6520	0.016520	1.4236	2.7722	3,751.38
Methylcyclohexane**	varies	C7H14	98.186	0.1300	0.001300	0.1276	0.2486	336.35
Heptanes**	varies	C7H16	100.202	0.6460	0.006460	0.6473	1.2605	1,705.72
C8+ Heavies**	varies	C8+	114.229	0.1970	0.001970	0.2250	0.4382	592.98
n-Hexane***	110-54-3	C6H14	86.175	1.0850	0.010850	0.9350	1.8207	2,463.83
Benzene***	71-43-2	C6H6	78.112	0.0180	0.000180	0.0141	0.0274	37.05
Toluene***	108-88-3	C7H8	92.138	0.0250	0.000250	0.0230	0.0449	60.70
Ethylbenzene***	100-41-4	C8H10	106.165	0.0001	0.000001	0.0001	0.0002	0.28
Xylenes***	1330-20-7	C8H10	106.165	0.0250	0.000250	0.0265	0.0517	69.94
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0110	0.000110	0.0126	0.0245	33.11
Totals:				**100.00**	**1.0000**	**51.3519**	**100.00**	**135,320.93**
THC:				**100.00**	**1.0000**	**51.3519**	**100.00**	**135,320.93**
Total VOC:				**98.67**	**0.9866**	**50.9498**	**99.22**	**134,261.39**
Total HAP:				**1.16**	**0.0116**	**1.0113**	**1.97**	**2,664.91**

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

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

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	---	---	---	---	---	---
Methane	75-82-8	CH4	---	---	---	---	---	---
Ethane	74-84-0	CH5	1.337	0.783	1,059.53	1.388	1.000	1,100.00
VOC (Propane)	74-98-6	C3H8	98.665	99.217	134,261.39	100.000	100.000	135,000.00
n-Hexane	110-54-3	C6H14	1.0850	1.8207	2,463.83	2.2019	3.6949	5,000.00
Benzene	71-43-2	C6H6	0.0180	0.0274	37.05	0.0729	0.1108	150.00
Toluene	108-88-3	C7H8	0.0250	0.0449	60.70	0.1030	0.1847	250.00
Ethylbenzene	100-41-4	C8H10	0.0001	0.0002	0.28	0.0179	0.0369	50.00
Xylenes	1330-20-7	C8H10	0.0250	0.0517	69.94	0.1072	0.2217	300.00
2,2,4-Trimethylpentane	540-84-1	C8H18	0.0110	0.0245	33.11	0.0498	0.1108	150.00
Total HAP:	Various	C6 thru C8	1.1641	1.9693	2,664.91	2.5526	4.3600	10,700.00

Dehydrator Inlet Gas Composition

Dehydrator Inlet Gas Composition (Groves Master - 07/02/13)

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.3474	0.003474	0.0973	0.4886	256.46
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1322	0.001322	0.0582	0.2921	153.32
Methane*	75-82-8	CH4	16.042	81.0242	0.810262	12.9986	65.2631	34,253.53
Ethane*	74-84-0	C2H6	30.069	12.9568	0.129571	3.8961	19.5614	10,266.84
Propane**	74-98-6	C3H8	44.096	3.5869	0.035870	1.5817	7.9414	4,168.06
i-Butane**	75-28-5	C4H10	58.122	0.4831	0.004831	0.2808	1.4098	739.94
n-Butane**	106-97-8	C4H10	58.122	0.7906	0.007906	0.4595	2.3072	1,210.93
Cyclopentane**	287-92-3	C5H10	70.100	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.149	0.2243	0.002243	0.1618	0.8125	426.46
n-Pentane**	109-66-0	C5H12	72.149	0.1722	0.001722	0.1242	0.6238	327.40
Cyclohexane**	110-82-7	C6H12	84.159	0.0136	0.000136	0.0114	0.0575	30.16
Other Hexanes**	varies	C6H14	86.175	0.1051	0.001051	0.0906	0.4547	238.67
Methylcyclohexane**	varies	C7H14	98.186	0.0117	0.000117	0.0115	0.0577	30.27
Heptanes**	varies	C7H16	100.202	0.0624	0.000624	0.0625	0.3139	164.77
C8+ Heavies**	varies	C8+	114.229	0.0242	0.000242	0.0276	0.1388	72.85
n-Hexane***	110-54-3	C6H14	86.175	0.0535	0.000535	0.0461	0.2315	121.49
Benzene***	71-43-2	C6H6	78.112	0.0012	0.000012	0.0009	0.0047	2.47
Toluene***	108-88-3	C7H8	92.138	0.0030	0.000030	0.0028	0.0139	7.28
Ethylbenzene***	100-41-4	C8H10	106.165	0.0001	0.000001	0.0001	0.0005	0.28
Xylenes***	1330-20-7	C8H10	106.165	0.0047	0.000047	0.0050	0.0251	13.15
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0003	0.000003	0.0003	0.0017	0.90
Totals:				**100.00**	**1.0000**	**19.9172**	**100.00**	**52,485.26**
THC:				**99.52**	**0.9952**	**19.7617**	**99.22**	**52,075.49**
Total VOC:				**5.54**	**0.0554**	**2.8670**	**14.39**	**7,555.11**
Total HAP:				**0.06**	**0.0006**	**0.0552**	**0.28**	**145.58**

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

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

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.132	0.292	153.32	0.172	0.381	200.00
Methane	75-82-8	CH4	81.024	65.263	34,253.53	99.348	75.000	42,000.00
Ethane	74-84-0	CH5	12.957	19.561	10,266.84	15.649	25.000	12,400.00
VOC (Propane)	74-98-6	C3H8	5.537	14.395	7,555.11	6.669	17.338	9,100.00
n-Hexane	110-54-3	C6H14	0.0535	0.2315	121.49	0.0661	0.2858	150.00
Benzene	71-43-2	C6H6	0.0012	0.0047	2.47	0.0049	0.0191	10.00
Toluene	108-88-3	C7H8	0.0030	0.0139	7.28	0.0041	0.0191	10.00
Ethylbenzene	100-41-4	C8H10	0.0001	0.0005	0.28	0.0018	0.0095	5.00
Xylenes	1330-20-7	C8H10	0.0047	0.0251	13.15	0.0071	0.0381	20.00
2,2,4-Trimethylpentane	540-84-1	C8H18	0.0003	0.0017	0.90	0.0017	0.0095	5.00
Total HAP:	Various	C6 thru C8	0.0628	0.2774	145.58	0.0856	0.3811	200.00

Dehydrator Inlet Gas Analysis

J-W Measurement Company
Canonsburg, PA
724-749-5180

Good

Customer	: 2259 - WILLIAMS	**Date Sampled**	: 07/02/2013
Station ID	: 52033-50	**Date Analyzed**	: 07/11/2013
Cylinder ID	: W1100	**Effective Date**	: 08/01/2013
Producer	: 009402-TRANS ENERGY INC	**Cyl Pressure**	: 864
Lease	: GROVES MASTER	**Temp**	: 75
Area	: 500 - OHIO VALLEY MID	**Cylinder Type**	: Spot
State	: WV	**Sample By**	: JR

COMPONENT	MOL%	GPM@14.73(PSIA)
Methane	81.0242	0.000
Ethane	12.9568	3.476
Propane	3.5869	0.991
Iso-Butane	0.4831	0.159
Normal-Butane	0.7906	0.250
Iso-Pentane	0.2243	0.082
Normal-Pentane	0.1722	0.063
Nitrogen	0.3474	0.000
Carbon-Dioxide	0.1322	0.000
Oxygen	0.0000	0.000
BENZENE	0.0012	0.000
TOLUENE	0.0030	0.001
ETHYLBENZENE	0.0000	0.000
M-XYLENE/P-XYLENE	0.0000	0.000
2,2-Dimethylbutane	0.0092	0.004
2,3-Dimethylbutane/CycloC5	0.0126	0.004
2-methylpentane	0.0516	0.021
3-methylpentane	0.0317	0.013
Normal-Hexane	0.0535	0.022
2,2-Dimethylpentane	0.0010	0.000
Methylcyclopentane	0.0082	0.003
3,3-Dimethylpentane	0.0040	0.002
CYCLOHEXANE	0.0054	0.002
2-Methylhexane	0.0216	0.010
2,3-Dimethylpentane	0.0042	0.001
3-Methylhexane	0.0143	0.007
1,t3-Dimethylcyclopentane	0.0002	0.000
1,t2-DMCYC5 / 2,2,4-TMC5	0.0003	0.000
N-Heptane	0.0173	0.008
METHYLCYCLOHEXANE	0.0112	0.005
2,5-Dimethylhexane	0.0012	0.001
2,3-Dimethylhexane	0.0013	0.001
2-Methylheptane	0.0049	0.003
4-Methylheptane	0.0019	0.001
3-Methylheptane	0.0036	0.002
1,t4-Dimethylcyclohexane	0.0016	0.001
N-OCTANE / 1,T2-DMCYC6	0.0051	0.002
1,t3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0011	0.000
2,4,4 TMC6	0.0000	0.000
2,6-Dimethylheptane / 1,C2-DMCYC6	0.0009	0.000
Ethylcyclohexane	0.0005	0.000
M-XYLENE	0.0029	0.001
P-XYLENE	0.0016	0.001
O-XYLENE	0.0002	0.000
NONANE	0.0021	0.001
N-DECANE	0.0016	0.001
N-UNDECANE	0.0013	0.001
TOTAL	**100.0000**	**5.140**

Waste Gas Composition - Old Process Flare

http://www.chemindustry.com/apps/chemicals

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.4052	0.004052	0.1135	0.6200	299.10
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1754	0.001754	0.0772	0.4216	203.37
Methane*	75-82-8	CH4	16.042	84.6798	0.846798	13.5847	74.2120	35,798.08
Ethane*	74-84-0	C2H6	30.069	14.0913	0.140913	4.2371	23.1470	11,165.57
Propane**	74-98-6	C3H8	44.096	0.6174	0.006174	0.2722	1.4873	717.42
i-Butane**	75-28-5	C4H10	58.122	0.0100	0.000100	0.0058	0.0318	15.32
n-Butane**	106-97-8	C4H10	58.122	0.0112	0.000112	0.0065	0.0357	17.23
Cyclopentane**	287-92-3	C5H10	70.100	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.149	0.0007	0.000007	0.0005	0.0029	1.39
n-Pentane**	109-66-0	C5H12	72.149	0.0008	0.000008	0.0006	0.0031	1.49
Cyclohexane**	110-82-7	C6H12	84.159	---	---	---	---	---
Other Hexanes**	varies	C6H14	86.175	---	---	---	---	---
Methylcyclohexane**	varies	C7H14	98.186	---	---	---	---	---
Heptanes**	varies	C7H16	100.202	---	---	---	---	---
C8+ Heavies**	varies	C8+	varies	---	---	---	---	---
n-Hexane***	110-54-3	C6H14	86.175	0.0076	0.000076	0.0066	0.0359	17.34
Benzene***	71-43-2	C6H6	78.112	0.0001	0.000001	0.0001	0.0004	0.21
Toluene***	108-88-3	C7H8	92.138	0.0001	0.000001	0.0001	0.0005	0.24
Ethylbenzene***	100-41-4	C8H10	106.165	0.0001	0.000001	0.0001	0.0006	0.28
Xylenes***	1330-20-7	C8H10	106.165	0.0001	0.000001	0.0001	0.0006	0.28
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0001	0.000001	0.0001	0.0006	0.30
Totals:				**100.00**	**1.0000**	**18.3053**	**100.00**	**48,237.61**
THC:				**99.42**	**0.9942**	**18.1146**	**98.96**	**47,735.14**
Total VOC:				**0.65**	**0.0065**	**0.2928**	**1.60**	**771.50**
Total HAP:				**0.008**	**0.00008**	**0.0071**	**0.039**	**18.65**

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

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

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.175	0.422	203.37	0.431	1.037	500.00
Methane	75-82-8	CH4	84.680	74.212	35,798.08	100.000	100.000	42,275.00
Ethane	74-84-0	C2H6	14.091	23.147	11,165.57	14.135	23.218	11,200.00
VOC (Propane)	74-98-6	C3H8	0.617	1.487	717.42	1.345	3.317	1,600.00
n-Hexane	110-54-3	C6H14	0.0076	0.0359	17.34	0.1321	0.6219	300.00
Benzene	71-43-2	C6H6	0.0001	0.0004	0.21	0.0121	0.0518	25.00
Toluene	108-88-3	C7H8	0.0001	0.0005	0.24	0.0103	0.0518	25.00
Ethylbenzene	100-41-4	C8H10	0.0001	0.0006	0.28	0.0089	0.0518	25.00
Xylenes	1330-20-7	C8H10	0.0001	0.0006	0.28	0.0089	0.0518	25.00
2,2,4-Trimethylpentane	540-84-1	C8H18	0.0001	0.0006	0.30	0.0083	0.0518	25.00
Total HAP:	Various	C6 thru C8	0.0081	0.0387	18.65	0.1807	0.8811	425.00

Btu Analysis - Old Process Flare

Based on Streams Disposed in Old Flare Stack

Component	Formula	Molecular Weight (MW)	Component Btu/scf (HHV)	Residue Gas Stream	
				Flow: 2,854 scfh	
				Mole %	Btu/scf
Water	H2O	15.999	0.0	---	---
Carbon Monoxide	CO	28.010	0.0	---	---
Nitrogen	N2	28.013	0.0	0.4052	---
Oxygen	O2	31.999	0.0	---	---
Hydrogen Sulfide	H2S	34.086	652.0	---	---
Carbon Dioxide	CO2	44.010	0.0	0.1754	---
Methane*	CH4	16.042	1,010.4	84.6798	855.643
Ethane*	C2H6	30.069	1,798.6	14.0913	253.441
Propane**	C3H8	44.096	2,572.1	0.6174	15.880
i-Butane**	C4H10	58.122	3,333.8	0.0100	0.333
n-Butane**	C4H10	58.122	3,345.3	0.0112	0.376
Cyclopentane**	C5H10	70.100	3,902.3	---	---
i-Pentane**	C5H12	72.149	4,110.0	0.0007	0.030
n-Pentane**	C5H12	72.149	4,118.8	0.0008	0.032
2-Mbutane	C5H12	72.149	4,110.0	---	---
2-Mpentane	C6H14	86.175	4,883.6	---	---
3-Mpentane	C6H14	86.175	4,886.8	---	---
Heptanes**	C7H16	100.202	5,666.7	---	---
C8+ Heavies**	C8+	114.2 est	6,440.2 est	---	---
n-Hexane***	C6H14	86.175	4,893.1	0.0076	0.374
Benzene***	C6H6	78.112	3,989.4	0.0001	0.004
Toluene***	C7H8	92.138	4,748.6	0.0001	0.005
Ethylbenzene***	C8H10	106.165	5,522.7	0.0001	0.006
Xylenes***	C8H10	106.165	5,509.0	0.0001	0.006
2,2,4-TMP***	C8H18	114.229	6,924.0	0.0001	0.007
				100.00	

Btu/scf (HHV): **1,126.13**

MMBtu/hr (HHV): **3.21**

Waste Gas Composition - New Process Flare

http://www.chemindustry.com/apps/chemicals

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.4861	0.004861	0.1362	0.6442	358.88
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1873	0.001873	0.0824	0.3900	217.24
Methane*	75-82-8	CH4	16.042	74.6090	0.746108	11.9694	56.6200	31,541.43
Ethane*	74-84-0	C2H6	30.069	16.9236	0.169241	5.0889	24.0725	13,410.13
Propane**	74-98-6	C3H8	44.096	5.5268	0.055270	2.4372	11.5287	6,422.31
i-Butane**	75-28-5	C4H10	58.122	0.5253	0.005253	0.3053	1.4443	804.59
n-Butane**	106-97-8	C4H10	58.122	1.1696	0.011697	0.6798	3.2159	1,791.48
Cyclopentane**	287-92-3	C5H10	70.100	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.149	0.1926	0.001926	0.1390	0.6574	366.21
n-Pentane**	109-66-0	C5H12	72.149	0.2113	0.002114	0.1525	0.7213	401.84
Cyclohexane**	110-82-7	C6H12	84.159	0.0100	0.000100	0.0084	0.0400	22.26
Other Hexanes**	varies	C6H14	86.175	0.0672	0.000672	0.0579	0.2740	152.66
Methylcyclohexane**	varies	C7H14	98.186	0.0056	0.000056	0.0055	0.0258	14.38
Heptanes**	varies	C7H16	100.202	0.0257	0.000257	0.0258	0.1219	67.93
C8+ Heavies**	varies	C8+	114.229	0.0078	0.000078	0.0089	0.0421	23.47
n-Hexane***	110-54-3	C6H14	86.175	0.0472	0.000472	0.0407	0.1925	107.24
Benzene***	71-43-2	C6H6	78.112	0.0007	0.000007	0.0006	0.0027	1.50
Toluene***	108-88-3	C7H8	92.138	0.0012	0.000012	0.0011	0.0051	2.85
Ethylbenzene***	100-41-4	C8H10	106.165	0.0001	0.000001	0.0001	0.0005	0.28
Xylenes***	1330-20-7	C8H10	106.165	0.0001	0.000001	0.0001	0.0005	0.28
2,2,4-Trimethylpentane***	540-84-1	C8H18	114.229	0.0001	0.000001	0.0001	0.0005	0.30
Totals:				**100.00**	**1.0000**	**21.1399**	**100.00**	**55,707.25**
THC:				**99.32**	**0.9933**	**20.9213**	**98.97**	**55,131.13**
Total VOC:				**7.79**	**0.0779**	**3.8630**	**18.27**	**10,179.58**
Total HAP:				**0.049**	**0.00049**	**0.0427**	**0.202**	**112.45**

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

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

To be conservative, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.187	0.390	217.24	0.259	0.539	300.00
Methane	75-82-8	CH4	74.609	56.620	31,541.43	89.650	68.034	37,900.00
Ethane	74-84-0	C2H6	16.924	24.072	13,410.13	20.318	28.901	16,100.00
VOC (Propane)	74-98-6	C3H8	7.742	18.071	10,179.58	9.355	21.836	12,300.00
n-Hexane	110-54-3	C6H14	0.0472	0.1925	107.24	0.0969	0.3949	220.00
Benzene	71-43-2	C6H6	0.0007	0.0027	1.50	0.0049	0.0180	10.00
Toluene	108-88-3	C7H8	0.0012	0.0051	2.85	0.0041	0.0180	10.00
Ethylbenzene	100-41-4	C8H10	0.0001	0.0005	0.28	0.2000	0.9000	10.00
Xylenes	1330-20-7	C8H10	0.0001	0.0005	0.28	0.2000	0.9000	10.00
2,2,4-Trimethylpentane	540-84-1	C8H18	0.0001	0.0005	0.30	0.0033	0.0180	10.00
Total HAP:	Various	C6 thru C8	0.0494	0.2019	112.45	0.5092	2.2488	270.00

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Btu Analysis - New Process Flare

Based on Streams Disposed in New Flare Stack

Component	Formula	Molecular Weight (MW)	Component Btu/scf (HHV)	Pilot + Purge Gas Flow: 1,065 scfh		Process + Maintenance Flow: 9,209 scfh		Combined Stream Flow: 10,274 scfh	
				Mole %	Btu/scf	Mole %	Btu/scf	Mole %	Btu/scf
Nitrogen	N2	28.013	0.0	0.4052	---	0.4955	---	0.4861	---
Hydrogen Sulfide	H2S	34.086	652.0	---	---	---	---	---	---
Carbon Dioxide	CO2	44.010	0.0	0.1754	---	0.1887	---	0.1873	---
Methane*	CH4	16.042	1,010.4	84.6798	855.643	73.4443	742.114	74.6090	753.882
Ethane*	C2H6	30.069	1,798.6	14.0913	253.441	17.2512	310.272	16.9236	304.381
Propane**	C3H8	44.096	2,572.1	0.6174	15.880	6.0946	156.760	5.5268	142.156
i-Butane**	C4H10	58.122	3,333.8	0.0100	0.333	0.5849	19.499	0.5253	17.513
n-Butane**	C4H10	58.122	3,345.3	0.0112	0.376	1.3036	43.610	1.1696	39.128
Cyclopentane**	C5H10	70.100	3,902.3	---	---	---	---	---	---
i-Pentane**	C5H12	72.149	4,110.0	0.0007	0.030	0.2148	8.828	0.1926	7.916
n-Pentane**	C5H12	72.149	4,118.8	0.0008	0.032	0.2357	9.708	0.2113	8.705
Cyclohexane**	C6H12	84.159	4,644.1	---	---	0.0112	0.520	0.0100	0.466
Other Hexanes**	C6H14	86.175	4,893.1	---	---	0.0750	3.670	0.0672	3.289
Methylcyclohexane**	C7H14	98.186	5,404.1	---	---	0.0062	0.335	0.0056	0.300
Heptanes**	C7H16	100.202	5,666.7	---	---	0.0287	1.626	0.0257	1.458
C8+ Heavies**	C8+	114.2 est	6,440.2 est	---	---	0.0087	0.560	0.0078	0.502
n-Hexane***	C6H14	86.175	4,893.1	0.0076	0.374	0.0518	2.535	0.0472	2.311
Benzene***	C6H6	78.112	3,989.4	0.0001	0.004	0.0008	0.032	0.0007	0.029
Toluene***	C7H8	92.138	4,748.6	0.0001	0.005	0.0013	0.062	0.0012	0.056
Ethylbenzene***	C8H10	106.165	5,522.7	0.0001	0.006	0.0001	0.006	0.0001	0.006
Xylenes***	C8H10	106.165	5,509.0	0.0001	0.006	0.0001	0.006	0.0001	0.006
2,4-Trimethylpentane*	C8H18	114.229	6,924.0	0.0001	0.007	0.0001	0.007	0.0001	0.007
				100.00		100.00		100.00	

Btu/scf (HHV):	**1,126.14**	**1,300.15**		**1,282.11**
MMBtu/hr (HHV):	**1.20**	**11.97**	**Total:**	**13.17**

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision Date: 10/02/2013 Version: 1.0

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

Product Identifier

Product Form: Mixture

Product Name: Wellhead Natural Gas

Synonyms: Wellhead Gas, Raw Gas, Methane, Residue Gas, Natural Gas Sweet, Marsh Gas, Fuel Gas, Petroleum Gas.

Intended Use of the Product

Use of the Substance/Mixture: Fuel.

Name, Address, and Telephone of the Responsible Party

Company

Williams, Inc.
One Williams Center
Tulsa, OK 74172, US
T 800-688-7507
enterpriseehs@williams.com

Emergency Telephone Number

Emergency number : 800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

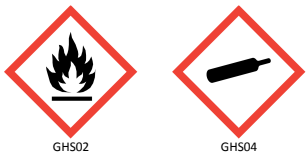
Classification (GHS-US)

Simple Asphy
Flam. Gas 1 H220
Compressed gas H280

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US) :



GHS02 GHS04

Signal Word (GHS-US) : Danger

Hazard Statements (GHS-US) : H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation

Precautionary Statements (GHS-US) : P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P403 - Store in a well-ventilated place.
P410+P403 - Protect from sunlight. Store in a well-ventilated place.

Other Hazards

Other Hazards Not Contributing to the Classification: Contains hydrogen sulfide. Hydrogen sulfide is a highly flammable, explosive gas under certain conditions, is a toxic gas, and may be fatal. Gas can accumulate in the headspace of closed containers, use caution when opening sealed containers. Heating the product or containers can cause thermal decomposition of the product and release hydrogen sulfide. Exposure may aggravate those with pre existing eye, skin, or respiratory conditions.

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product identifier	% (w/w)	Classification (GHS-US)
Methane	(CAS No) 74-82-8	> 75	Simple Asphy

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

			Flam. Gas 1, H220 Liquefied gas, H280
Ethane	(CAS No) 74-84-0	< 20	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Propane	(CAS No) 74-98-6	< 10	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Carbon dioxide	(CAS No) 124-38-9	< 10	Simple Asphy Compressed gas, H280
Butane	(CAS No) 106-97-8	< 5	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Nitrogen	(CAS No) 7727-37-9	< 5	Simple Asphy Compressed gas, H280
Hydrogen sulfide	(CAS No) 7783-06-4	<= 0.0004	Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 2 (Inhalation:gas), H330 Aquatic Acute 1, H400

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible). If frostbite or freezing occurs, immediately flush with plenty of lukewarm water to GENTLY warm the affected area. Do not use hot water. Do not rub affected area. Get immediate medical attention.

Inhalation: When symptoms occur: go into open air and ventilate suspected area.Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER/doctor/physician if you feel unwell

Skin Contact: Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Obtain medical attention if irritation persists.Thaw frosted parts with lukewarm water. Do not rub affected area.

Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.Obtain medical attention if irritation persists

Ingestion: Rinse mouth.Do NOT induce vomiting.Get immediate medical attention.

Most Important Symptoms and Effects Both Acute and Delayed

General: May cause frostbite on contact with the liquid.Butane is an asphyxiant. Lack of oxygen can be fatal

Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air.Asphyxia by lack of oxygen: risk of death.May cause drowsiness or dizziness

Skin Contact: Contact with the liquid may cause cold burns/frostbite

Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns

Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating; but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Chronic Symptoms: Contains a small amount of Hydrogen Sulfide, symptoms of overexposure are headaches, dizziness, nausea, coughing, respiratory irritation, eye irritation, skin irritation, pain in the nose, and loss of consciousness. Heating of the product may release higher amounts of Hydrogen Sulfide (H_2S).

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Foam, dry chemical, carbon dioxide, water spray, fog

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Special Hazards Arising From the Substance or Mixture

Fire Hazard: Extremely flammable gas

Explosion Hazard: May form flammable/explosive vapor-air mixture.Heating may cause an explosion.Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity: Hazardous reactions will not occur under normal conditions.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire

Firefighting Instructions: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.In case of leaking gas fire, eliminate all ignition sources if safe to do so.Use water spray or fog for cooling exposed containers.In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Carbon oxides (CO, CO_2).Hydrocarbon, sulfur dioxide (SO_2), and Hydrogen sulfide (H_2S) fatal and irritating gases

Other information: Do not allow run-off from fire fighting to enter drains or water courses

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Use special care to avoid static electric charges.Eliminate every possible source of ignition.Keep away from heat/sparks/open flames/hot surfaces - No smoking.Avoid breathing (dust, vapor, mist, gas).Use only outdoors or in a well-ventilated area.Ruptured cylinders may rocket.Do not allow product to spread into the environment

For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

Environmental Precautions

Prevent entry to sewers and public waters.Avoid release to the environment

Methods and Material for Containment and Cleaning Up

For Containment: Notify authorities if liquid enters sewers or public waters.Use only non-sparking tools

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely.Isolate area until gas has dispersed.Use water spray to disperse vapors.For water based spills contact appropriate authorities and abide by local regulations for hydrocarbon spills into waterways.Contact competent authorities after a spill

Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

Additional Hazards When Processed: Handle empty containers with care because residual vapors are flammable.Extremely flammable gas.Do not pressurize, cut, or weld containers. Do not puncture or incinerate container.Liquid gas can cause frost-type burns. If stored under heat for extended periods or significantly agitated, this material might evolve or release hydrogen sulfide, a toxic, flammable gas, which can raise and widen this material's actual flammability limits and significantly lower its auto-ignition temperature. Hydrogen sulfide can be fatal.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures.Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work.Do no eat, drink or smoke when using this product

Technical Measures: Proper grounding procedures to avoid static electricity should be followed.Comply with applicable regulations.

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Storage Conditions: Store in a dry, cool and well-ventilated place.Keep container closed when not in use. Keep in fireproof place.Store in a well-ventilated place. Keep container tightly closed.Keep/Store away from extremely high or low temperatures, ignition sources, direct sunlight, incompatible materials. Store in original container.

Incompatible Materials: strong acids,Strong bases,Strong oxidizers,chlorine,Halogenated compounds

Conditions for Safe Storage, Including Any Incompatibilities Not available

Specific End Use(s)

Fuel.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Hydrogen sulfide (7783-06-4)		
USA ACGIH	ACGIH TWA (ppm)	1 ppm
USA ACGIH	ACGIH STEL (ppm)	5 ppm
USA OSHA	OSHA PEL (Ceiling) (ppm)	20 ppm
USA NIOSH	NIOSH REL (ceiling) (mg/m3)	15 mg/m³
USA NIOSH	NIOSH REL (ceiling) (ppm)	10 ppm
USA IDLH	US IDLH (ppm)	100 ppm
Alberta	OEL Ceiling (mg/m³)	21 mg/m³
Alberta	OEL Ceiling (ppm)	15 ppm
Alberta	OEL TWA (mg/m³)	14 mg/m³
Alberta	OEL TWA (ppm)	10 ppm
British Columbia	OEL Ceiling (ppm)	10 ppm
Manitoba	OEL STEL (ppm)	5 ppm
Manitoba	OEL TWA (ppm)	1 ppm
New Brunswick	OEL STEL (mg/m³)	21 mg/m³
New Brunswick	OEL STEL (ppm)	15 ppm
New Brunswick	OEL TWA (mg/m³)	14 mg/m³
New Brunswick	OEL TWA (ppm)	10 ppm
Newfoundland & Labrador	OEL STEL (ppm)	5 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1 ppm
Nova Scotia	OEL STEL (ppm)	5 ppm
Nova Scotia	OEL TWA (ppm)	1 ppm
Nunavut	OEL Ceiling (mg/m³)	28 mg/m³
Nunavut	OEL Ceiling (ppm)	20 ppm
Nunavut	OEL STEL (mg/m³)	21 mg/m³
Nunavut	OEL STEL (ppm)	15 ppm
Nunavut	OEL TWA (mg/m³)	14 mg/m³
Nunavut	OEL TWA (ppm)	10 ppm
Northwest Territories	OEL Ceiling (mg/m³)	28 mg/m³
Northwest Territories	OEL Ceiling (ppm)	20 ppm
Northwest Territories	OEL STEL (mg/m³)	21 mg/m³
Northwest Territories	OEL STEL (ppm)	15 ppm
Northwest Territories	OEL TWA (mg/m³)	14 mg/m³
Northwest Territories	OEL TWA (ppm)	10 ppm
Ontario	OEL STEL (ppm)	15 ppm
Ontario	OEL TWA (ppm)	10 ppm
Prince Edward Island	OEL STEL (ppm)	5 ppm
Prince Edward Island	OEL TWA (ppm)	1 ppm
Québec	VECD (mg/m³)	21 mg/m³
Québec	VECD (ppm)	15 ppm

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Québec	VEMP (mg/m³)	14 mg/m³
Québec	VEMP (ppm)	10 ppm
Saskatchewan	OEL STEL (ppm)	15 ppm
Saskatchewan	OEL TWA (ppm)	10 ppm
Yukon	OEL STEL (mg/m³)	27 mg/m³
Yukon	OEL STEL (ppm)	15 ppm
Yukon	OEL TWA (mg/m³)	15 mg/m³
Yukon	OEL TWA (ppm)	10 ppm

Propane (74-98-6)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m3)	1800 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m3)	1800 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	1000 ppm
USA IDLH	US IDLH (ppm)	2100 ppm (10% LEL)
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m³)	1800 mg/m³
Québec	VEMP (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Butane (106-97-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m3)	1900 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	800 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL STEL (ppm)	750 ppm
British Columbia	OEL TWA (ppm)	600 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
New Brunswick	OEL TWA (mg/m³)	1900 mg/m³
New Brunswick	OEL TWA (ppm)	800 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Nunavut	OEL STEL (mg/m³)	2576 mg/m³
Nunavut	OEL STEL (ppm)	1000 ppm
Nunavut	OEL TWA (mg/m³)	1901 mg/m³
Nunavut	OEL TWA (ppm)	800 ppm
Northwest Territories	OEL STEL (mg/m³)	2576 mg/m³
Northwest Territories	OEL STEL (ppm)	1000 ppm
Northwest Territories	OEL TWA (mg/m³)	1901 mg/m³
Northwest Territories	OEL TWA (ppm)	800 ppm
Ontario	OEL TWA (ppm)	800 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m³)	1900 mg/m³

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Québec	VEMP (ppm)	800 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Yukon	OEL STEL (mg/m³)	1600 mg/m³
Yukon	OEL STEL (ppm)	750 ppm
Yukon	OEL TWA (mg/m³)	1400 mg/m³
Yukon	OEL TWA (ppm)	600 ppm

Carbon dioxide (124-38-9)		
USA ACGIH	ACGIH TWA (ppm)	5000 ppm
USA ACGIH	ACGIH STEL (ppm)	30000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m3)	9000 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m3)	9000 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m3)	54000 mg/m³
USA NIOSH	NIOSH REL (STEL) (ppm)	30000 ppm
USA IDLH	US IDLH (ppm)	40000 ppm
Alberta	OEL STEL (mg/m³)	54000 mg/m³
Alberta	OEL STEL (ppm)	30000 ppm
Alberta	OEL TWA (mg/m³)	9000 mg/m³
Alberta	OEL TWA (ppm)	5000 ppm
British Columbia	OEL STEL (ppm)	15000 ppm
British Columbia	OEL TWA (ppm)	5000 ppm
Manitoba	OEL STEL (ppm)	30000 ppm
Manitoba	OEL TWA (ppm)	5000 ppm
New Brunswick	OEL STEL (mg/m³)	54000 mg/m³
New Brunswick	OEL STEL (ppm)	30000 ppm
New Brunswick	OEL TWA (mg/m³)	9000 mg/m³
New Brunswick	OEL TWA (ppm)	5000 ppm
Newfoundland & Labrador	OEL STEL (ppm)	30000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	5000 ppm
Nova Scotia	OEL STEL (ppm)	30000 ppm
Nova Scotia	OEL TWA (ppm)	5000 ppm
Nunavut	OEL STEL (mg/m³)	27000 mg/m³
Nunavut	OEL STEL (ppm)	15000 ppm
Nunavut	OEL TWA (mg/m³)	9000 mg/m³
Nunavut	OEL TWA (ppm)	5000 ppm
Northwest Territories	OEL STEL (mg/m³)	27000 mg/m³
Northwest Territories	OEL STEL (ppm)	15000 ppm
Northwest Territories	OEL TWA (mg/m³)	9000 mg/m³
Northwest Territories	OEL TWA (ppm)	5000 ppm
Ontario	OEL STEL (ppm)	30000 ppm
Ontario	OEL TWA (ppm)	5000 ppm
Prince Edward Island	OEL STEL (ppm)	30000 ppm
Prince Edward Island	OEL TWA (ppm)	5000 ppm
Québec	VECD (mg/m³)	54000 mg/m³
Québec	VECD (ppm)	30000 ppm
Québec	VEMP (mg/m³)	9000 mg/m³
Québec	VEMP (ppm)	5000 ppm
Saskatchewan	OEL STEL (ppm)	30000 ppm

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Saskatchewan	OEL TWA (ppm)	5000 ppm
Yukon	OEL STEL (mg/m³)	27000 mg/m³
Yukon	OEL STEL (ppm)	15000 ppm
Yukon	OEL TWA (mg/m³)	9000 mg/m³
Yukon	OEL TWA (ppm)	5000 ppm

Nitrogen (7727-37-9)		
Methane (74-82-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Ethane (74-84-0)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Exposure Controls

Appropriate Engineering Controls: Gas detectors should be used when flammable gases/vapours may be released.Ensure adequate ventilation, especially in confined areas.Proper grounding procedures to avoid static electricity should be followed.Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.Use explosion-proof equipment

Personal Protective Equipment: Protective goggles.Protective clothing.Respiratory protection of the dependent type.Insulated gloves

Materials for Protective Clothing: Chemically resistant materials and fabrics.Wear fire/flame resistant/retardant clothing

Hand Protection: Wear chemically resistant protective gloves.Insulated gloves

Eye Protection: Chemical goggles or face shield.

Skin and Body Protection: Not available

Respiratory Protection: Use a NIOSH-approved self-contained breathing apparatus whenever exposure may exceed established Occupational Exposure Limits.

Thermal Hazard Protection: Wear suitable protective clothing.

Other Information: When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State : Gas

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Appearance	:	Clear, Colorless gas
Odor	:	Contains Ethyl Mercaptan for leak detection, which has a skunk-like odor, odorless.
Odor Threshold	:	Not available
pH	:	Not available
Relative Evaporation Rate (butylacetate=1)	:	Not available
Melting Point	:	Not available
Freezing Point	:	Not available
Boiling Point	:	-157 °C (-250.6°F)
Flash Point	:	-187 °C (-304.6°F)
Auto-ignition Temperature	:	> 288 °C (>550.4°F)
Decomposition Temperature	:	Not available
Flammability (solid, gas)	:	Extremely flammable gas
Lower Flammable Limit	:	3 %
Upper Flammable Limit	:	17 %
Vapor Pressure	:	40 mm Hg @25°C (77°F)
Relative Vapor Density at 20 °C	:	0.6
Relative Density	:	Not available
Specific Gravity	:	Not available
Solubility	:	Not available
Log Pow	:	Not available
Log Kow	:	Not available
Viscosity, Kinematic	:	Not available
Viscosity, Dynamic	:	Not available
Explosion Data – Sensitivity to Mechanical Impact	:	Not available
Explosion Data – Sensitivity to Static Discharge	:	Not available

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions.

Chemical Stability: Extremely flammable gas.Stable at standard temperature and pressure.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Direct sunlight.Extremely high or low temperatures.Open flame.Overheating.Heat.Sparks.Incompatible materials. Avoid ignition sources

Incompatible Materials: Strong acids.Strong bases.Strong oxidizers.Halogenated compounds.Chlorine

Hazardous Decomposition Products: Carbon oxides (CO, CO2).hydrocarbons. Sulfur dioxide and hydrogen sulfide are fatal and irritating gases.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity : Not classified

LD50 and LC50 Data Not available

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness.

Symptoms/Injuries After Skin Contact: Contact with the liquid may cause cold burns/frostbite.

Symptoms/Injuries After Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns.

Symptoms/Injuries After Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating; but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data

Hydrogen sulfide (7783-06-4)	
LC50 Inhalation Rat (mg/l)	0.99 mg/l (Exposure time: 1 h)
ATE (gases)	100.000 ppmV/4h

Propane (74-98-6)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)

Butane (106-97-8)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)

Ethane (74-84-0)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Wellhead Natural Gas (CAS Mixture)	
LC50 Fish 1	0.002 mg/l (Exposure time: 96 h - Species: Coregonus clupeaformis)

Hydrogen sulfide (7783-06-4)	
LC50 Fish 1	0.0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 Daphnia 1	0.022 mg/l (Exposure time: 96 h - Species: Gammarus pseudolimnaeus)
LC 50 Fish 2	0.016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])

Persistence and Degradability

Wellhead Natural Gas	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Wellhead Natural Gas	
Bioaccumulative Potential	Not established.

Hydrogen sulfide (7783-06-4)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	0.45 (at 25 °C)

Propane (74-98-6)	
Log Pow	2.3

Butane (106-97-8)	
Log Pow	2.89

Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83

Ethane (74-84-0)	
Log Pow	<= 2.8

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Mobility in Soil Not available

Other Adverse Effects

Other adverse effects: Can cause frost damage to vegetation. Has photochemical ozone creation potential.

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

Additional Information: Handle empty containers with care because residual vapors are flammable. Empty gas cylinders should be returned to the vendor for recycling or refilling.

SECTION 14: TRANSPORT INFORMATION

In Accordance With ICAO/IATA/DOT/TDG

UN Number

UN-No.(DOT): 1971

DOT NA no.: UN1971

UN Proper Shipping Name

DOT Proper Shipping Name : Natural gas, compressed (with high methane content)

Hazard Labels (DOT) : 2.1 - Flammable gases

DOT Packaging Exceptions (49 CFR 173.xxx) : 306

DOT Packaging Non Bulk (49 CFR 173.xxx) : 302

DOT Packaging Bulk (49 CFR 173.xxx) : 302

Additional Information

Emergency Response Guide (ERG) Number : 115

Transport by sea

DOT Vessel Stowage Location : E - The material may be stowed ''on deck'' or ''under deck'' on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length, but is prohibited from carriage on passenger vessels in which the limiting number of passengers is exceeded.

DOT Vessel Stowage Other : 40 - Stow ''clear of living quarters''

Air transport

DOT Quantity Limitations Passenger Aircraft/Rail (49 CFR 173.27) : Forbidden

DOT Quantity Limitations Cargo Aircraft Only (49 CFR 175.75) : 150 kg

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Wellhead Natural Gas	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard

Hydrogen sulfide (7783-06-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on SARA Section 302 (Specific toxic chemical listings)	
Listed on SARA Section 313 (Specific toxic chemical listings)	
SARA Section 302 Threshold Planning Quantity (TPQ)	500
SARA Section 313 - Emission Reporting	1.0 %

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Propane (74-98-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Butane (106-97-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Carbon dioxide (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Nitrogen (7727-37-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Methane (74-82-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Ethane (74-84-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

US State Regulations

Hydrogen sulfide (7783-06-4)
U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Acute
U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Chronic
U.S. - California - Toxic Air Contaminant List (AB 1807, AB 2728)
U.S. - Colorado - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Toxic Endpoints
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Hawaii - Occupational Exposure Limits - STELs
U.S. - Hawaii - Occupational Exposure Limits - TWAs
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs)
U.S. - Idaho - Occupational Exposure Limits - Acceptable Maximum Peak Above the Ceiling Concentration for an 8-Hour Shift
U.S. - Idaho - Occupational Exposure Limits - Ceilings
U.S. - Idaho - Occupational Exposure Limits - TWAs
U.S. - Louisiana - Reportable Quantity List for Pollutants
U.S. - Maine - Air Pollutants - Hazardous Air Pollutants
U.S. - Massachusetts - Allowable Ambient Limits (AALs)
U.S. - Massachusetts - Allowable Threshold Concentrations (ATCs)
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Threshold Effects Exposure Limits (TELs)
U.S. - Michigan - Occupational Exposure Limits - STELs
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Michigan - Polluting Materials List
U.S. - Michigan - Process Safety Management Highly Hazardous Chemicals
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - STELs
U.S. - Minnesota - Permissible Exposure Limits - TWAs

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

U.S. - Montana - Ambient Air Quality Standards
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - New Mexico - Air Quality - Ambient Air Quality Standards
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances
U.S. - North Carolina - Control of Toxic Air Pollutants
U.S. - North Dakota - Ambient Air Quality Standards - Maximum Permissible Concentrations
U.S. - North Dakota - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Ohio - Extremely Hazardous Substances - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - Ceilings
U.S. - Oregon - Permissible Exposure Limits - STELs
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 1-Hour
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 24-Hour
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - Annual
U.S. - South Carolina - Toxic Air Pollutants - Maximum Allowable Concentrations
U.S. - South Carolina - Toxic Air Pollutants - Pollutant Categories
U.S. - Tennessee - Occupational Exposure Limits - STELs
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Drinking Water Standards - Secondary Constituent Levels (SCLs)
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Hazardous Waste - Hazardous Constituents
U.S. - Vermont - Permissible Exposure Limits - STELs
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Virginia - Water Quality Standards - Chronic Freshwater Aquatic Life
U.S. - Virginia - Water Quality Standards - Chronic Saltwater Aquatic Life
U.S. - Washington - Dangerous Waste - Dangerous Waste Constituents List
U.S. - Washington - Dangerous Waste - Discarded Chemical Products List
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 25 Feet to Less Than 40 Feet
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 40 Feet to Less Than 75 Feet
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 75 Feet or Greater
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights Less Than 25 Feet
U.S. - Wyoming - Process Safety Management - Highly Hazardous Chemicals
U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Fresh Water
U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Marine Water

Propane (74-98-6)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

U.S. - Hawaii - Occupational Exposure Limits - TWAs
U.S. - Idaho - Occupational Exposure Limits - TWAs
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Right To Know List
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs

Butane (106-97-8)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Hawaii - Occupational Exposure Limits - TWAs
U.S. - Maine - Chemicals of High Concern
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Right To Know List
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
U.S. - Pennsylvania - RTK (Right to Know) List

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs

Carbon dioxide (124-38-9)

U.S. - Hawaii - Occupational Exposure Limits - STELs
U.S. - Hawaii - Occupational Exposure Limits - TWAs
U.S. - Idaho - Occupational Exposure Limits - TWAs
U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
U.S. - Michigan - Occupational Exposure Limits - STELs
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - STELs
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - Oregon - Permissible Exposure Limits - TWAs
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - STELs
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Permissible Exposure Limits - STELs
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs

Nitrogen (7727-37-9)

U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Right To Know List
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Methane (74-82-8)

U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

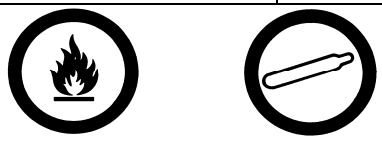
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Excluded Volatile Organic Compounds
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Ethane (74-84-0)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Excluded Volatile Organic Compounds
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Canadian Regulations

Wellhead Natural Gas	
WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas



Hydrogen sulfide (7783-06-4)

Listed on the Canadian DSL (Domestic Substances List) inventory.
Listed on the Canadian Ingredient Disclosure List

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Propane (74-98-6)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas

Butane (106-97-8)	
Listed on the Canadian DSL (Domestic Substances List) inventory. Listed on the Canadian Ingredient Disclosure List	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas

Carbon dioxide (124-38-9)	
Listed on the Canadian DSL (Domestic Substances List) inventory. Listed on the Canadian Ingredient Disclosure List	
WHMIS Classification	Class A - Compressed Gas

Nitrogen (7727-37-9)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas

Methane (74-82-8)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas

Ethane (74-84-0)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION

Revision date : 10/02/2013

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200

GHS Full Text Phrases:

Acute Tox. 2 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 2
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Compressed gas	Gases under pressure Compressed gas
Flam. Gas 1	Flammable gases Category 1
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H330	Fatal if inhaled
H400	Very toxic to aquatic life

Party Responsible for the Preparation of This Document

Wellhead Natural Gas

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Williams, Inc.
One Williams Center
Tulsa, OK 74172, US
800-688-7507

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

North America GHS US 2012 & WHMIS

SAFETY DATA SHEET

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 (HNOC)	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.

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

5. Fire-fighting measures

Suitable extinguishing media	Extinguish with foam, carbon dioxide, dry powder or water fog.
Unsuitable extinguishing media	None.
Specific hazards arising from the chemical	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.
Special protective equipment and precautions for firefighters	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.
Fire-fighting equipment/instructions	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

Personal precautions, protective equipment and emergency procedures	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).
Methods and materials for containment and cleaning up	In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.
Environmental precautions	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

Precautions for safe handling	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). 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 (H2S) and flammability. Cold burns may occur during filling operations. Containers and delivery lines may become cold enough to present cold burn hazard. 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.

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

Appearance	Colorless gas.
Physical state	Gas Compressed.
Form	Gas.
Color	Colorless.
Odor	Odorless to slight, sweet.
Odor threshold	Not available.
pH	Not applicable.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	-259.6 °F (-162 °C)
Flash point	-304.6 °F (-187 °C)
Evaporation rate	Not available.
Flammability (solid, gas)	Extremely flammable gas.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	5 %
Flammability limit - upper (%)	15 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	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").

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
Subsidary 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
Subsidary 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
Subsidary 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 Liquids

Synonyms: NGL, Y-Grade

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: Compressed, liquified gas
Color: Clear and colorless
Odor: Hydrocarbon

DANGER!
Gas reduces oxygen available for breathing. Prolonged or repeated contact may dry skin and cause dermatitis.
Flammable gas - may cause flash fire. Compressed gas.

Potential Health Effects

Inhalation: Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Due to oxygen deficiency inhalation of gas may cause dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness.

Eye Contact: Direct contact with cold gas may cause eye damage from frostbite.

Skin Contact: Prolonged or repeated contact may dry skin and cause dermatitis. Contact with cold gas might cause frostbites, in some cases with tissue damage.

Ingestion: This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Target Organ(s): | Central nervous system | Eye | Skin |

Potential Physical / Chemical Effects: Inert gas and/or simple asphyxiant. Reduces oxygen available for breathing. Flammable gas - may cause flash fire. If the cylinders are heated it will cause rise in

pressure with risk of bursting. Contact with compressed gas can cause damage (frostbite) due to rapid evaporative cooling.

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

3 COMPOSITION / INFORMATION ON INGREDIENTS

General Information: The product contains:

Chemical Name	CAS-No.	Concentration*
†Heptane	142-82-5	< 30%
†Propane	74-98-6	< 15%
†Butane	106-97-8	< 15%
†2-methylbutane	78-78-4	< 15%
†Octane	111-65-9	< 10%
†Isobutane	75-28-5	< 10%
†Pentane	109-66-0	< 10%
†n-Hexane	110-54-3	< 8%
†2-Methylpentane	107-83-5	< 6%
†Decane	124-18-5	< 5%
†Nonane	111-84-2	< 5%
†3-Methylpentane	96-14-0	< 5%
†2,2-Dimethylbutane	75-83-2	< 5%
†Ethane	74-84-0	< 5%

* 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: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory tract irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. Get medical attention if symptoms persist.

Eye Contact: If frostbite occurs, immediately flush eyes with plenty of warm water (not exceeding 105°F/41°C) for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention immediately.

Skin Contact: Immediately remove contaminated clothing and shoes and wash skin with soap and plenty of water. Get medical attention if symptoms occur. If frostbite occurs, immerse affected area in warm water (not exceeding 105°F/41°C). Keep immersed for 20 to 40 minutes. Get medical attention immediately.

Ingestion: This material is a gas under normal atmospheric conditions and ingestion is unlikely.

5 FIRE-FIGHTING MEASURES

Extinguishing Media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable Extinguishing Media: Not applicable.

Special Fire Fighting Procedures: Evacuate area. Remove pressurized gas cylinders from the immediate vicinity. Cool containers exposed to flames with water until well after the fire is out. 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.

Unusual Fire & Explosion Hazards: Flammable gas - may cause flash fire. Containers can burst violently when heated, due to excess pressure build-up. Gases may form explosive mixtures with air.

Hazardous Combustion Products: Carbon Oxides

Protective Measures: Self-contained breathing apparatus, operated in positive pressure mode and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions: If leakage cannot be stopped, evacuate area. Check oxygen content before entering the area. Avoid contact with cold gas. See Section 8 of the MSDS for Personal Protective Equipment.

Spill Cleanup Methods: Ventilate well, stop flow of gas or liquid if possible. Allow gas to evaporate. Remove sources of ignition. Beware of the explosion danger. Do not allow chemical to enter confined spaces such as sewers due to explosion risk.

7 HANDLING AND STORAGE

Handling: Open valve slowly. Control oxygen content in the workplace as described in section 8 of the MSDS. Secure that cylinders are not exposed to heat. Keep away from ignition sources such as heat/sparks/open flame - No smoking. Use non-sparking hand tools and explosion-proof electrical equipment. Avoid contact with eyes, skin, and clothing. Ground container and transfer equipment to eliminate static electric sparks.

Storage: Flammable compressed gas storage. Keep container tightly closed in a cool, well-ventilated place. Secure cylinders in an upright position at all times, close all valves when not in use. Secure cylinders from falling or being knocked over. Should be stored and transported separately from oxygen and other oxidizers. Ground container and transfer equipment to eliminate static electric sparks. Store away from incompatible materials.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits:

Chemical Name	Source	Type	Exposure Limits	Notes
2,2-Dimethylbutane	CA. Alberta OELs	TWA	1760 mg/m³ 500 ppm	
2,2-Dimethylbutane	CA. Alberta OELs	STEL	3500 mg/m³ 1000 ppm	
2,2-Dimethylbutane	CA. British Columbia OELs	TWA	200 ppm	
2,2-Dimethylbutane	CA. Ontario OELs	TWA	1760 mg/m³ 500 ppm	
2,2-Dimethylbutane	CA. Ontario OELs	STEL	3520 mg/m³ 1000 ppm	
2,2-Dimethylbutane	CA. Quebec OELs	TWA	1760 mg/m³ 500 ppm	
2,2-Dimethylbutane	CA. Quebec OELs	STEL	3500 mg/m³ 1000 ppm	

2,2-Dimethylbutane	MEX. OELs	TWA	1760 mg/m³ 500 ppm	
2,2-Dimethylbutane	MEX. OELs	STEL	3500 mg/m³ 1000 ppm	
2,2-Dimethylbutane	US. ACGIH TLV	STEL	1000 ppm	
2,2-Dimethylbutane	US. ACGIH TLV	TWA	500 ppm	
2,2-Dimethylbutane	US. NIOSH Guide	IDLH	-	
2-Methylpentane	CA. Alberta OELs	TWA	1760 mg/m³ 500 ppm	
2-Methylpentane	CA. Alberta OELs	STEL	3500 mg/m³ 1000 ppm	
2-Methylpentane	CA. British Columbia OELs	TWA	200 ppm	
2-Methylpentane	CA. Ontario OELs	STEL	3520 mg/m³ 1000 ppm	
2-Methylpentane	CA. Ontario OELs	TWA	1760 mg/m³ 500 ppm	
2-Methylpentane	CA. Quebec OELs	TWA	1760 mg/m³ 500 ppm	
2-Methylpentane	CA. Quebec OELs	STEL	3500 mg/m³ 1000 ppm	
2-Methylpentane	MEX. OELs	TWA	1760 mg/m³ 500 ppm	
2-Methylpentane	MEX. OELs	STEL	3500 mg/m³ 1000 ppm	
2-Methylpentane	US. ACGIH TLV	STEL	1000 ppm	
2-Methylpentane	US. ACGIH TLV	TWA	500 ppm	
2-Methylpentane	US. NIOSH Guide	IDLH	-	
2-methylbutane	CA. Alberta OELs	TWA	1770 mg/m³ 600 ppm	
2-methylbutane	CA. British Columbia OELs	TWA	600 ppm	
2-methylbutane	CA. Ontario OELs	TWA	1770 mg/m³ 600 ppm	
2-methylbutane	CA. Ontario OELs	STEL	2210 mg/m³ 750 ppm	
2-methylbutane	US. ACGIH TLV	TWA	600 ppm	
2-methylbutane	US. NIOSH Guide	IDLH	1500 ppm	
2-methylbutane	US. OSHA Z-1 PEL	TWA	2950 mg/m³ 1000 ppm	
3-Methylpentane	CA. Alberta OELs	STEL	3500 mg/m³ 1000 ppm	
3-Methylpentane	CA. Alberta OELs	TWA	1760 mg/m³ 500 ppm	
3-Methylpentane	CA. British Columbia OELs	TWA	200 ppm	
3-Methylpentane	CA. Ontario OELs	TWA	1760 mg/m³ 500 ppm	
3-Methylpentane	CA. Ontario OELs	STEL	3520 mg/m³ 1000 ppm	
3-Methylpentane	CA. Quebec OELs	STEL	3500 mg/m³ 1000 ppm	
3-Methylpentane	CA. Quebec OELs	TWA	1760 mg/m³ 500 ppm	
3-Methylpentane	MEX. OELs	STEL	3500 mg/m³ 1000 ppm	
3-Methylpentane	MEX. OELs	TWA	1760 mg/m³ 500 ppm	
3-Methylpentane	US. ACGIH TLV	TWA	500 ppm	
3-Methylpentane	US. ACGIH TLV	STEL	1000 ppm	
3-Methylpentane	US. NIOSH Guide	IDLH	-	
Butane	CA. British Columbia OELs	STEL	750 ppm	
Butane	CA. British Columbia OELs	TWA	600 ppm	
Butane	CA. Ontario OELs	TWA	1900 mg/m³ 800 ppm	
Butane	MEX. OELs	TWA	1900 mg/m³ 800 ppm	
Butane	US. NIOSH Guide	IDLH	-	
Ethane	CA. Alberta OELs	Limit value not established	-	Simple asphyxiant.
Ethane	CA. British Columbia OELs	TWA	1000 ppm	
Ethane	CA. Ontario OELs	TWA	1000 ppm	
Ethane	MEX. OELs	Limit value not	-	Simple asphyxiant.

		established		
Ethane	US. ACGIH TLV	TWA	1000 ppm	
Heptane	CA. Alberta OELs	STEL	2050 mg/m³ 500 ppm	
Heptane	CA. Alberta OELs	TWA	1640 mg/m³ 400 ppm	
Heptane	CA. British Columbia OELs	TWA	400 ppm	
Heptane	CA. British Columbia OELs	STEL	500 ppm	
Heptane	MEX. OELs	STEL	2000 mg/m³ 500 ppm	Skin
Heptane	MEX. OELs	TWA	1600 mg/m³ 400 ppm	Skin
Heptane	US. ACGIH TLV	STEL	500 ppm	
Heptane	US. ACGIH TLV	TWA	400 ppm	
Heptane	US. NIOSH Guide	IDLH	750 ppm	
Heptane	US. OSHA Z-1 PEL	TWA	2000 mg/m³ 500 ppm	
Isobutane	CA. Ontario OELs	TWA	1900 mg/m³ 800 ppm	
Isobutane	US. ACGIH TLV	TWA	1000 ppm	
Nonane	CA. Alberta OELs	TWA	1050 mg/m³ 200 ppm	
Nonane	CA. British Columbia OELs	TWA	200 ppm	
Nonane	CA. Ontario OELs	TWA	1050 mg/m³ 200 ppm	
Nonane	CA. Quebec OELs	TWA	1050 mg/m³ 200 ppm	
Nonane	MEX. OELs	STEL	1300 mg/m³ 250 ppm	
Nonane	MEX. OELs	TWA	1050 mg/m³ 200 ppm	
Nonane	US. ACGIH TLV	TWA	200 ppm	
Nonane	US. NIOSH Guide	IDLH	-	
Octane	CA. Alberta OELs	TWA	1401 mg/m³ 300 ppm	
Octane	CA. British Columbia OELs	TWA	300 ppm	
Octane	CA. Ontario OELs	STEL	1750 mg/m³ 375 ppm	
Octane	CA. Ontario OELs	TWA	1400 mg/m³ 300 ppm	
Octane	CA. Quebec OELs	TWA	1400 mg/m³ 300 ppm	
Octane	CA. Quebec OELs	STEL	1750 mg/m³ 375 ppm	
Octane	MEX. OELs	TWA	1450 mg/m³ 300 ppm	
Octane	MEX. OELs	STEL	1800 mg/m³ 375 ppm	
Octane	US. ACGIH TLV	TWA	300 ppm	
Octane	US. NIOSH Guide	IDLH	1000 ppm	
Octane	US. OSHA Z-1 PEL	TWA	2350 mg/m³ 500 ppm	
Pentane	CA. Alberta OELs	TWA	1770 mg/m³ 600 ppm	
Pentane	CA. British Columbia OELs	TWA	600 ppm	
Pentane	CA. Ontario OELs	STEL	2210 mg/m³ 750 ppm	
Pentane	CA. Ontario OELs	TWA	1770 mg/m³ 600 ppm	
Pentane	MEX. OELs	STEL	2250 mg/m³ 760 ppm	
Pentane	MEX. OELs	TWA	1800 mg/m³ 600 ppm	
Pentane	US. ACGIH TLV	TWA	600 ppm	
Pentane	US. NIOSH Guide	IDLH	1500 ppm	
Pentane	US. OSHA Z-1 PEL	TWA	2950 mg/m³ 1000 ppm	
Propane	CA. Alberta OELs	STEL	2700 mg/m³ 1500 ppm	
Propane	CA. Alberta OELs	TWA	1800 mg/m³ 1000 ppm	
Propane	CA. British Columbia OELs	TWA	1000 ppm	
Propane	CA. Ontario OELs	TWA	1000 ppm	
Propane	CA. Quebec OELs	TWA	1800 mg/m³ 1000 ppm	
Propane	MEX. OELs	Limit value	-	Simple

		not established		asphyxiant.
Propane	US. ACGIH TLV	TWA	1000 ppm	
Propane	US. NIOSH Guide	IDLH	2100 ppm	
Propane	US. OSHA Z-1 PEL	TWA	1800 mg/m³ 1000 ppm	
n-Hexane	CA. Alberta OELs	TWA	176 mg/m³ 50 ppm	Skin
n-Hexane	CA. British Columbia OELs	TWA	20 ppm	Skin
n-Hexane	CA. Ontario OELs	TWA	176 mg/m³ 50 ppm	
n-Hexane	MEX. OELs	TWA	176 mg/m³ 50 ppm	
n-Hexane	US. ACGIH TLV	TWA	50 ppm	Skin
n-Hexane	US. NIOSH Guide	IDLH	1100 ppm	
n-Hexane	US. OSHA Z-1 PEL	TWA	1800 mg/m³ 500 ppm	

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 ventilation equipment.

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. Respirator type: Use positive pressure air supplied respirator for uncontrolled releases. Follow respirator protection program requirements (OSHA 1910.134 and ANSI Z88.2) for all respirator use. Seek advice from supervisor on the company's respiratory protection standards.

Eye Protection: Risk of contact: Wear approved safety goggles.

Hand Protection: Thermally protective gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

Skin Protection: Apron and long sleeves are recommended. Risk of contact: Wear appropriate clothing to prevent freezing of skin.

Hygiene Measures: Practice good housekeeping.

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

9 PHYSICAL AND CHEMICAL PROPERTIES

Color: Clear and colorless
Odor: Hydrocarbon
Odor Threshold: No data available.
Physical State: Compressed, liquified gas
pH: Not applicable
Melting Point: No data available.
Freezing Point: No data available.
Boiling Point: -96°C (-141°F) - -170°C (-274°F)
Flash Point: <-40°C (-40°F) (Closed Cup)

Evaporation Rate: No data available.
Flammability (Solid): No data available.
Flammability Limit - Upper (%): No data available.
Flammability Limit - Lower (%): No data available.
Vapor Pressure: No data available.
Vapor Density (Air=1): 1 - 3
Specific Gravity: 0.63892
Solubility in Water: No data available.
Solubility (Other): No data available.
Partition Coefficient (n-Octanol/water): No data available.
Autoignition Temperature: No data available.
Decomposition Temperature: No data available.
Viscosity: No data available.
Percent Volatile: 100 %w
Explosive Properties: No data available

10 STABILITY AND REACTIVITY

Stability: Stable under the prescribed storage conditions.

Conditions to Avoid: Heat may cause the containers to explode.

Incompatible Materials: Strong oxidizing agents.

Hazardous Decomposition Products: No data available.

11 TOXICOLOGICAL INFORMATION

Specified Substance(s)
Acute Toxicity:

Chemical Name	Test Results
Butane	Inhalation LC50 (4 hour(s), Rat): 658 g/m³
Heptane	Inhalation LC50 (4 hour(s), Rat): 103 mg/m³

Listed Carcinogens: None.

Product Information
Acute Toxicity:
Test Results: No test data available for the product.

Other Acute: Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. Gas reduces oxygen available for breathing.

Chronic Toxicity: No additional adverse health effects noted.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data available.

Mobility: Not relevant, due to the form of the product.

Persistence and Degradability: Not relevant.

Bioaccumulation Potential: Not relevant.

13 DISPOSAL CONSIDERATIONS

General Information: The packaging should be collected for reuse.

Disposal Methods: 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.

RCRA Information: D001

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

14 TRANSPORT INFORMATION

DOT
UN No.: UN1971
Proper Shipping Name: Natural gas, compressed
Class: 2.1
Packing Group: (N/A)
Label(s): 2.1

TDG
UN No.: UN1971
Proper Shipping Name: Natural gas, compressed
Class: 2.1
Packing Group: (N/A)

IATA
UN No.: UN1971
Proper Shipping Name: Natural gas, compressed
Class: 2.1
Packing Group: (N/A)
Label(s): Flamm. gas

IMDG
UN No.: UN1971
Proper Shipping Name: Natural gas, compressed
Class: 2.1
Packing Group: (N/A)
EmS No.: F-D, S-U

15 REGULATORY INFORMATION

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: A, B1

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

Inventory Status

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

US Regulations

CERCLA Hazardous Substance List (40 CFR 302.4):

Chemical Name	RQ
2-Methylpentane	100 lbs
2,2-Dimethylbutane	100 lbs
3-Methylpentane	100 lbs
Butane	100 lbs
2-methylbutane	100 lbs
Ethane	100 lbs
Heptane	100 lbs
Isobutane	100 lbs
n-Hexane	5000 lbs
Nonane	100 lbs
Octane	100 lbs
Pentane	100 lbs
Propane	100 lbs

SARA Title III

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

Section 311/312 (40 CFR 370):

[X] Acute (Immediate) [ ] Chronic (Delayed) [X] Fire [ ] Reactive [X] Pressure Generating

Section 313 Toxic Release Inventory (40 CFR 372): Not regulated.

Chemical Name	CAS-No.	Reporting threshold for other users	Reporting threshold for manufacturing and processing
n-Hexane	110-54-3	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):
2-methylbutane; Pentane; Ethane; Isobutane; Butane; Propane

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3): Not regulated.

Drug Enforcement Act: Not regulated.

TSCA

TSCA Section 4(a) Final Test Rules & Testing Consent Orders: 2-methylbutane; Heptane; Nonane; Pentane

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): 2-methylbutane; Heptane; Nonane; Pentane

State Regulations

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): Not regulated.

Massachusetts Right-To-Know List: 2,2-Dimethylbutane; 2-Methylpentane; 2-methylbutane; 3-Methylpentane; Butane; Ethane; Heptane; Isobutane; Nonane; Octane; Pentane; Propane; n-Hexane

Michigan Critical Materials List (Michigan Natural Resources and Environmental Protection Act (Act. 451 of 1994)): Not regulated.

Minnesota Hazardous Substances List: 2,2-Dimethylbutane; 2-Methylpentane; 2-methylbutane; 3-Methylpentane; Butane; Decane; Ethane; Heptane; Isobutane; Nonane; Octane; Pentane; Propane; n-Hexane

New Jersey Right-To-Know List: 2,2-Dimethylbutane; 2-Methylpentane; 2-methylbutane; 3-Methylpentane; Butane; Decane; Ethane; Heptane; Isobutane; Nonane; Octane; Pentane; Propane; n-Hexane

Pennsylvania Right-To-Know List: 2,2-Dimethylbutane; 2-Methylpentane; 2-methylbutane; 3-Methylpentane; Butane; Decane; Ethane; Heptane; Isobutane; Nonane; Octane; Pentane; Propane; n-Hexane

Rhode Island Right-To-Know List: 2-methylbutane; Butane; Decane; Ethane; Heptane; Nonane; Octane; Pentane; Propane; n-Hexane

16 OTHER INFORMATION

HAZARD RATINGS

	Health Hazard	Fire Hazard	Instability	Special Hazard
NFPA	1	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
HMIS	1	4	0	--

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
HMIS Label colored bar code: Blue - Health; Red - Flammability; Orange - Physical Hazards; White - Special

Issue Date: 11/6/2009
Supercedes Date: New
SDS No.: 1027335
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.

Crude Condensate

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Crude Condensate

MSDS Code: 730370

Synonyms: Natural Gas Condensates, Petroleum
Crude Oil Condensate
Gas Drips

Responsible Party: ConocoPhillips
600 N. Dairy Ashford
Houston, Texas 77079-1175

MSDS Information: Phone: 800-762-0942
Email: MSDS@conocophillips.com
Internet: http://w3.conocophillips.com/NetMSDS/

Emergency Telephone Numbers: Chemtrec: 800-424-9300 (24 Hours)
California Poison Control System: 800-356-3219

2. HAZARDS IDENTIFICATION

Emergency Overview

DANGER!
Extremely Flammable Liquid and Vapor
Skin Irritant
Harmful or Fatal If Inhaled
May Contain or Release Poisonous Hydrogen Sulfide Gas
Aspiration Hazard
Target Organ Hazard (Component)
Cancer Hazard (Component)

NFPA

Appearance: Amber to dark brown
Physical Form: Liquid
Odor: Petroleum. Rotten egg / sulfurous

Potential Health Effects
Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Mild to moderate skin irritant. Contact may cause redness, itching, a burning sensation, and skin damage. Prolonged or repeated contact may cause drying and cracking of the skin, dermatitis (inflammation), burns, and severe skin damage. Not acutely toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): Contains poisonous hydrogen sulfide gas. May be harmful or fatal if inhaled. See Signs and Symptoms

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD - This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, coughing, nausea, vomiting, diarrhea and signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

This material contains hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.

Other Comments:
Crude oil can contain trace amounts of heavy metals, some of which may concentrate in vessels and equipment during production and processing operations. While some of these metals are known toxins, the hazard is dependent upon the extent of accumulation. Significant deposits of elemental mercury have the potential to create airborne vapors of the metal, which might result in a hazardous condition. Overexposure to mercury is known to cause neurologic effects and damage the kidneys and developing fetus (See Sections 7 and 8).

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders, respiratory (asthma-like) disorders, blood disorders, and nervous system disorders Exposure to high concentrations of this material may increase the sensitivity of the heart to certain drugs. Persons with pre-existing heart disorders may be more susceptible to this effect (see Section 4 - Note to Physicians).

See Section 11 for additional Toxicity Information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS	Concentration (wt %)
Natural Gas Condensate ..C2-20	64741-47-5	100
Benzene	71-43-2	<5
Hydrogen Sulfide	7783-06-4	0.1-5

Condensate can contain minor amounts of sulfur, nitrogen and oxygen containing organic compounds as well as trace amounts of heavy metals like mercury, arsenic, nickel, and vanadium. Composition can vary depending on the source of condensate.

4. FIRST AID MEASURES

Eye: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention.

Inhalation (Breathing): Immediately move victim away from exposure and into fresh air. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Notes to Physician: Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

At high concentrations hydrogen sulfide may produce pulmonary edema, respiratory depression, and/or respiratory paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. Animal studies suggest that nitrites are a useful antidote, however, documentation of the efficacy of nitrites in humans is lacking. If the diagnosis of hydrogen sulfide poisoning is confirmed and if the patient does not respond rapidly to supportive care, the use of nitrites may be an effective antidote if delivered within the first few minutes of exposure. For adults the dose is 10 mL of a 3% NaNO2 solution (0.5 gm NaNO2 in 15 mL water) I.V. over 2-4 minutes. The dosage should be adjusted in children or in the presence of anemia, and methemoglobin levels, arterial blood gases, and electrolytes should be monitored closely.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

5. FIRE-FIGHTING MEASURES

NFPA 704 Hazard Class

Health: 3 **Flammability:** 4 **Instability:** 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

Unusual Fire & Explosion Hazards: Extremely flammable. This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire. Hazardous combustion/decomposition products may be released by this material when exposed to heat or fire. Use caution and wear protective clothing, including respiratory protection.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Contains poisonous hydrogen sulfide gas. Extremely flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8).

Environmental Precautions: If spill/release in excess of EPA reportable quantity (see Section 15) is made into the environment, immediately notify the National Response Center (phone number 800-424-8802). Stop spill/release if it can be done with minimal risk. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors (see Section 5). Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods for Containment and Clean-Up: Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Spilled material may be absorbed into an appropriate absorbent material.

7. HANDLING AND STORAGE

Precautions for safe handling: Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use only outdoors or in well-ventilated area. Wear respiratory protection. Do not eat, drink, or smoke when using this product. Do not breathe vapors or mists. Use good personal hygiene practices and wear appropriate personal protective equipment.

Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Mercury and other heavy metals may be present in trace quantities in crude oil, raw natural gas, and condensates. Production and processing of these materials can lead to "drop-out" of elemental mercury in enclosed vessels and pipe work, typically at the low point of any process equipment because of its density. Mercury may also occur in other process system deposits such as sludges, sands, scales, waxes, and filter media. Personnel engaged in work with equipment where mercury deposits might occur (confined space entry, sampling, opening drain valves, draining process lines, etc), may be exposed to a mercury hazard (see sections 3 and 8).

Conditions for safe storage: This material may contain or release poisonous hydrogen sulfide gas. In a tank, barge, or other closed container, the vapor space above this material may accumulate hazardous concentrations of hydrogen sulfide. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep container(s) tightly closed. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component	ACGIH	OSHA	Other:
Natural Gas Condensate ..C2-20	TWA: 1000 ppm (as Aliphatic hydrocarbon gases Alkane (C1-C4)) TWA: 300 ppm (as Natural Gasoline) STEL: 500 ppm (as Natural Gasoline)	---	---
Benzene	TWA: 0.5 ppm STEL: 2.5 ppm Skin	Ceiling: 25 ppm STEL: 5 ppm TWA: 1 ppm TWA: 10 ppm	---
Hydrogen Sulfide	TWA: 10 ppm STEL: 15 ppm	Ceiling: 20 ppm	---

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Personal Protective Equipment (PPE):

Eye/Face: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the performance of their products. Suggested protective materials: Nitrile

Respiratory: Where there is potential for airborne exposure to hydrogen sulfide (H2S) above exposure limits, a NIOSH approved, self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode should be used. Under conditions where hydrogen sulfide (H2S) is NOT detected, a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used. A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29CFR1910.1028 - Benzene). Also see Section 4.

Workplace monitoring plans should consider the possibility that heavy metals such as mercury may concentrate in processing vessels and equipment presenting the possibility of exposure during various sampling and maintenance operations. Implement appropriate respiratory protection and the use of other protective equipment as dictated by monitoring results (See Sections 2 and 7).

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

Appearance:	Amber to dark brown
Physical Form:	Liquid
Odor:	Petroleum. Rotten egg / sulfurous
Odor Threshold:	No data
pH:	Not applicable
Vapor Pressure:	5-15 psia (Reid VP) @ 100°F
Vapor Density (air=1):	1
Boiling Point/Range:	-20 to 800°F / -29 to 427°C
Melting/Freezing Point:	No data
Solubility in Water:	Negligible
Partition Coefficient (n-octanol/water) (Kow):	No data
Specific Gravity:	0.6 - 0.8 @ 60ºF (15.6ºC)
Bulk Density:	6.25 lbs/gal
VOC Content(%):	50
Evaporation Rate (nBuAc=1):	1
Flash Point:	-51°F / -46°C
Test Method:	Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010
LEL (vol % in air):	1.1
UEL (vol % in air):	6.0
Autoignition Temperature:	590°F / 310°C

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated conditions of storage and handling. Extremely flammable liquid and vapor. Vapor can cause flash fire.

Conditions to Avoid: Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield oxides of carbon, nitrogen and sulfur. May contain or liberate poisonous hydrogen sulfide gas.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Chronic Data:

Xylenes

Target Organs: Rats exposed to 800, 1000 or 1200 ppm 14 hours daily for 6 weeks demonstrated high frequency hearing loss. Another study in rats exposed to 1800 ppm 8 hours daily for 5 days demonstrated middle frequency hearing loss.

Reproductive: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions.

Toluene

Target Organs: Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

Reproductive: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies.

n-Hexane

Target Organs: Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone.

Reproductive: Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Ethyl Benzene

Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC. Ethyl benzene has not been listed as a carcinogen by NTP, or OSHA.

Benzene

Carcinogenicity: Benzene is known to cause cancer of the blood-forming organs in humans, including acute myelogenous leukemia. It has been identified as a human carcinogen by NTP, IARC and OSHA.

Target Organs: Prolonged or repeated exposures to benzene vapors can cause damage to the blood and blood forming organs, including disorders like leukopenia, thrombocytopenia, and aplastic anemia.

Reproductive: Exposure to benzene during pregnancy demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased body weight and increased skeletal variations in rodents. Alterations in hematopoeisis have been observed in the fetuses and offspring of pregnant mice.

Mutagenic Effects: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells, and DNA damage in mammalian cells in vitro.

Acute Data:

Component	Oral LD50	Dermal LD50	Inhalation LC50
Natural Gas Condensate ..C2-20	> 5g/kg (est)	>2 g/kg (est)	No Data
Hydrogen Sulfide	Not Applicable	Not Applicable	LC50 (rat) = 1500 mg/m^3/15 min

12. ECOLOGICAL INFORMATION

Not evaluated.

13. DISPOSAL CONSIDERATIONS

13. DISPOSAL CONSIDERATIONS

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D001 - Ignitability characteristic
- D018 - Toxicity characteristic (Benzene)

14. TRANSPORTATION INFORMATION

U.S. Department of Transportation (DOT)

Shipping Description:
If boiling point is < 68° F (20° C) and H2S is > 8.8 molar % shipping description is:
Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulfide , Liquefied petroleum gas), 2.3 , (2.1), UN3160, Inhalation Hazard Zone ***X*** ,
If boiling point is < 68° F (20° C) and H2S is < 8.8 molar % shipping description is:
Hydrocarbon gas mixture, liquefied, n.o.s., 2.1, UN1965
If boiling point is > 68° F (20° C) and H2S is < 8.8 molar % shipping description is:
Petroleum crude oil, 3, UN1267, I ***or*** II [**I** if BP < 95° F (35° C); **II** if BP > 95° F]

Non-Bulk Package Marking:
Must be consistent with shipping description, either:
Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulfide, Liquefied petroleum gas), UN3160
or
Hydrocarbon gas mixture, liquefied, n.o.s., UN1965
or
Petroleum crude oil, UN1267

Non-Bulk Package Labeling:
For UN3160: Poison gas and Flammable gas
For UN1965: Flammable gas
For UN1267: Flammable liquid

Bulk Package/Placard Marking:
For UN3160: Poison gas/3160
For UN1965: Flammable gas/1965
For UN1267: Flammable / 1267

Packaging - References:
For UN3160: 49 CFR: None; 173.304; 173.314 & .315
For UN1965: 49 CFR: 173.306; 173.304; 173.314 & .315
For UN1267: 49 CFR 173.150; 173.201; 173.243 ***[PG I]***
-or-
49 CFR 173.150; 173.202; 173.242 ***[PG II]***
(Exceptions; Non-bulk; Bulk)

Hazardous Substance:
The EPA's Petroleum Exclusion applies to Section 2 and/or 15 components which are listed in 49 CFR 172.101, Table 1 to Appendix A.

Emergency Response Guide:
UN3160 - 119; ***UN1965 -*** 115; ***UN1267 -*** 128;

Note:
Replace ***X*** in shipping description with:
D if Molar % H2S is from 8.8% to 14.8%
C if Molar % H2S is from 14.9% to 44.4%
B if Molar % H2S is from 44.5% to 100.0%

International Maritime Dangerous Goods (IMDG)

14. TRANSPORTATION INFORMATION

Shipping Description:

If boiling point is < 68° F (20° C) and H2S is > 8.8 molar % shipping description is:
UN3160, Liquefied gas, toxic, flammable, n.o.s.(Hydrogen sulphide , Liquefied petroleum gas), 2.3 ,(2.1)
If boiling point is < 68° F (20° C) and H2S is < 8.8 molar % shipping description is:
UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), 2.1
If boiling point is > 68° F (20° C) and H2S is < 8.8 molar % shipping description is:
UN1267, Petroleum crude oil, 3, I ***or*** II [**I** if BP < 95° F (35° C); **II** if BP > 95° F] (-46° C)

Non-Bulk Package Marking:

Must be consistent with shipping description, either:
Liquefied gas, toxic, flammable, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), UN3160
or
Hydrocarbon gas mixture, liquefied, n.o.s., (Hydrogen sulphide, Liquefied petroleum gas), UN1965
or
Petroleum crude oil, UN1267

Labels:

For UN3160: Toxic gas and Flammable gas
For UN1965: Flammable gas
For UN1267: Flammable liquid

Placards/Marking (Bulk):

For UN3160: Toxic gas/3160 and Flammable gas
For UN1965: Flammable gas/1965
For UN1267: Flammable / 1267

Packaging - Non-Bulk:

For UN3160 & UN1965: P200
For UN1267: P001

EMS:

For UN3160 & UN1965: F-D, S-U
For UN1267: F-E, S-E

Note: Federal compliance requirements may apply. See 49 CFR 171.12.

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #:

UN3160 - ***Forbidden***
UN1965 ***or*** UN1267

Proper Shipping Name:

For UN1965: Hydrocarbon gas mixture, liquefied, n.o.s. (Liquefied petroleum gas, Hydrogen sulphide)
For UN1267: Petroleum crude oil

Hazard Class/Division:

For UN1965: 2.1
For UN1267: 3

Subsidiary risk: None

Packing Group:

For UN1965: None
For UN1267: I ***or*** II (determined by DGR 3.3.2.2)

Non-Bulk Package Marking:

For UN1965: Hydrocarbon gas mixture, liquefied, n.o.s. (Liquefied petroleum gas, Hydrogen sulphide), UN1965
For UN1267: Petroleum crude oil, UN1267

Labels:

For UN1965: Flammable gas , Cargo Aircraft Only
For UN1267: Flammable liquid

ERG Code:

For UN1965: 10L ***or For UN1267:*** 3L

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	***UN1965 -*** Forbidden ***UN1267*** (PG I) - None; (PG II) - Y305	***UN1965 -*** Forbidden ***UN1267 -*** 302 - ***[PG I]*** 305 - ***[PG II]***	***UN1965 -*** 201 ***UN1267 -*** 303 - ***[PG I]*** 307 - ***[PG II]***
Max. Net Qty. Per Package:			

14. TRANSPORTATION INFORMATION

UN1267 - None (PG I); 1L (PG II)	***UN1267 -*** 1L ***[PG I]*** 5 L ***[PG II]***	***UN1965 -*** 150 kg ***UN1267 -*** 30 L ***[PG I]*** 60 L ***[PG II]***

15. REGULATORY INFORMATION

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):
This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:

Component	TPQ	EPCRA RQ
Hydrogen Sulfide	500 lb	100 lb

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health:	Yes
Chronic Health:	Yes
Fire Hazard:	Yes
Pressure Hazard:	No
Reactive Hazard:	No

CERCLA/SARA - Section 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

Component	Concentration (wt %)	de minimis
Ethyl Benzene	1-3	0.1%
Toluene	1-7	1.0%
n-Hexane	2-4	1.0%
Cyclohexane	1-5	1.0%
Xylenes	1-8	1.0%
Benzene	<5	0.1%

EPA (CERCLA) Reportable Quantity (in pounds):
EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:
Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Component	Type of Toxicity
Toluene	Developmental Toxicant
Benzene	Cancer Developmental Toxicant Male Reproductive Toxicant

National Chemical Inventories:
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.

U.S. Export Control Classification Number: EAR99

16. OTHER INFORMATION

Issue Date:	22-Aug-2007
Status:	Final
Previous Issue Date:	22-Jan-2007
Revised Sections or Basis for Revision:	Shipping information (Section 14)
MSDS Code:	730370

MSDS Legend:
ACGIH = American Conference of Governmental Industrial Hygienists; CAS = Chemical Abstracts Service Registry; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

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SOUTHERN UNION GAS SERVICES, LTD.
MATERIAL SAFETY DATA SHEET

NATURAL GASOLINE

1. CHEMICAL PRODUCT AND COMPANY INFORMATION — Revised June 2006

Southern Union Gas Services, Ltd.
301Commerce Street, Suite 700
Fort Worth, Texas 76102
Company Phone Number: (817) 302-9400 **CHEMTREC: (800) 424-9300**

CHEMICAL NAME: Natural Gasoline

SYNONYMS/COMMON NAMES: Hydrocarbon Liquid, Natural Gasoline

CAS NUMBER: 68425-31-0

CHEMICAL FORMULA: Consisting primarily of C_5-C_8 Hydrocarbons

2. COMPOSITION AND INFORMATION ON INGREDIENTS — Revised Feb. 2000

Natural Gasoline is a mixture of aliphatic hydrocarbons with aromatics.

Component or Material Name	%	CAS Number	ACGIH Limits			OSHA Exposure Limits			
			TLV	STEL	Units	PEL	STEL	C/P*	Units
Natural gasoline	~100	68425-31-0	300	500	ppm	300	500	NA	ppm

Component or Material Name	%	CAS Number	ACGIH Limits			OSHA Exposure Limits			
			TLV	STEL	Units	PEL	STEL	C/P*	Units
Butane	< 3	106-97-8	800	NA	ppm	800	NA	NA	ppm
Pentane	< 32	109-66-0	600	750	ppm	1000	NA	NA	ppm
n-Hexane	< 13	110-54-3	50	NA	ppm	500	NA	NA	ppm
Hexane (other isomers)	< 14	N/A	500	1000	ppm	NA	NA	NA	
Cyclopentane	< 2	287-92-3	600	NA	ppm	NA	NA	NA	
Benzene	< 4	71-43-2	0.5	2.5	ppm	1	5	NA	ppm
Methylcyclohexane	< 1	108-87-2	400	NA	ppm	500	NA	NA	ppm
n-Octane	< 1	115-65-9	300	375	ppm	500	NA	NA	ppm
Toluene	< 1	108-88-3	50	NA	ppm	200	NA	300/500	ppm
Heptane	< 3	142-82-5	400	500	ppm	500	NA	NA	ppm
Cyclohexane	< 4	110-82-7	300	NA		300	NA	NA	ppm

*C = Ceiling value which is the concentration that shall not be exceeded during any part of the working exposure.
*P = 10 minute peak not to be exceeded more than once per 8-hours.

3. HAZARDOUS IDENTIFICATION

Revised Feb. 2000

HEALTH HAZARD DATA:

1. The major effect of exposure is central nervous system depression and polyneuropathy.
2. ACGIH lists benzene as a human carcinogen with a proposed TLV of 0.5 ppm 8 hour TWA; IARC, NTP and OSHA show sufficient evidence for classifying Benzene as a human carcinogen see 29 CFR 1910.1028 for current PEL of 1 ppm and specific actions to take. Studies have shown that benzene can induce leukemia at concentrations as low as 1 ppm. Benzene can cause myeloid leukemia, Hodgkin's disease, and lymphomas by inhalation. Significant elevations of chromosomal aberrations have been corroborated among workers exposed to levels at mean concentrations less than 10 ppm. Based on risk assessment studies by Rinsky, an individual inhaling 1 ppm of benzene for 40 years, the odds of benzene-induced leukemic death were 1.7 times higher than that of unexposed workers. IARC has published theoretical excess cancer risk estimates of 14-140 excess cases/1000 individuals exposed at 10 ppm, and 1.4 to 14 cases/1000 individuals exposed at 1 ppm.
3. N-Hexane has been shown to cause polyneuropathy (peripheral nerve damage) after repeated and prolonged exposure; other hexane's show narcotic effects at 1000 ppm and are not metabolized like n-hexane. Other hexane isomers are not metabolized in the same manner as n-hexane and the toxicity is primarily narcotic or neurotoxic.
4. Pentane causes narcosis in very high concentrations. Aspiration of pentane into lungs can produce chemical Pneumonitis and/or pulmonary edema.
5. Cyclopentane vapors causes slight irritation of eyes. Prolonged contact of liquid with skin may cause irritation. Inhalation of vapors at high concentrations causes similar effects to gasoline.
6. N-Heptane is reported to cause slight dizziness in man at 1000ppm. At 5000 ppm it can cause nausea, loss of appetite, and a gasoline taste that can persist for hours.
7. Octane has effects similar to gasoline when high concentrations of vapors are inhaled or aspirated. Contact with eyes will cause irritation. A prolonged exposure of the skin to liquid can cause irritation and cracking.
8. Toluene is a depressant of the human CNS. Exposure above 200 ppm is associated with CNS encephalopathy, headache, depression, lassitude, memory loss, and impaired reaction time. Increased risk to fetal injury has been observed in pregnant women exposed to levels above 10,000 ppm, which may occur if toluene is deliberately concentrated and inhaled.
9. Cyclohexane is irritating to eyes and mucous membranes.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Medical conditions, which have the same symptoms or effects as stated below.

MEDICAL LIMITATION: N/A

HAZARDS OF COMBUSTION PRODUCTS: Carbon monoxide and carbon dioxide can be found in the combustion products of this product and other forms of hydrocarbon combustion. Carbon Monoxide in moderate concentrations can cause symptoms of headache, nausea, vomiting, increased cardiac output, and confusion. Exposure to higher concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage, and/or death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing available oxygen. Combustion of this and other similar materials should only be carried out in well-ventilated areas.

ROUTES OF EXPOSURE

INHALATION: Irritation of the upper respiratory tract with central nervous system stimulation possibly followed by depression, dizziness, headache, incoordination, anesthesia, coma and respiratory arrest. Irregular heartbeat is a dangerous complication.

SKIN CONTACT: Defatting may occur with continued or prolonged contact. Irritation and burning sensation may occur on exposure to liquid or vapor phase exposure.

SKIN ABSORPTION: Not significant.

EYE CONTACT: Liquid will cause severe burning sensation with temporary irritation and swelling of lids. Vapor concentration of 160-270 ppm can cause irritation.

INGESTION: Irritation of mucous membranes of throat, esophagus and stomach which may result in nausea and vomiting; depression may occur if absorbed. (See Inhalation above.)

EFFECTS OF OVEREXPOSURE

ACUTE: Central nervous system depression with extreme overexposure; effects may include anesthesia, coma, respiratory arrest, and irregular heart rate. Oxygen deprivation is possible if working in confined spaces.

CHRONIC: Experience has shown no major cumulative or latent effects to have resulted from exposure to this product. IARC and NIOSH list gasoline as possible human carcinogen. (See Health Hazard Data above.)

4. FIRST AID MEASURES

Revised Feb. 2000

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes, holding lids apart to ensure flushing of the entire eye surface. **SEEK MEDICAL ATTENTION IMMEDIATELY**.

SKIN: Wash contaminated areas with plenty of soap and water. A soothing ointment may be applied to irritated skin after thorough cleansing. Remove contaminated clothing and footwear. SEEK MEDICAL ATTENTION.

INHALATION: Get person out of contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. **SEEK MEDICAL ATTENTION IMMEDIATELY.**
INGESTION: Never give anything by mouth to an unconscious person. If swallowed, DO NOT induce vomiting. If vomiting occurs spontaneously, keep airway clear. Wash out mouth until all taste is gone. **SEEK MEDICAL ATTENTION IMMEDIATELY.**
NOTES TO PHYSICIAN: Gastric lavage only if large quantity has been ingested. Guard against aspiration into lungs, which may result in Chemical Pneumonitis. Irregular heartbeat may occur, use of Adrenaline is not advisable; treat symptomatically.

5. FIRE FIGHTING MEASURES

Revised Feb. 2000

FLASH POINT: -49 to -58%°F (PM) **AUTOIGNITION TEMPERATURE:** N/A

FLAMMABLE LIMITS IN AIR, % BY VOLUME-UPPER (UEL): 7.1% **LOWER (LEL):** 1.3%

EXTINGUISHING MEDIA: Dry chemical, foam or carbon dioxide; water may be ineffective on burning product. Water spray may be ineffective on fighting fires of liquids with low flash points, but water should be used to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect pople attempting to stop a leak.
SPECIAL FIRE FIGHTING PROCEDURES: Use water spray to keep fire-exposed containers cool. Pressure-demand, self-contained breathing apparatus should be provided for fire fighters in buildings or confined areas where natural gasoline is stored.
UNUSUAL FIRE AND EXPLOSION HAZARD: Vapor is heavier than air and may travel some distance to source of ignition and flash back. Vapor may explode if ignited in an enclosed area. Transfer to and from with grounded containers.

6. ACCIDENTAL RELEASE MEASURES

Revised Feb. 2000

If material is spilled or released to the atmosphere, steps should be take to contain liquids and prevent discharges to streams or sewer systems; and control or stop the loss of volatile materials to the atmosphere. Spills or releases should be reported, if required, to the appropriate local, state and federal regulatory agencies.

7. HANDLING AND STORAGE

Revised Feb. 2000

Protect containers against physical damage. Outside or detached storage is preferred. Separate from oxidizing materials. Store in cool, well-ventilated area of non-combustible construction away from possible sources of ignition. Transfer into containers with proper grounding and bonding.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Revised Feb. 2000

VENTILATION REQUIREMENTS: Work in well-ventilated areas. use good engineering to process, transfer and store; special ventilation is not required under normal use; good engineering controls in high volume uses.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY: Respiratory protection is not required when the PEL for any ingredient is not exceeded which should not occur if material is not heated or use in an enclosed space. NIOSH/MSHA approved respiratory protection following manufacturer's recommendation where spray, mist, or vapor may be generated; supplied air respiratory protection is required for IDLH areas.

EYE: Face shield and chemical goggles should be worn where mist or spray may be generated.

GLOVES: Impervious gloves should be worn during routine handling of this product.

OTHER CLOTHING AND EQUIPMENT: Standard work clothing. Shoes contaminated with this product that can not be decontaminated should be discarded. Clothing contaminated with this product should be removed, washed in soap and water and dried before reuse. Contaminated clothing should be stored in well-ventilated areas. Shower and eyewash facilities should be accessible.

MONITORING EXPOSURE

BIOLOGICAL: No applicable procedure; breath analysis for hydrocarbons has been suggested.

PERSONAL/AREA: Both active and passive monitor employing charcoal absorption followed by gas chromatography. A molecular weight of 72.5 has been suggested as the average value to convert the determined weight of hydrocarbons to ppm. Direct reading indicating tubes are available to evaluate short-term exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Revised Feb. 2000

BOILING RANGE @ 760 mm Hg: 80-210 °F
MELTING POINT: N/A
VAPOR PRESSURE: 13 psi at 25 ^{o}C
SPECIFIC GRAVITY (H_2O=1): 0.625-0.630 @ 60°F
SOLUBILITY IN H_2O % BY WT.: Insoluble

VAPOR DENSITY (Air=1): 3 to 4
EVAPORATION RATE (BuAc=1): N/A
BULK DENSITY: 5.20-5.25 lbs./gal
pH: N/A
% VOLATILES BY VOL.: 100%

APPEARANCE AND ODOR: Clear liquid with pungent odor; odor threshold is 0.25 ppm and is not an index of exposure.

10. STABILITY AND REACTIVITY

Revised Feb. 2000

CONDITIONS CONTRIBUTING TO INSTABILITY: Under normal conditions, the material is stable. Avoid sources of ignition such as flames, hot surfaces, electrical/frictional sparks, etc.
INCOMPATIBILITY: Avoid contact with oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: This material at high temperatures may decompose to form carbon monoxide and carbon dioxide.
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION: Material is not known to polymerize.

11. TOXICOLOGICAL PROPERTIES

Revised Feb. 2000

CHRONIC EFFECTS AND CARCINOGENICITY: Exposure to light hydrocarbons in the same boiling range as this product have been associated in animal studies with effects to the central nervous system, peripheral nervous system, liver, and kidneys. The significance of these animal models to predict similar human response is uncertain. Observing good work practices and personal hygiene procedures can minimize potential risks to humans. Product may contain benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood forming system and serious blood disorders, such as aplastic anemia and leukemia. IARC, OSHA, ACGIH, and NTP list benzene.

12. ECOLOGICAL INFORMATION

Revised Feb. 2000

Keep out of sewers, drainage ditches and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS

Revised Feb. 2000

Clean-up action should be carefully planned and executed. Shipment, storage, and/or disposal of waste materials are regulated and action to handle or dispose of spilled or released materials must meet all applicable local, state and federal rules and regulations. If any question exists, the appropriate agencies should be contacted to assure proper action being taken. Waste product and contaminated material will be considered a hazardous waste if the flash point is less than 140°F requiring disposal at an approved hazardous waste facility.

14. TRANSPORTATION INFORMATION

Revised Feb. 2000

Alternative Classification

DOT PROPER SHIPPING NAME	Natural Gasoline
DOT HAZARD CLASS	3
DOT PACKING GROUP (PG)	II
I.D. NUMBER	UN1203
REQUIRED LABELING	FLAMMABLE LIQUID

15. REGULATORY INFORMATION

Revised Feb. 2000

TSCA (Toxic Substances Control Act) Inventory
Gasoline is listed in the TSCA inventory.

SARA (Superfund Amendments and Reauthorization Act) TITLE III
This product is reportable under SARA Title III, Sections 311 & 312 as a hazardous substance.

Hazard Categories Applicable under 40 CFR 370.2 (SARA Section 311):

Acute Health	Chronic Health	Pressure	Fire	Reactive
Yes	No	No	Yes	No

Components listed under 40 CFR 372.65 (SARA Section 313):
This product does contain chemicals identified as toxic by EPA under 40 CFR Part 372 and is subject to the reporting requirements of this section. The chemical is:

Chemical Name	CAS #	Wt. %
Benzene	71-43-2	< 4
n-hexane	110-54-3	< 13
Toluene	108-82-7	< 1
Cyclohexane	110-82-7	< 4

16. OTHER INFORMATION

Revised May 2001

NFPA® HAZARD RATING

Health	Fire	Reactivity	Other
1	4	0	NA

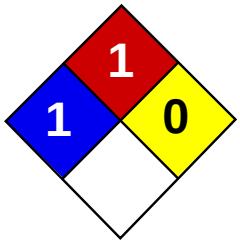
ABBREVIATIONS: AP …….approximate
< ..…….less than
> ..…….greater than
ppm……part per million
N/A …….not applicable
N/D …….not determined

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
API	American Petroleum Institute
CERCLA	Comprehensive Emergency Response, Compensation and Liability Act
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association
NIOSH	National Institute Of Occupational Safety and Health
NOIC	Notice of Intended Change
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety and Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self Contained Breathing Apparatus
SPCC	Spill Prevention, Control and Countermeasures
STEL	Short-Term Exposure Limit
TLV	Threshold Exposure Value (ACGIH)
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average
WEEL	Workplace Environmental Exposure Level

Inquiries regarding this MSDS should be directed to:
Herb Harless, CSP
Director, Environmental Health and Safety
(817) 302-9425

ScienceLab.com
Chemicals & Laboratory Equipment



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-Ethanediylbis(oxy)]bisethanol

Chemical Formula: C6H14O4

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

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, CO2).

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

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Conforms to ANSI Z400.1-2004 Standard (United States, Canada).

Material Safety Data Sheet

Synthetic Stationary Natural Gas Engine Oil SAE (20W) 40

Date : 03/15/2012
Version : 3

Section 1. Product and company identification

Product name
Synthetic Stationary Natural Gas Engine Oil SAE (20W) 40

Material uses
Lubricating oil. Not to be misted.

Supplier/Manufacturer
AMSOIL INC.
925 Tower Avenue
Superior, WI 54880

Code
ANGS

MSDS authored by
AMSOIL INC.

In case of emergency
CHEMTREC, U.S. : 1-800-424-9300
International: +1-703-527-3887

Section 2. Hazards identification

Emergency overview

Color : Amber.
Physical state : Liquid. [Clear.]
Odor : Mild hydrocarbon.
Hazard statements : NOT EXPECTED TO PRODUCE SIGNIFICANT ADVERSE HEALTH EFFECTS WHEN THE RECOMMENDED INSTRUCTIONS FOR USE ARE FOLLOWED.
Precautions : No known significant effects or critical hazards. Avoid prolonged contact with eyes, skin and clothing.
OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.
Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : No known significant effects or critical hazards.
Ingestion : No known significant effects or critical hazards.
Skin : No known significant effects or critical hazards.
Eyes : No known significant effects or critical hazards.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.
Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Inhalation : No specific data.
Ingestion : No specific data.
Skin : No specific data.
Eyes : No specific data.

Medical conditions aggravated by over-exposure : None known.

See toxicological information (Section 11)

Section 3. Composition/information on ingredients

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Section 4. First aid measures

Eye contact : Immediately flush eyes with plenty of water for at least 20 minutes, occasionally lifting the upper and lower eyelids. Get medical attention if symptoms occur.

Skin contact : After contact with skin, wash immediately with plenty of soap and water. Get medical attention if symptoms occur.

Inhalation : Move exposed person to fresh air. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Section 5. Fire-fighting measures

Flammability of the product : No specific fire or explosion hazard.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Hazardous decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective equipment for fire-fighters : No special protection is required.

Section 6. Accidental release measures

Personal precautions : Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Absorb with an inert dry material and place in an appropriate waste disposal container. Dispose via a licensed waste disposal contractor.

Large spill : Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose via a licensed waste disposal contractor. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Avoid contact with used product. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Under conditions which may generate mists, the following exposure limits are recommended: ACGIH TLV TWA: 5 mg/m³ ; STEL: 10 mg/m³.

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.

Respiratory : Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Not required under normal conditions of use.

Hands : Not required under normal conditions of use. Use gloves appropriate for work or task being performed.

Eyes : Not required under normal conditions of use. Safety eyewear should be used when there is a likelihood of exposure. Recommended: Safety glasses with side shields.

Skin : No special protective clothing is required.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Section 9. Physical and chemical properties

Physical state : Liquid. [Clear.]

Color : Amber.

Flash point : Open cup: 254°C (489.2°F) [Cleveland.]

Odor : Mild hydrocarbon.

pH : Not available.

Auto-ignition temperature : Not available.

Flammable limits	:	Not available.	**Melting point/ Pour point**	:	-40°C (-40°F)
Boiling point	:	Not available.	**Vapor pressure**	:	Not available.
Relative density	:	0.8529	**Vapor density**	:	Not available.
Volatility	:	Not available.	**Evaporation rate**	:	Not available.
Viscosity	:	Kinematic: 0.142 cm^2/s (14.2 cSt) (100°C) Kinematic: 0.975 cm^2/s (97.5 cSt) (40°C)	**Solubility**	:	Not available.

Section 10. Stability and reactivity

Chemical stability	:	The product is stable.
Conditions to avoid	:	No specific data.
Materials to avoid	:	Reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Hazardous polymerization	:	Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Acute toxicity

There is no data available.

Chronic toxicity

There is no data available.

Irritation/Corrosion

Skin	:	There is no data available.
Eyes	:	There is no data available.
Respiratory	:	There is no data available.

Sensitizer

Skin	:	There is no data available.
Respiratory	:	There is no data available.

Carcinogenicity

There is no data available.

Mutagenicity

There is no data available.

Teratogenicity

There is no data available.

Reproductive toxicity

There is no data available.

Section 12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity

There is no data available.

Persistence/degradability

There is no data available.

Section 13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Empty containers or liners may retain some product residues. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14. Transport information

DOT/TDG/IMDG/IATA : Not regulated.

Section 15. Regulatory information

United States

HCS Classification : Not regulated.

U.S. Federal regulations : **United States inventory (TSCA 8b)**: Not determined.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: No products were found.
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : The following components are listed: Distillates (petroleum), solvent-dewaxed heavy paraffinic

Pennsylvania : None of the components are listed.

California Prop. 65

No products were found.

Canada

WHMIS (Canada) : Not controlled under WHMIS (Canada).

Canadian lists

Canadian NPRI : None of the components are listed.

CEPA Toxic substances : None of the components are listed.

Canada inventory : Not determined.

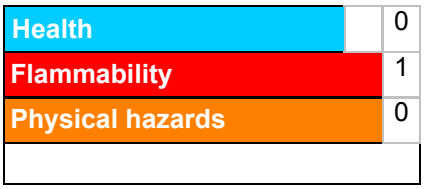
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Section 16. Other information

United States

Label requirements : NOT EXPECTED TO PRODUCE SIGNIFICANT ADVERSE HEALTH EFFECTS WHEN THE RECOMMENDED INSTRUCTIONS FOR USE ARE FOLLOWED.

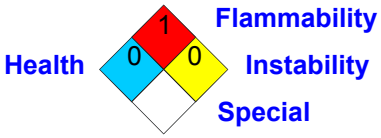
Hazardous Material Information System (U.S.A.) :



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :



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Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

ATTACHMENT I

Emission Units Table

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

- **Emissions Unit Table**

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

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.)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
Equipment Authorized by R13-2826I - Fort Beeler Gas Processing Plant						
1E	CE-01	CAT G342NA Compressor Engine	2010/---	225 bhp	Existing	01-NSCR
2E	CE-02	CAT G398TA Compressor Engine	2011/---	625 bhp	Existing	02-NSCR
3E	CE-03	CAT G3612LE Compressor Engine	2010/---	3,550 bhp	Existing	01-OxCat
4E	CE-04	CAT G3612LE Compressor Engine	2010/---	3,550 bhp	Existing	02-OxCat
5E	CE-05	CAT G3612LE Compressor Engine	2010/---	3,550 bhp	Existing	03-OxCat
6E	**SSM**	**Start/Stop/Maintenance (MODIFIED)**	**2010/---**	**na**	**Existing**	**Part-FL-01**
7E	**RPC**	**Rod Packing/Crankcase (MODIFIED)**	**2010/---**	**na**	**Existing**	**na**
8E	GE-01	Olympian G70LG EmGen Engine	2014/---	118 bhp	Existing	na
9E	H-01	TXP1 Hot Oil Heater	2010/---	10.00 MMBtu/hr	Existing	na
10E	H-02	TXP1 Regen Gas Heater	2010/---	4.74 MMBtu/hr	Existing	na
11E	H-03	TXP2 Regen Gas Heater	2011/---	6.60 MMBtu/hr	Existing	na
12E	H-04	TXP3 Regen Gas Heater	2012/---	6.60 MMBtu/hr	Existing	na
13E	H-05	TXP2 Heat Medium Heater	2011/---	21.22 MMBtu/hr	Existing	na
14E	H-06	TXP3 Heat Medium Heater	2012/---	21.22 MMBtu/hr	Existing	na
17E	**FL-01**	**Old Process Flare (MODIFIED)**	**2011/tbd**	**25.00 MMscf/yr**	**Modification**	**na**
18E	**FL-02**	**New Process Flare (MODIFIED)**	**2014/tbd**	**90.00 MMscf/yr**	**Modification**	**na**
20E	TLO	Truck Load-Out - Prod H2O/Condensate	2010/---	600,000 bbl/yr	na	na
21E	**FUG**	**Process Piping Fugitives (MODIFIED)**	**2010/---**	**na**	**na**	**na**
22E	T-03	Produced Water Tank (9913)	2011/---	400 bbl	na	na
23E	T-04	Produced Water Tank (9914)	2011/---	400 bbl	na	na
Please see Attachement L - Storage Tank Data Sheet) (T-02, T-05 thru T-25)						
Equipment Authorized by R13-3212 - Groves Dehydration Station						
15E	DH-01	Groves Dehydrator - Flash Tank/Still Vent*	2011/---	5.00 MMscfd	na	na
16E	BLR-01	Groves Dehydrator - Reboiler*	2011/---	0.20 MMBtu/hr	na	na

[1] For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S, ... or other appropriate designation.

[2] For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

[3] New, modification, removal, etc.

[4] For Control Devices use the following numbering system: 1C, 2C, 3C, ... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheet

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

- **Table 1 – Emissions Data**
  - Recovery Compressor Engine 01 – 225 bhp CAT G342NA (CE-01 (1E))
  - Recovery Compressor Engine 02 - 625 bhp CAT G398TA (CE-02 (2E))
  - TXP1 Compressor Engines 03 thru 05 - 3,550 bhp CAT G3612LE (CE-03 (3E) thru CE-05 (5E)) (EACH)
  - Startup/Shutdown/Maintenance (Including Blowdown) (SSM (6E))
  - Compressor Rod Packing and Engine Crankcase (RPC (7E))
  - Emergency Generator Engine - 118 bhp Olympian G70LG (GE-01 (8E))
  - TXP1 Hot Oil Heater - 10.0 MMBtu/hr (H-01 (9E))
  - TXP1 Regenerator Gas Heater - 4.74 MMBtu/hr (H-02 (10E))
  - TXP2 and TXP3 Regenerator Gas Heater - 6.60 MMBtu/hr (H-03 (11E) and H-04 (12E)) (EACH)
  - TXP2 and TXP3 Heat Medium Heater - 21.22 MMBtu/hr (H-05 (13E) and H-06 (14E)) (EACH)
  - Groves Dehydrator Flash Tank and Still Vent - 5.0 MMscfd (DH-01 (15E))
  - Groves Dehydrator Reboiler - 0.20 MMBtu/hr (BLR-01 (16E))
  - Old Process Flare (FL-01 (17E)) (MODIFIED)
  - New Process Flare (FL-02 (18E)) (MODIFIED)
  - Truck Load-Out (TLO (20E))
  - Process Piping Fugitive Emissions (FUG (21E))
  - Produced H2O Storage Tank Emissions - (T-03 (22E) and T-04 (23E)) (TOTAL)
  - FACILITY-WIDE SUMMARY (Including Fugitives (FUG (1F))
  - Table 1 Notes
- **Table 2 – Release Parameter Data**

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Recovery Compressor Engine 01 - 225 bhp CAT G342NA (CE-01/1E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	6.40	28.03	0.05	0.22	Gas	Vendor	
								CO	6.80	29.77	0.99	4.35	Gas	Vendor	
								VOC	0.37	1.63	0.28	1.22	Gas	Vendor	
								SOx	1.2E-03	0.01	1.2E-03	0.01	Gas	AP-42	
								PM10/2.5	0.04	0.18	0.04	0.18	Liq/Solid	AP-42	
	Recovery Compressor Engine 01 - 225 bhp CAT G342NA (CE-01 (1E))							Acetaldehyde	0.01	0.03	0.01	0.03	Gas	---	
								Acrolein	0.01	0.02	0.01	0.02	Gas	---	
								Benzene	3.4E-03	0.01	3.4E-03	0.01	Gas	AP-42	
								Ethylbenzene	5.3E-05	2.3E-04	5.3E-05	2.3E-04	Gas	---	
								Formaldehyde	0.12	0.54	0.03	0.13	Gas	Vendor	
								n-Hexane	---	---	---	---	Gas	AP-42	
								Methanol	0.01	0.03	0.01	0.03	Gas	---	
CE-01 (1E)	Upward Vertical	CE-01 (1E)	CE-01 (1E)	NSCR -01	NSCR	C	8,760	Toluene	1.2E-03	0.01	1.2E-03	0.01	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	4.1E-04	1.8E-03	4.1E-04	1.8E-03	Gas	---	
								Other HAP	2.0E-03	0.01	2.0E-03	0.01	Gas	AP-42	
								Total HAP	0.15	0.65	0.05	0.24	Gas	Sum	
								CO2	249	1,093	249	1,093	Gas	40CFR98	
								CH4	0.89	3.91	0.89	3.91	Gas	Vendor	
								N2O	4.7E-04	2.0E-03	4.7E-04	2.0E-03	Gas	40CFR98	
								CO2e	272	1,191	272	1,191	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Recovery Compressor Engine 02 - 625 bhp CAT G398TA (CE-02/2E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	13.50	59.14	0.69	3.02	Gas	Vendor	
	Recovery Compressor Engine 02 - 625 bhp CAT G398TA (CE-02 (2E))							CO	14.74	64.58	0.69	3.04	Gas	Vendor	
								VOC	0.41	1.81	0.09	0.39	Gas	Vendor	
								SOx	3.4E-03	0.01	3.4E-03	0.01	Gas	AP-42	
								PM10/2.5	0.11	0.49	0.11	0.49	Liq/Solid	AP-42	
								Acetaldehyde	0.02	0.07	3.2E-03	0.01	Gas	---	
								Acrolein	0.02	0.07	3.1E-03	0.01	Gas	---	
								Benzene	0.01	0.04	1.8E-03	0.01	Gas	AP-42	
								Ethylbenzene	1.4E-04	6.3E-04	2.9E-05	1.3E-04	Gas	---	
								Formaldehyde	0.14	0.60	0.03	0.14	Gas	Vendor	
								n-Hexane	---	---	---	---	Gas	AP-42	
CE-02 (2E)	Upward Vertical	CE-02 (2E)	CE-02 (2E)	NSCR -02	NSCR	C	8,760	Methanol	0.02	0.08	3.6E-03	0.02	Gas	---	
								Toluene	3.2E-03	0.01	6.5E-04	0.00	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	1.1E-03	5.0E-03	2.3E-04	9.9E-04	Gas	---	
								Other HAP	0.01	0.02	1.1E-03	4.8E-03	Gas	AP-42	
								Total HAP	0.21	0.90	0.05	0.20	Gas	Sum	
								CO2	684	2,995	684	2,995	Gas	40CFR98	
								CH4	1.10	4.83	1.10	4.83	Gas	Vendor	
								N2O	1.3E-03	0.01	1.3E-03	0.01	Gas	40CFR98	
								CO2e	712	3,117	712	3,117	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

TXP1 Compressor Engines 03 thru 05 - 3,550 bhp CAT G3612LE (CE-03/3E thru CE-05/5E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	3.91	17.14	3.91	17.14	Gas	Vendor	
	TXP1 Compressor Engines 03 thru 05 - 3,550 bhp CAT G3612LE (CE-03 (3E) thru CE-05 (5E)) (EACH)							CO	21.52	94.27	2.15	9.43	Gas	Vendor	
								VOC	7.12	31.19	2.85	12.48	Gas	Vendor	
								SOx	1.5E-02	0.07	1.5E-02	0.07	Gas	AP-42	
								PM10/2.5	0.26	1.14	0.26	1.14	Liq/Solid	AP-42	
								Acetaldehyde	0.22	0.96	1.1E-01	0.48	Gas	---	
								Acrolein	0.13	0.59	6.7E-02	0.29	Gas	---	
								Benzene	0.01	0.05	5.7E-03	0.03	Gas	AP-42	
								Ethylbenzene	1.0E-03	4.5E-03	5.2E-04	2.3E-03	Gas	---	
								Formaldehyde	2.03	8.91	0.31	1.34	Gas	Vendor	
CE-03/3E CE-04/4E CE-05/5E	Upward Vertical	CE-03/3E CE-04/4E CE-05/5E	CE-03/3E CE-04/4E CE-05/5E	OxCat -03 OxCat -04 OxCat -05	Oxidation Catalyst	C	8760 (Each)	n-Hexane	2.9E-02	0.13	1.4E-02	0.06	Gas	AP-42	
								Methanol	0.07	0.29	3.3E-02	0.14	Gas	---	
								Toluene	1.1E-02	0.05	5.3E-03	0.02	Gas	AP-42	
								2,2,4-TMP	6.5E-03	0.03	3.3E-03	1.4E-02	Gas	---	
								Xylenes	4.8E-03	2.1E-02	2.4E-03	1.1E-02	Gas	---	
								Other HAP	0.02	0.11	1.2E-02	5.3E-02	Gas	AP-42	
								Total HAP	2.54	11.13	0.56	2.44	Gas	Sum	
								CO2	3,451	15,117	3,451	15,117	Gas	Vendor	
								CH4	42.81	187.51	42.81	187.51	Gas	Vendor	
								N2O	5.8E-03	0.03	5.8E-03	0.03	Gas	40CFR98	
								CO2e	4,523	19,813	4,523	19,813	Gas	Wgt Sum	

Continued …

Startup/Shutdown/Maintenance (Including Blowdown) (SSM/6E) (MODIFIED)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	---	---	---	---	Gas	---	
	Startup/Shutdown/Maintenance (Including Blowdown) (SSM (6E))							CO	---	---	---	---	Gas	---	
								VOC	---	16.26	---	13.96	Gas	Various	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Liq/Solid	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	---	0.14	---	0.11	Gas	Various	
								Ethylbenzene	---	0.14	---	0.11	Gas	Various	
								Formaldehyde	---	---	---	---	Gas	---	
								n-Hexane	---	1.86	---	1.43	Gas	Various	
								Methanol	---	---	---	---	Gas	---	
SSM (6E)	na	SSM (6E)	SSM (6E)	FL-01 (7E)	Flare (Partial)	I	na	Toluene	---	0.14	---	0.11	Gas	Various	
								2,2,4-TMP	---	0.14	---	0.11	Gas	---	
								Xylenes	---	0.14	---	0.11	Gas	Various	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	---	2.57	---	1.96	Gas	---	
								CO2	---	---	---	---	Gas	---	
								CH4	---	225	---	164	Gas	Various	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	5,617	---	4,095	Gas		

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Compressor Rod Packing and Engine Crankcase (RPC/7E) (MODIFIED)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RPC (7E)	na	RPC (7E)	RPC (7E)	na	na	C	8,760	NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	4.62	20.23	4.62	20.23	Gas	vendor	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Liq/Solid	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.09	0.39	0.09	0.39	Gas	mass bal	
								Ethylbenzene	0.09	0.39	0.09	0.39	Gas	mass bal	
								Formaldehyde	0.05	0.22	0.05	0.22	Gas	---	
								n-Hexane	0.09	0.39	0.09	0.39	Gas	mass bal	`
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.09	0.39	0.09	0.39	Gas	mass bal	
								2,2,4-TMP	0.09	0.39	0.09	0.39	Gas	mass bal	
								Xylenes	0.09	0.39	0.09	0.39	Gas	mass bal	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.58	2.55	0.58	2.55	Gas	---	
								CO2	85	372	85	372	Gas	---	
								CH4	41.20	180	41	180	Gas	mass bal	
								N2O	---	---	---	---	Gas	---	
								CO2e	1,115	4,884	1,115	4,884	Gas		

Compressor Rod Packing and Engine Crankcase (RPC (7E))

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Emergency Generator Engine - 118 bhp Olympian G70LG (GE-01/8E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	0.93	0.23	0.93	0.23	Gas	Vendor	
	Emergency Generator Engine - 118 bhp Olympian G70LG (GE-01 (8E))							CO	29.10	7.28	29.10	7.28	Gas	Vendor	
								VOC	0.38	0.10	0.38	0.10	Gas	Vendor	
								SOx	8.9E-04	2.2E-04	8.9E-04	2.2E-04	Gas	AP-42	
								PM10/2.5	0.03	0.01	0.03	0.01	Liq/Solid	AP-42	
								Acetaldehyde	4.2E-03	1.1E-03	4.2E-03	1.1E-03	Gas	---	
								Acrolein	4.0E-03	9.9E-04	4.0E-03	9.9E-04	Gas	---	
								Benzene	2.4E-03	6.0E-04	2.4E-03	6.0E-04	Gas	AP-42	
								Ethylbenzene	3.7E-05	9.4E-06	3.7E-05	9.4E-06	Gas	---	
								Formaldehyde	0.03	0.01	0.03	0.01	Gas	Vendor	
								n-Hexane	---	---	---	---	Gas	AP-42	
GE-01 (8E)	Upward Vertical	GE-01 (8E)	GE-01 (8E)	na	na	I	500	Methanol	4.6E-03	1.2E-03	4.6E-03	1.2E-03	Gas	---	
								Toluene	8.4E-04	2.1E-04	8.4E-04	2.1E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	2.9E-04	7.4E-05	2.9E-04	7.4E-05	Gas	---	
								Other HAP	1.4E-03	3.5E-04	1.4E-03	3.5E-04	Gas	AP-42	
								Total HAP	0.05	0.01	0.05	0.01	Gas	Sum	
								CO2	136	34	136	34	Gas	40CFR98	
								CH4	1.26	0.31	1.26	0.31	Gas	Vendor	
								N2O	1.3E-03	3.3E-04	1.3E-03	3.3E-04	Gas	40CFR98	
								CO2e	168	42	168	42	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

TXP1 Hot Oil Heater - 10.0 MMBtu/hr (H-01/9E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	1.09	4.76	1.09	4.76	Gas	AP-42	
								CO	0.91	4.00	0.91	4.00	Gas	AP-42	
								VOC	0.06	0.27	0.06	0.27	Gas	AP-42	
								SOx	0.01	0.03	0.01	0.03	Gas	AP-42	
	TXP1 Hot Oil Heater - 10.0 MMBtu/hr (H-01 (9E))							PM10/2.5	0.08	0.36	0.08	0.36	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	2.3E-05	1.0E-04	2.3E-05	1.0E-04	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								Formaldehyde	8.2E-04	3.6E-03	8.2E-04	3.6E-03	Gas	AP-42	
								n-Hexane	0.02	0.09	0.02	0.09	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
H-01 (9E)	Upward Vertical	H-01 (9E)	H-01 (9E)	na	na	C	8,760	Toluene	3.7E-05	1.6E-04	3.7E-05	1.6E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	2.1E-05	9.0E-05	2.1E-05	9.0E-05	Gas	AP-42	
								Total HAP	0.02	0.09	0.02	0.09	Gas	Sum	
								CO2	1,297	5,681	1,297	5,681	Gas	40CFR98	
								CH4	0.02	0.11	0.02	0.11	Gas	40CFR98	
								N2O	2.4E-03	0.01	2.4E-03	0.01	Gas	40CFR98	
								CO2e	1,298	5,686	1,298	5,686	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

TXP1 Regenerator Gas Heater - 4.74 MMBtu/hr (H-02/10E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	0.52	2.26	0.52	2.26	Gas	AP-42	
	TXP1 Regenerator Gas Heater - 4.74 MMBtu/hr (H-02 (10E))							CO	0.43	1.90	0.43	1.90	Gas	AP-42	
								VOC	0.03	0.13	0.03	0.13	Gas	AP-42	
								SOx	3.1E-03	0.01	3.1E-03	0.01	Gas	AP-42	
								PM10/2.5	0.04	0.17	0.04	0.17	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	1.1E-05	4.7E-05	1.1E-05	4.7E-05	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								Formaldehyde	3.9E-04	1.7E-03	3.9E-04	1.7E-03	Gas	AP-42	
								n-Hexane	0.01	0.04	0.01	0.04	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
H-02 (10E)	Upward Vertical	H-02 (10E)	H-02 (10E)	na	na	C	8,760	Toluene	1.8E-05	7.7E-05	1.8E-05	7.7E-05	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	9.8E-06	4.3E-05	9.8E-06	4.3E-05	Gas	AP-42	
								Total HAP	0.01	0.04	0.01	0.04	Gas	Sum	
								CO2	615	2,693	615	2,693	Gas	40CFR98	
								CH4	0.01	0.05	0.01	0.05	Gas	40CFR98	
								N2O	1.2E-03	0.01	1.2E-03	0.01	Gas	40CFR98	
								CO2e	615	2,695	615	2,695	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

TXP2 and TXP3 Regenerator Gas Heater - 6.60 MMBtu/hr (H-03/11E and H-04/12E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	0.72	3.14	0.72	3.14	Gas	AP-42	
	TXP2 and TXP3 Regenerator Gas Heater - 6.60 MMBtu/hr (H-03 (11E) and H-04 (12E)) (EACH)							CO	0.60	2.64	0.60	2.64	Gas	AP-42	
								VOC	0.04	0.18	0.04	0.18	Gas	AP-42	
								SOx	0.00	0.02	0.00	0.02	Gas	AP-42	
								PM10/2.5	0.05	0.24	0.05	0.24	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	1.5E-05	6.6E-05	1.5E-05	6.6E-05	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								Formaldehyde	5.4E-04	2.4E-03	5.4E-04	2.4E-03	Gas	AP-42	
								n-Hexane	0.01	0.06	0.01	0.06	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
H-03 (11E) H-04 (12E)	Upward Vertical	H-03 (11E) H-04 (12E)	H-03 (11E) H-04 (12E)	na	na	C	8760 (Each)	Toluene	2.4E-05	1.1E-04	2.4E-05	1.1E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	1.4E-05	6.0E-05	1.4E-05	6.0E-05	Gas	AP-42	
								Total HAP	0.01	0.06	0.01	0.06	Gas	Sum	
								CO2	856	3,749	856	3,749	Gas	40CFR98	
								CH4	0.02	0.07	0.02	0.07	Gas	40CFR98	
								N2O	1.6E-03	0.01	1.6E-03	0.01	Gas	40CFR98	
								CO2e	857	3,753	857	3,753	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

TXP2 and TXP3 Heat Medium Heater - 21.22 MMBtu/hr (H-05/13E and H-06/14E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	2.31	10.10	2.31	10.10	Gas	AP-42	
								CO	1.94	8.49	1.94	8.49	Gas	AP-42	
								VOC	0.13	0.57	0.13	0.57	Gas	AP-42	
								SOx	0.01	0.06	0.01	0.06	Gas	AP-42	
								PM10/2.5	0.18	0.77	0.18	0.77	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	4.8E-05	2.1E-04	4.8E-05	2.1E-04	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								Formaldehyde	1.7E-03	7.6E-03	1.7E-03	7.6E-03	Gas	AP-42	
								n-Hexane	0.04	0.18	0.04	0.18	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
H-03 (13E) H-04 (14E)	Upward Vertical	H-03 (13E) H-04 (14E)	H-03 (13E) H-04 (14E)	na	na	C	8760 (Each)	Toluene	7.8E-05	3.4E-04	7.8E-05	3.4E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	4.4E-05	1.9E-04	4.4E-05	1.9E-04	Gas	AP-42	
								Total HAP	0.04	0.19	0.04	0.19	Gas	Sum	
								CO2	2,752	12,054	2,752	12,054	Gas	40CFR98	
								CH4	0.05	0.23	0.05	0.23	Gas	40CFR98	
								N2O	5.2E-03	0.02	5.2E-03	0.02	Gas	40CFR98	
								CO2e	2,755	12,067	2,755	12,067	Gas	Wgt Sum	

TXP2 and TXP3 Heat Medium Heater - 21.22 MMBtu/hr (H-05 (13E) and H-06 (14E)) (EACH)

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Groves Dehydrator Flash Tank and Still Vent - 5.0 MMscfd (DH-01/15E)

Authorized by R13-3212 - Groves Dehydration Station

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
	Groves Dehydrator Flash Tank and Still Vent - 5.0 MMscfd (DH-01 (15E))							VOC	5.77	25.28	3.88	17.00	Gas	GLYCALC	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Liq/Solid	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.08	0.34	0.07	0.31	Gas	GLYCALC	
								Ethylbenzene	---	---	---	---	Gas	---	
								Formaldehyde	---	---	---	---	Gas	---	
								n-Hexane	0.11	0.50	0.07	0.30	Gas	GLYCALC	
								Methanol	---	---	---	---	Gas	---	
DH-01 (15E)	Upward Vertical	DH-01 (15E)	DH-01 (15E)	na	na	C	8,760	Toluene	0.32	1.41	0.31	1.34	Gas	GLYCALC	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	1.00	4.37	0.98	4.27	Gas	GLYCALC	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	1.51	6.62	1.42	6.22	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	10.19	44.63	5.14	22.50	Gas	GLYCALC	
								N2O	---	---	---	---	Gas	---	
								CO2e	255	1,116	128	562	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Groves Dehydrator Reboiler - 0.20 MMBtu/hr (BLR-01/16E)

Authorized by R13-3212 - Groves Dehydration Station

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	0.02	0.10	0.02	0.10	Gas	AP-42	
	Groves Dehydrator Reboiler - 0.20 MMBtu/hr (BLR-01 (16E))							CO	0.02	0.08	0.02	0.08	Gas	AP-42	
								VOC	1.2E-03	0.01	1.2E-03	0.01	Gas	AP-42	
								SOx	1.3E-04	5.7E-04	1.3E-04	5.7E-04	Gas	AP-42	
								PM10/2.5	1.7E-03	0.01	1.7E-03	0.01	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	4.6E-07	2.0E-06	4.6E-07	2.0E-06	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								Formaldehyde	1.6E-05	7.1E-05	1.6E-05	7.1E-05	Gas	AP-42	
								n-Hexane	3.9E-04	1.7E-03	3.9E-04	1.7E-03	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
BLR-01 (16E)	Upward Vertical	BLR-01 (16E)	BLR-01 (16E)	na	na	C	8,760	Toluene	7.4E-07	3.2E-06	7.4E-07	3.2E-06	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	4.1E-07	1.8E-06	4.1E-07	1.8E-06	Gas	AP-42	
								Total HAP	4.1E-04	1.8E-03	4.1E-04	1.8E-03	Gas	Sum	
								CO2	25.94	113.61	25.94	113.61	Gas	40CFR98	
								CH4	4.9E-04	2.1E-03	4.9E-04	2.1E-03	Gas	40CFR98	
								N2O	4.9E-05	2.1E-04	4.9E-05	2.1E-04	Gas	40CFR98	
								CO2e	26	114	25.97	114	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Old Process Flare (FL-01/17E) (MODIFIED)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	---	---	16.32	0.96	Gas	AP-42	
								CO	---	---	74.40	4.36	Gas	AP-42	
	Old Process Flare (FL-01 (17E)) (MODIFIED)							VOC	431.57	25.31	8.63	0.51	Gas	Mass Bal	
								SOx	---	---	0.14	8.3E-03	Gas	AP-42	
								PM10/2.5	---	---	1.79	0.10	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	5.33	0.31	0.11	6.3E-03	Gas	Mass Bal	
								Ethylbenzene	5.33	0.31	0.11	6.3E-03	Gas	Mass Bal	
								Formaldehyde	---	---	0.02	1.0E-03	Gas	AP-42	
								n-Hexane	63.94	3.75	1.28	7.5E-02	Gas	Mass Bal	
								Methanol	---	---	---	---	Gas	---	
FL-01 (17E)	Upward Vertical	FL-01 (17E)	FL-01 (17E)	na	na	C	8,760	Toluene	5.33	0.31	0.11	6.3E-03	Gas	Mass Bal	
								2,2,4-TMP	---	---	---	---	Gas	Mass Bal	
								Xylenes	5.33	0.31	0.11	6.3E-03	Gas	Mass Bal	
								Other HAP	4.5E-04	0.00	4.5E-04	2.6E-05	Gas	AP-42	
								Total HAP	85.25	5.00	1.72	0.10	Gas	Sum	
								CO2	---	---	28,664	1,680	Gas	40CFR98	
								CH4	9,010	528.44	180.19	10.57	Gas	40CFR98	
								N2O	---	---	1.2E-01	7.0E-03	Gas	40CFR98	
								CO2e	225,241	13,211	33,204	1,947	Gas	Wgt Sum	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

New Process Flare (FL-02/18E) (MODIFIED)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	---	---	31.28	3.95	Gas	AP-42	
								CO	---	---	142.61	17.99	Gas	AP-42	
								VOC	4484.07	565.65	89.68	11.31	Gas	Mass Bal	
								SOx	---	---	0.27	3.4E-02	Gas	AP-42	
								PM10/2.5	---	---	3.43	0.43	Liq/Solid	AP-42	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	3.57	0.45	0.07	0.01	Gas	Mass Bal	
								Ethylbenzene	3.57	0.45	0.07	0.01	Gas	Mass Bal	
								Formaldehyde	---	---	0.03	4.3E-03	Gas	AP-42	
								n-Hexane	78.48	9.90	1.57	0.20	Gas	Mass Bal	
								Methanol	---	---	---	---	Gas	---	
FL-02 (18E)	Upward Vertical	FL-02 (18E)	FL-02 (18E)	na	na	C	8,760	Toluene	3.57	0.45	0.07	0.01	Gas	Mass Bal	
								2,2,4-TMP	---	---	---	---	Gas	Mass Bal	
								Xylenes	3.57	0.45	0.07	0.01	Gas	Mass Bal	
								Other HAP	8.6E-04	0.00	8.6E-04	0.00	Gas	AP-42	
								Total HAP	92.75	11.70	1.89	0.24	Gas	Sum	
								CO2	---	---	56,681	7,150	Gas	40CFR98	
								CH4	13,520	1,705.50	270.40	34.11	Gas	40CFR98	
								N2O	---	---	3.5E-01	0.04	Gas	40CFR98	
								CO2e	338,000	42,638	63,547	8,016	Gas	Wgt Sum	

New Process Flare (FL-02 (18E)) (MODIFIED)

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Truck Load-Out (TLO/20E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
	Truck Load-Out (TLO/20E)							VOC	---	1.96	---	1.96	Gas	AP-42	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Liq/Solid	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	---	0.10	---	0.10	Gas	Mass Bal	
								Ethylbenzene	---	0.10	---	0.10	Gas	Mass Bal	
								Formaldehyde	---	---	---	---	Gas	---	
								n-Hexane	---	0.10	---	0.10	Gas	Mass Bal	
								Methanol	---	---	---	---	Gas	---	
TLO (20E)	Upward Vertical	TLO (20E)	TLO (20E)	na	na	I	na	Toluene	---	0.10	---	0.10	Gas	Mass Bal	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	0.10	---	0.10	Gas	Mass Bal	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	---	0.49	---	0.49	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	---	---	---	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	---	

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Process Piping Fugitive Emissions (FUG/21E) (MODIFIED)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
FUG (21E)	na	FUG (21E)	FUG (21E)	na	na	C	8,760	NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	32.42	142.00	16.16	70.76	Gas	EPA	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Liq/Solid	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.07	0.30	0.03	0.15	Gas	Mass Bal	
								Ethylbenzene	0.07	0.30	0.03	0.15	Gas	Mass Bal	
								Formaldehyde	---	---	---	---	Gas	---	
								n-Hexane	1.33	5.82	0.66	2.88	Gas	Mass Bal	
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.07	0.30	0.03	0.15	Gas	Mass Bal	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	0.07	0.30	0.03	0.15	Gas	Mass Bal	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	1.60	7.03	0.79	3.47	Gas	Sum	
								CO2	0.40	1.74	0.18	0.80	Gas	Mass Bal	
								CH4	33.74	147.80	15.42	67.54	Gas	Mass Bal	
								N2O	---	---	---	---	Gas	---	
								CO2e	844	3,697	386	1,689	Gas	Wgt Sum	

Process Piping Fugitive Emissions (FUG/21E) (MODIFIED)

Continued …

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Produced Water Storage Tank Emissions (T-03/22E and T-04/23E)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	0.46	2.03	0.46	2.03	Gas	EPA	
								SOx	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Liq/Solid	---	
								Acetaldehyde	---	---	---	---	Gas	---	
								Acrolein	---	---	---	---	Gas	---	
								Benzene	0.02	0.10	0.02	0.10	Gas	Mass Bal	
								Ethylbenzene	0.02	0.10	0.02	0.10	Gas	Mass Bal	
								Formaldehyde	---	---	---	---	Gas	---	
								n-Hexane	0.02	0.10	0.02	0.10	Gas	Mass Bal	
								Methanol	---	---	---	---	Gas	---	
								Toluene	0.02	0.10	0.02	0.10	Gas	Mass Bal	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	0.02	0.10	0.02	0.10	Gas	Mass Bal	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.12	0.51	0.12	0.51	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	---	---	---	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	---	
T-03 (22E) and T-04 (23E)	**Produced H2O Storage Tank Emissions - (T-03 (22E) and T-04 (23E)) (TOTAL)**														
	na	T-03 (22E) and T-04 (23E)	T-03 (22E) and T-04 (23E)	na	na	C	8,760								

Continued …

FACILITY-WIDE SUMMARY

Table 1: Emissions Data - Continued

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOx	40.24	172.43	68.68	93.40	Gas	Sum	
								CO	121.65	412.65	260.70	93.51	Gas	Sum	
								VOC - Point	4,949.46	755.74	117.00	108.02	Gas	Sum	
								VOC - Fug	32.42	142.00	16.16	70.76	Gas	Sum	
								VOC - Total	4,982	897.75	133.16	178.79	Gas	Sum	
								SOx	0.10	0.42	0.51	0.47	Gas	Sum	
								PM10/2.5	1.55	6.66	6.76	7.20	Solid/Gas	Sum	
								Acetaldehyde	0.68	2.96	0.34	1.47	Gas	Sum	
								Acrolein	0.43	1.85	0.21	0.92	Gas	Sum	
								Benzene	9.20	2.34	0.42	1.27	Gas	Sum	
								Ethylbenzene	9.08	1.81	0.33	0.86	Gas	Sum	
								Formaldehyde	6.45	28.14	1.12	4.54	Gas	Sum	
								n-Hexane	144.20	23.41	3.87	6.26	Gas	Sum	
								Methanol	0.22	0.96	0.11	0.47	Gas	Sum	
na	na	na	na	na	na	na	na	Toluene	9.43	3.36	0.65	2.27	Gas	Sum	
								2,2,4-TMP	0.11	0.62	0.10	0.54	Gas	Sum	
								Xylenes	10.09	6.24	1.31	5.17	Gas	Sum	
								Other HAP	0.08	0.35	0.04	0.17	Gas	Sum	
								Total HAP	190	72.05	8.49	23.96	Gas	Sum	
								CO2	20,663	89,941	106,008	98,770	Gas	Sum	
								CH4	22,747	3,404	644	1,051	Gas	Sum	
								N2O	0.04	0.16	0.51	0.21	Gas	Sum	
								CO2e	589,339	175,084	122,265	125,115	Gas	Sum	

FACILITY-WIDE SUMMARY
(Including Fugitives (FUG (1F))

Table 1 Notes

Criteria Pollutants	
Pollutant	**CAS**
NO2	10102-44-0
CO	630-08-0
VOC	varies
Propane	74-98-6
i-Butane	75-28-5
n-Butane	106-97-8
SO2	7446-09-5
PM10/2.5	varies
Lead	7439-92-1
Ozone	10028-15-5

Hazardous Air Pollutants (HAPs)	
Pollutant	**CAS**
Acetaldehyde	75-07-0
Acrolein	107-02-8
Benzene	71-43-2
Ethylbenzene	100-41-4
Formadehyde	50-00-0
n-Hexane	110-54-3
Methanol	67-56-1
Toluene	108-88-3
2,2,4-TMP	540-84-1
Xylenes	1330-20-7

Greenhouse Gas (GHG) Pollutants	
Pollutant	**CAS**
CO2	124-38-9
CH4	74-82-8
N2O	10024-97-2
CO2e	na

Table 1: Notes

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

1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.
2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).
3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.
4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
6 Indicate method used to determine emission rate as follows:
MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).
7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment J - Emission Points Data Summary Sheet

Table 2 - RELEASE PARAMETER DATA

Emission Unit ID	Emission Point ID	Inner Diameter (Ft)	Temper-ature (oF)	Flow Rate[1] (acfm)	Ground Elevation (ft)	Stack Height[2] (ft)	Northing (km)	Easting (km)
Equipment Authorized by R13-2826I - Fort Beeler Gas Processing Plant								
1E	CE-01	1.00	1,170	851	1,400	10	4,414.33	535.00
2E	CE-02	0.75	1,112	3,040	1,400	10	4,414.33	535.00
3E	CE-03	2.00	838	24,013	1,400	34	4,414.33	535.00
4E	CE-04	2.00	838	24,013	1,400	34	4,414.33	535.00
5E	CE-05	2.00	838	24,013	1,400	34	4,414.33	535.00
6E	**SSM**	**na**	**100**	**na**	**1,400**	**4**	**4,414.33**	**535.00**
7E	**RPC**	**na**	**800**	**na**	**1,400**	**4**	**4,414.33**	**535.00**
8E	GE-01	0.50	1,250	680	1,400	8	4,414.33	535.00
9E	H-01	1.00	310	8,100	1,400	16.6	4,414.33	535.00
10E	H-02	0.75	550	4,100	1,400	14.6	4,414.33	535.00
11E	H-03	0.75	550	4,100	1,400	16.5	4,414.33	535.00
12E	H-04	0.75	550	4,100	1,400	16.5	4,414.33	535.00
13E	H-05	1.25	255	8,600	1,400	17.9	4,414.33	535.00
14E	H-06	1.25	255	8,600	1,400	17.9	4,414.33	535.00
17E	**FL-01**	**7.80**	**1,200**	**na**	**1,400**	**26.8**	**4,414.33**	**535.00**
18E	**FL-02**	**na**	**1,200**	**na**	**1,400**	**190**	**4,414.33**	**535.00**
19E	T-01	0.50	100	na	1,400	10	4,414.33	535.00
20E	TLO	0.50	100	400	1,400	10	4,414.33	535.00
21E	**FUG**	**na**	**100**	**na**	**1,400**	**4**	**4,414.33**	**535.00**
22E	T-03	0.50	100	na	1,400	10	4,414.33	535.00
23E	T-04	0.50	100	na	1,400	10	4,414.33	535.00
Equipment Authorized by R13-3212 - Groves Dehydration Station								
15E	DH-01	0.50	212	3,500	1,400	10	4414.33	535.00
16E	BLR-01	0.60	120	500	1,400	10	4414.33	535.00

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

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

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

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

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

☐ 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 UNIT 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.”

FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS[1]	Maximum Potential Pre-Controlled Emissions[2]		Maximum Potential Controlled Emissions[3]		Est. Method Used[4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Paved Haul Roads	na	---	---	---	---	---
Unpaved Haul Roads	na	---	---	---	---	---
Storage Pile Emissions	na	---	---	---	---	---
Loading/Unloading Operations	na	---	---	---	---	---
Wastewater Treatment	na	---	---	---	---	---
Equipment Leaks (FUG (21E))	**VOC**	**32.42**	**142.00**	**16.16**	**70.76**	**AP-42**
	Benzene	**0.07**	**0.30**	**0.03**	**0.15**	**MB**
	Ethylbenzene	**0.07**	**0.30**	**0.03**	**0.15**	**MB**
	Formaldehyde	**---**	**---**	**---**	**---**	**MB**
	n-Hexane	**1.33**	**5.82**	**0.66**	**2.88**	**MB**
	Toluene	**0.07**	**0.30**	**0.03**	**0.15**	**MB**
	2,2,4-TMP	**---**	**---**	**---**	**---**	**MB**
	Xylenes	**0.07**	**0.30**	**0.03**	**0.15**	**MB**
	Other HAP	**---**	**---**	**---**	**---**	**---**
	Total HAP	**1.60**	**7.03**	**0.79**	**3.47**	**Sum**
	CO2	**0.40**	**1.74**	**0.18**	**0.80**	**MB**
	CH4	**33.74**	**147.80**	**15.42**	**67.54**	**MB**
	N2O	**---**	**---**	**---**	**---**	**---**
	CO2e	**844**	**3,697**	**386**	**1,689**	**Wgt Sum**
General Clean-up VOC Emissions	na	---	---	---	---	---
Other	na	---	---	---	---	---

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

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

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

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

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment K - Fugitive Emissions

DESCRIPTION OF FUGITIVE EMISSIONS

Soure Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (Days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	Light Liquid VOC[6,7]				
	Heavy Liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC				
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves[11]	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Open Ended Lines[12]	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Sampling Connections[13]	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Compressors	Gas VOC				
	Non-VOC				
Flanges / Connectors	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Other*	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
				TOTAL (lb/yr)	**141,528**
				TOTAL (tpy)	**70.76**

FUG (21E)

Please Reference:
Attachment J - Process Piping Fugitive Emissions
Attachment K - Fugitive Emissions Summary Data Sheet
and
Attachment N - Process Piping Fugitive Emissions

*Other components include compressor seals, relief valves, diaphragms, drains, meters, etc.

Attachment K
DESCRIPTION OF FUGITIVE EMISSIONS - 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; EPA - emission factors established by EPA (cite document used);
EE - engineering estimate; 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, H2S, mineral acids, NO, SO, etc. DO NOT LIST H, H2O, 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)

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

- **NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEETS**
  - 225 bhp CAT G342NA (CE-01/1E) – 4SRB Compressor Engine
  - 625 bhp CAT G398NA (CE-02/2E) – 4SRB Compressor Engine
  - 3,550 bhp CAT G3612LE (CE-03/3E thru CE-05/5E) – 4SLB Compressor Engines
  - 118 bhp Olympian G70LG (GE-01/8E) – 4SRB Emergency Generator Engine
- **NATURAL GAS FIRED HEATERS/BOILER UNIT DATA SHEETS**
  - 10.0 MMBtu/hr TXP1 Hot Oil Heater (H-01/9E)
  - 4.74 MMBtu/hr TXP-1 Regen Gas Heater (H-02/10E)
  - 6.60 MMBtu/hr TXP-2 Regen Gas Heater (H-03/11E)
  - 6.60 MMBtu/hr TXP-3 Regen Gas Heater (H-04/12E)
  - 21.22 MMBtu/hr TXP-2 Heat Medium Heater (H-05/13E)
  - 21.22 MMBtu/hr TXP-3 Heat Medium Heater (H-06/14E)
- **NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEETS**
  - 5.0 MMscfd Glycol Dehydration Unit 01 (DH-01/15E and BLR-01/16E)
  - 40 CFR Part 63; Subpart HH & HHH Registration Form
- **TRUCK LOAD-OUT UNIT DATA SHEET**
  - 600,000 gal/yr Produced Water Load-Out (TLO/20E))
- **STORAGE TANK UNIT DATA SHEETS**
  - 400 bbl 10.0 Produced Water Storage Tanks (T-03/22E and T-04/23E)

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment L - Emission Unit Data Sheet

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Facility		**Fort Beeler**		**Fort Beeler**		**Fort Beeler**	
Source Identification Number[1]		**CE-01/1E**		**CE-02/2E**		**CE-03/3E**	
Engine Manufacturer and Model		**CAT G342NA**		**CAT G398TA**		**CAT G3612LE**	
Manufacturer's Rated bhp/rpm		**225 / 1,200**		**625 / 1,200**		**3,550 / 1,000**	
Source Status[2]		**ES**		**ES**		**ES**	
Date Installed/Modified/Removed[3]		**2010/---**		**2011/---**		**2010/---**	
Manufactured/Reconstruction Date[4]		**Before 06/12/06**		**Before 06/12/06**		**After 06/12/06**	
Certified Engine (40CFR60 NSPS JJJJ)[5]		**No**		**No**		**No**	
Engine, Fuel and Combustion Data	Engine Type[6]	**RB4S**		**RB4S**		**LB4S**	
	APCD Type[7]	**NSCR**		**NSCR**		**OxCat**	
	Fuel Type[8]	**RG**		**RG**		**RG**	
	H_2S (gr/100 scf)	**0.2**		**0.2**		**0.2**	
	Operating bhp/rpm	**225 / 1,200**		**625 / 1,200**		**3,550 / 1,000**	
	BSFC (Btu/bhp-hr)	**8,500**		**8,387**		**6,629**	
	Fuel (ft^3/hr)	**2,079**		**5,698**		**25,579**	
	Fuel ($MMft^3$/yr)	**18.21**		**49.91**		**224.07**	
	Operation (hrs/yr)	**8,760**		**8,760**		**8,760**	
Reference[9]	PTE[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NOx	**0.05**	**0.22**	**0.69**	**3.02**	**3.91**	**17.14**
MD	CO	**0.99**	**4.35**	**0.69**	**3.04**	**2.15**	**9.43**
MD	VOC	**0.28**	**1.22**	**0.09**	**0.39**	**2.85**	**12.48**
AP	SOx	**0.00**	**0.01**	**0.00**	**0.01**	**0.02**	**0.07**
AP	PM10/2.5	**0.04**	**0.18**	**0.11**	**0.49**	**0.26**	**1.14**
MD	HCHO	**0.03**	**0.13**	**0.03**	**0.14**	**0.31**	**1.34**
MD/AP	Total HAP	**0.05**	**0.24**	**0.05**	**0.20**	**0.56**	**2.44**
MD/40CFR98	CO2e	**272**	**1,191**	**712**	**3,117**	**4,523**	**19,813**

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		CE-04/4E		CE-05/5E		GE-01/	
Engine Manufacturer and Model		CAT G3612LE		CAT G3612LE		Olympian G70LG	
Manufacturer's Rated bhp/rpm		3,550 / 1,000		3,550 / 1,000		118 / 1,800	
Source Status[2]		ES		ES		NS	
Date Installed/Modified/Removed[3]		2010/---		2010/---		2015/---	
Manufactured/Reconstruction Date[4]		After 06/12/06		After 06/12/06		After 01/01/09	
Certified Engine (40CFR60 NSPS JJJJ)[5]		No		No		No	
Engine, Fuel and Combustion Data		LB4S		LB4S		RB4S	
Engine, Fuel and Combustion Data	APCD Type[7]	OxCat		OxCat		na	
	Fuel Type[8]	RG		RG		RG	
	H_2S (gr/100 scf)	0.2		0.2		0.2	
	Operating bhp/rpm	3,550 / 1,000		3,550 / 1,000		118 / 1,800	
	BSFC (Btu/bhp-hr)	6,629		6,629		7,650	
	Fuel (ft^3/hr)	25,579		25,579		985	
	Fuel ($MMft^3$/yr)	224.07		224.07		0.49	
	Operation (hrs/yr)	8,760		8,760		500	
	PTE[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NOx	**3.91**	**17.14**	**3.91**	**17.14**	**0.93**	**0.23**
MD	CO	**2.15**	**9.43**	**2.15**	**9.43**	**29.10**	**7.28**
MD	VOC	**2.85**	**12.48**	**2.85**	**12.48**	**0.38**	**0.10**
AP	SOx	**0.02**	**0.07**	**0.02**	**0.07**	**8.9E-04**	**2.2E-04**
AP	PM10/2.5	**0.26**	**1.14**	**0.26**	**1.14**	**0.03**	**0.01**
MD	HCHO	**0.31**	**1.34**	**0.31**	**1.34**	**0.03**	**0.01**
MD/AP	Total HAP	**0.56**	**2.44**	**0.56**	**2.44**	**0.05**	**0.01**
MD/40CFR98	CO2e	**4,523**	**19,813**	**4,523**	**19,813**	**168**	**42**

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

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.

225 bhp CAT G342NA (4SRB@1,200 rpm)
Compressor Engine w/ NSCR

Prepared For:
Mr. Alan Kane

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G342 NA HCR
Horsepower:	225
RPM:	1200
Compression Ratio:	10.5:1
Exhaust Flow Rate:	851 ft³/min
Exhaust Temperature:	1170 °F
Reference:	LEBQ9194
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions Data

NO_x:	12.90	g/bhp-hr
CO:	13.70	g/bhp-hr
THC:	1.80	g/bhp-hr
NMHC:	N/A	g/bhp-hr
NMNEHC:	N/A	g/bhp-hr
HCHO:	N/A	g/bhp-hr
Oxygen:	0.50	%

POST CATALYST EMISSIONS

NO_x:	<0.1	g/bhp-hr
CO:	<2.0	g/bhp-hr
VOC:	<0.5	g/bhp-hr
HCHO:	>76%	reduction

CONTROL EQUIPMENT

Catalytic Converter

Model:	**EAS-1700T-0606F-22CEE**
Catalyst Type:	NSCR, Precious group metals
Manufacturer:	EMIT Technologies, Inc.
Element Size:	17" x 3.5"
Catalyst Elements:	2
Housing Type:	2 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	6 (0.5" NPT)
Inlet Connections:	6" Flat Face Flange
Outlet Connections:	6" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Critical
Insertion Loss:	20-25 dBA

Air Fuel Ratio Controller

Part Number:	**ENG-S-125-T**
Manufacturer:	EMIT Technologies, Inc.
Description:	**EDGE NG Air Fuel**
	4-Wire Narrowband
	Digital Power Valve
	O2 Sensor
	Wiring Harnesses
	(2) 25' Type K
Digital Power Valve Size:	1.25" NPT

225 bhp CAT G342NA (4SRB@1,200 rpm)
Compressor Engine w/ NSCR

WARRANTY

EMIT Technologies,Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of one (1) year from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures.

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

If a high temperature shut down switch is not installed, thermal deactivation of catalyst at temperatures above 1300 °F is not covered.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent.

Engine lubrication oil shall contain less than 0.6% ash (by weight) with a maximum allowable specific oil consumption of 0.01 gal/bhp-hr. The maximum ash loading on the catalyst shall be limited to 350 g/m3. Phosphorous and zinc additives are limited to 0.03% (by weight).

The catalyst must not be exposed to the following know poisoning agents, including: iron, nickel, sodium, chromium, arsenic, zinc, lead, phosphorous, silicon, potassium, magnesium, copper, tin, and mercury. Total poison concentrations in the gas are limited to 0.3 ppm.

625 bhp CAT G398TA (4SRB@1,200 rpm)
Compressor Engine w/ NSCR

EXTERRAN

Jun 27, 2011

Joey Owens
Exterran Energy Solutions LP
337 Industrial Dr
Oak Hill, WV 25901

Exterran
QHSE and Operations Services
16666 Northchase Drive
Houston, Texas 77060 U.S.A.

Main 281.836.7000
Fax 281.836.8161
www.exterran.com

Re: Engine Pedigree for Exterran Compressor Unit 70704, Engine Serial Number 73B01671

In order to better assist your company with any of its state and federal permitting needs, Exterran submits the following information in regards to the engine of the above-referenced compressor unit, which Exterran is currently utilizing to provide your company contract compression services. This letter should provide information necessary to answer questions pertaining to, but not limited to, the New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines, Subpart JJJJ. This information is current as of Jun 27, 2011.

Engine Make:	CATERPILLAR
Engine Model:	G398TAA
Engine Serial Number:	73B01671
Engine Type:	4 Stroke RB
Engine Category:	Existing
Engine Subcategory:	Non Certified
Engine NSPS Status*:	Exempt
Exemption Justification*:	Overhauls since 6/12/06 have not triggered recon./modif.
Engine Speed:	1200.00
OEM Rated HP:	625.00
Engine Manufacture Date:	Pre June 12, 2006
Customer:	N/A
Business Unit:	N/A
Exterran Unit Number:	70704
Customer Lease Name:	N/A

Please contact Kyle Poycker with any questions at or kyle.poycker@exterran.com.

* The "Engine NSPS Status" and "Exemption Justification" entries herein are based on Exterran's present knowledge of the engine in question and its reading of U.S. EPA's regulations and guidance pursuant to 40 C.F.R. Part 60, Subpart JJJJ. Any change in law or in the federal, state, or local interpretation of existing law could result in this engine being subject to additional or different legal requirements. These conclusions are Exterran's and are not offered as legal opinions or advice to your company. Additionally, any reconstruction or modification respecting this engine (as those terms are defined in the applicable regulations) could result in the applicability of Subpart JJJJ or other legal requirements to this engine and create legal compliance responsibilities for your company.

625 bhp CAT G398TA (4SRB@1,200 rpm)
Compressor Engine w/ NSCR

G398 EMISSIONS DATA @ STANDARD RATINGS

ENGINE	RATING (hp/rpm)	NOx	CO (gram/hp-hr)	HC	%02	A/FR vol/vol	Tstack deg F	EXH FLOW cfm	AIR FLOW kg/hr	BSFC Btu/hp-hr
NA HCR	500/1200									
	stand/catalyst	12.7	13.7	2.0	0.5	9.6	1100	2251	1437	7800
NA HCR	412/1000									
	stand	18.3	0.8	1.2	2.0	10.5	1090	1895	1225	7460
	catalyst	11.2	12.1	1.7	0.5	9.5	1101	1838	1139	7669
NA LCR	450/1200									
	stand/catalyst	11.4	11.5	0.8	0.5	9.5	1202	2435	1459	8803
NA LCR	375/1000									
	stand	15.1	0.8	0.8	2.0	10.4	1000	1778	1220	8273
	catalyst	11.3	11.8	0.8	0.5	9.5	1032	1720	1145	8582
TA LCR	625/1200									
	stand	20.5	0.8	0.8	2.0	10.5	1040	3053	2040	8026
	catalyst	9.8	10.7	0.8	0.5	9.5	1112	3043	1929	8387
TA LCR	550/1000									
	stand	19.0	0.9	0.9	2.0	10.4	1004	2558	1750	8011
	catalyst	9.7	9.7	0.9	0.5	9.5	1056	2445	1607	8052
TA LCR	700/1200									
	stand	18.3	0.8	1.1	2.0	—	1096	3107	1999	7936
TA HCR	700/1200									
	stand	15.2	1.1	0.9	2.0	10.5	1103	3278	2155	7778
	catalyst	9.4	9.9	1.6	0.5	9.5	1132	3144	1968	7850
TA LCR	610/1000									
	stand	16.8	0.9	1.2	2.0	—	984	2484	1723	7846
TA HCR	610/1000									
	stand	14.9	0.8	1.1	2.0	10.5	1064	2775	1825	7587
	catalyst	8.9	9.6	1.8	0.5	9.5	1075	3032	1698	7804
TA HCR 32C LOW EMIS	700/1200 stand	5.0	1.6	1.4	6.2	13.6	1010	4482	3100	7643
TA HCR 32C LOW EMIS	610/1000 stand	5.0	1.2	2.0	7.8	14.2	950	3841	2770	7529
TA HCR 54C LOW EMIS	625/1200 stand	5.0	1.5	1.3	6.0	13.6	992	4136	2890	7791
TA HCR 54C LOW EMIS	550/1000 stand	5.0	1.3	1.7	6.7	14.2	929	3210	2350	7563

625 bhp CAT G398TA (4SRB@1,200 rpm)
Compressor Engine w/ NSCR

Prepared For:
Kyle Poycker
EXTERRAN

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G398 TA LCR
Horsepower:	625
RPM:	1200
Compression Ratio:	7.0:1
Exhaust Flow Rate:	3043 CFM
Exhaust Temperature:	1112 °F
Reference:	LEBQ9194
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

NOx:	9.80 g/bhp-hr
CO:	10.70 g/bhp-hr
THC:	0.80 g/bhp-hr
NMHC:	N/A
NMNEHC:	N/A
HCHO:	N/A
Oxygen:	0.50 %

POST CATALYST EMISSIONS

NOx:	<0.5 g/bhp-hr
CO:	<0.5 g/bhp-hr
VOC:	<0.04 g/bhp-hr
HCHO:	>76% Reduction

CONTROL EQUIPMENT

Catalytic Converter

Model:	**EAS-2500T-0808F-21CEE**
Catalyst Type:	NSCR, Precious group metals
Manufacturer:	EMIT Technologies, Inc.
Element Size:	Round 25 x 3.5
Catalyst Elements:	1
Housing Type:	2 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	6 (0.5" NPT)
Inlet Connections:	8" Flat Face Flange
Outlet Connections:	8" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Critical
Insertion Loss:	20-25 dBA

Air Fuel Ratio Controller

Model:	**ENG-D-125-TA**
Manufacturer:	EMIT Technologies, Inc.
Description:	EDGE NG Air Fuel Ratio Controller (2) 4-Wire Narrowband O2 Sensor (2) Digital Power Valve (2) O2 Sensor Weldment Armored Wiring Harness (2) 25' Type K Thermocouple
Digital Power Valve Size:	1.25" NPT

WARRANTY

EMIT Technologies,Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of one (1) year from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst (Rich Burn Engines Only) shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures.

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

If a high temperature shut down switch is not installed, thermal deactivation of catalyst at temperatures above 1300 °F is not covered.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent.

Engine lubrication oil shall contain less than 0.6% ash (by weight) with a maximum allowable specific oil consumption of 0.01 gal/bhp-hr. The maximum ash loading on the catalyst shall be limited to 350 g/m3. Phosphorous and zinc additives are limited to 0.03% (by weight).

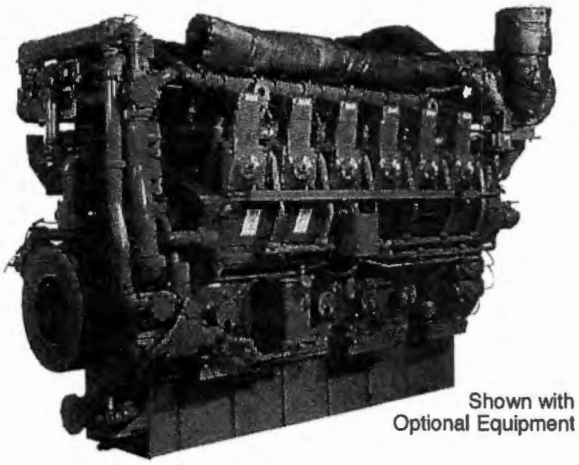
The catalyst must not be exposed to the following know poisoning agents, including: iron, nickel, sodium, chromium, arsenic, zinc, lead, phosphorous, silicon, potassium, magnesium, copper, tin, and mercury. Total poison concentrations in the gas are limited to 0.3 ppm.

3,550 bhp CAT G3612LE (4SLB@1,000 rpm)
Compressor Engines w/ OxCat (3X)
(Each)

CATERPILLAR®

G3612 LE Gas Petroleum Engine

2647-2823 bkW
(3550-3785 bhp)
1000 rpm



Shown with Optional Equipment

0.5 g/bhp-hr NOx or 0.7 g/bhp-hr NOx (NTE)

CAT® ENGINE SPECIFICATIONS

V-12, 4-Stroke-Cycle

Bore	300 mm (11.8 in.)
Stroke	300 mm (11.8 in.)
Displacement	254 L (15,528 cu. in.)
Aspiration	Turbocharged-Aftercooled
Digital Engine Management	
Governor and Protection	Electronic (ADEM™ A3)
Combustion	Low Emission (Lean Burn)
Engine Weight	
net dry (approx)	25,084 kg (55,300 lb)
Power Density	8.9 kg/kW (14.6 lb/hp)
Power per Displacement	14.9 bhp/L
Total Cooling System Capacity	734.4 L (194 gal)
Jacket Water	670 L (177 gal)
Aftercooler Circuit	64 L (17 gal)
Lube Oil System (refill)	1030 L (272 gal)
Oil Change Interval	5000 hours
Rotation (from flywheel end)	Counterclockwise
Flywheel Teeth	255

FEATURES

Engine Design
- Proven reliability and durability
- Ability to burn a wide spectrum of gaseous fuels
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Broad operating speed range

Emissions
Meets U.S. EPA Spark Ignited Stationary NSPS Emissions for 2010/11 with the use of an oxidation catalyst

Lean Burn Engine Technology
Lean-burn engines operate with large amounts of excess air. The excess air absorbs heat during combustion reducing the combustion temperature and pressure, greatly reducing levels of NOx. Lean-burn design also provides longer component life and excellent fuel consumption.

Ease of Operation
- High-strength pan and rails for excellent mounting and stability
- Side covers on block allow for inspection of internal components

Advanced Digital Engine Management
ADEM A3 engine management system integrates speed control, air/fuel ratio control, and ignition/detonation controls into a complete engine management system. ADEM A3 has improved: user interface, display system, shutdown controls, and system diagnostics.

Full Range of Attachments
Large variety of factory-installed engine attachments reduces packaging time.

Testing
Every engine is full-load tested to ensure proper engine performance.

Gas Engine Rating Pro
GERP is a PC-based program designed to provide site performance capabilities for Cat® natural gas engines for the gas compression industry. GERP provides engine data for your site's altitude, ambient temperature, fuel, engine coolant heat rejection, performance data, installation drawings, spec sheets, and pump curves.

Product Support Offered Through Global Cat Dealer Network
More than 2,200 dealer outlets

Cat factory-trained dealer technicians service every aspect of your petroleum engine

Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S•O•S℠ program matches your oil and coolant samples against Caterpillar set standards to determine:
- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

Over 80 Years of Engine Manufacturing Experience
Over 60 years of natural gas engine production

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

Web Site
For all your petroleum power requirements, visit www.catoilandgas.cat.com.

3,550 bhp CAT G3612LE (4SLB@1,000 rpm)
Compressor Engines w/ OxCat (3X)
(Each)

CATERPILLAR®

G3612 LE

2647-2823 bkW (3550-3785 bhp)

STANDARD EQUIPMENT

Air Inlet System
Air cleaner — standard duty
Inlet air adapter

Control System
A3 control system — provides electronic governing integrated with air/fuel ratio control and individual cylinder ignition timing control

Cooling System
Jacket water pump
Jacket water thermostats and housing
Aftercooler pump
Aftercooler water thermostats and housing
Single-stage aftercooler

Exhaust System
Dry wrapped exhaust manifolds
Vertical outlet adapter

Flywheel & Flywheel Housing
SAE standard rotation

Fuel System
Gas admission valves — electronically controlled fuel supply pressure

Ignition System
A3 control system — senses individual cylinder detonation and controls individual cylinder timing

Instrumentation
LCD display panel — monitors engine parameters and displays diagnostic codes

Lube System
Crankcase breathers — top mounted
Oil cooler
Oil filter
Oil pan drain valve

Mounting System
Engine mounting feet (six total)

Protection System
Electronic shutoff system with purge cycle
Crankcase explosion relief valves
Gas shutoff valve

Starting System
Air starting system

General
Paint — Cat yellow
Vibration dampers

OPTIONAL EQUIPMENT

Air Inlet System
Heavy-duty air cleaner with precleaners
Heavy-duty air cleaner with rain protection

Charging System
Charging alternators

Control System
Custom control system software — available for non-standard ratings, field programmable using flash memory

Cooling System
Expansion tank
Flexible connections
Jacket water heater

Exhaust System
Flexible bellows adapters
Exhaust expander
Weld flanges

Fuel System
Fuel filter
Gas pressure regulator
Flexible connection
Low energy fuel system
Corrosive gas fuel system

Ignition System
CSA certification

Instrumentation
Remote data monitoring and speed control
Compatible with Cat Electronic Technician (ET) and Data View
Communication Device — PL1000T/E
Display panel deletion is optional

Lube System
Air or electric motor-driven prelube
Duplex oil filter
LH or RH service
Lube oil makeup system

Mounting System
Mounting plates (set of six)

Power Take-Offs
Front stub shafts

Starting System
Air pressure reducing valve
Natural gas starting system

General
Engine barring device
Damper guard

3,550 bhp CAT G3612LE (4SLB@1,000 rpm)
Compressor Engines w/ OxCat (3X)
(Each)

CATERPILLAR®

G3612 LE

2647-2823 bkW (3550-3785 bhp)

TECHNICAL DATA

G3612 LE Gas Petroleum Engine — 1000 rpm

		DM5134-02	DM5309-05	DM5310-05	DM8607-01
Engine Power					
@ 100% Load	bkW (bhp)	2733 (3665)	2823 (3785)	2647 (3550)	2647 (3550)
@ 75% Load	bkW (bhp)	2050 (2729)	2117 (2839)	1985 (2663)	1985 (2663)
Engine Speed	rpm	1000	1000	1000	1000
Max Altitude @ Rated Torque and 38°C (100°F)	m (ft)	1219.2 (4000)	1219.2 (4000)	609.6 (2000)	304.8 (1000)
Speed Turndown @ Max Altitude, Rated Torque, and 38°C (100°F)	%	21	20	23	23
SCAC Temperature	°C (°F)	43 (110)	32 (90)	55 (130)	55 (130)
Emissions*					
NOx	g/bkW-hr (g/bhp-hr)	0.94 (0.7)	0.94 (0.7)	0.94 (0.7)	0.67 (0.5)
CO	g/bkW-hr (g/bhp-hr)	3.4 (2.5)	3.4 (2.5)	3.4 (2.5)	3.7 (2.75)
CO_2	g/bkW-hr (g/bhp-hr)	587 (438)	585 (436)	589 (439)	591 (441)
VOC**	g/bkW-hr (g/bhp-hr)	0.79 (0.59)	0.75 (0.56)	0.82 (0.61)	0.87 (0.65)
Fuel Consumption***					
@ 100% Load	MJ/bkW-hr (Btu/bhp-hr)	9.31 (6580)	9.28 (6561)	9.34 (6600)	9.38 (6629)
@ 75% Load	MJ/bkW-hr (Btu/bhp-hr)	9.7 (6856)	9.66 (6829)	9.74 (6883)	9.78 (6914)
Heat Balance					
Heat Rejection to Jacket Water					
@ 100% Load	bkW (Btu/min)	657 (37,360)	678 (38,565)	640 (36,401)	639 (36,360)
@ 75% Load	bkW (Btu/min)	576 (32,727)	594 (33,770)	546 (31,064)	548 (31,192)
Heat Rejection to Aftercooler					
@ 100% Load	bkW (Btu/min)	515 (29,299)	563 (32,045)	468 (26,661)	488 (27,783)
@ 75% Load	bkW (Btu/min)	281 (15,954)	310 (17,616)	252 (14,361)	264 (15,016)
Heat Rejection to Exhaust					
@ 100% Load	bkW (Btu/min)	2705 (153,813)	2743 (156,017)	2664 (151,486)	2673 (152,035)
@ 75% Load	bkW (Btu/min)	2152 (122,365)	2184 (124,184)	2132 (121,263)	2141 (121,731)
Exhaust System					
Exhaust Gas Flow Rate					
@ 100% Load	N•m³/bkW-hr (cfm)	690.14 (24,372)	705.85 (24,927)	674.20 (23,809)	682.15 (24,090)
@ 75% Load	N•m³/bkW-hr (cfm)	543.32 (19,187)	553.65 (19,552)	532.67 (18,811)	538.95 (19,033)
Exhaust Stack Temperature					
@ 100% Load	°C (°F)	453.30 (848)	448 (838)	459 (858)	448 (838)
@ 75% Load	°C (°F)	472.20 (882)	464 (867)	480 (896)	469 (876)
Intake System					
Air Inlet Flow Rate					
@ 100% Load	N•m³/bkW-hr (scfm)	265.78 (9386)	273.91 (9673)	257.66 (9099)	264.99 (9358)
@ 75% Load	N•m³/bkW-hr (scfm)	203.85 (7199)	210.00 (7416)	197.71 (6982)	203.34 (7181)
Gas Pressure	kPag (psig)	295-324 (42.8-47)	295-324 (42.8-47)	295-324 (42.8-47)	295-324 (42.8-47)

*at 100% load and speed, all values are listed as not to exceed
**Volatile organic compounds as defined in U.S. EPA 40 CFR 60, subpart JJJ
***ISO 3046/1

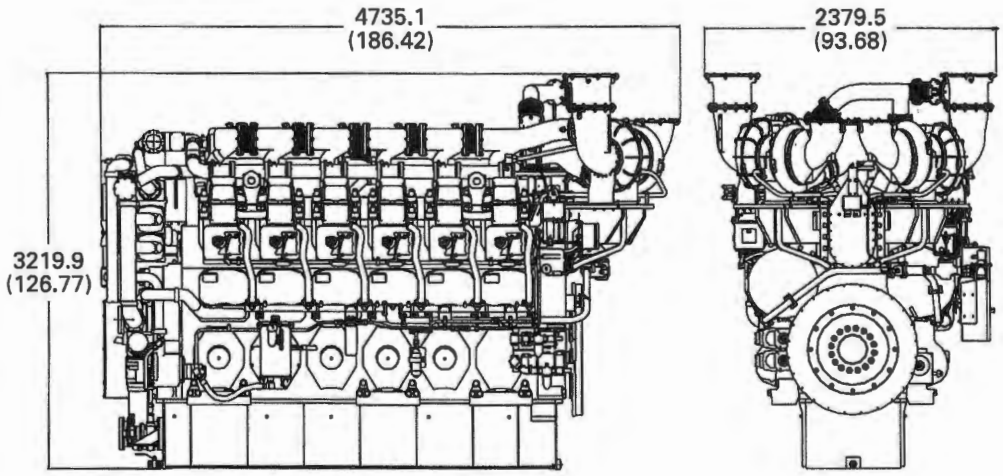
3,550 bhp CAT G3612LE (4SLB@1,000 rpm)
Compressor Engines w/ OxCat (3X)
(Each)

CATERPILLAR®

G3612 LE

2647-2823 bkW (3550-3785 bhp)

GAS PETROLEUM ENGINE



DIMENSIONS		
Length	mm (in)	4735.1 (186.42)
Width	mm (in)	2379.5 (93.68)
Height	mm (in)	3219.9 (126.77)
Shipping Weight	kg (lb)	25,084 (55,300)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

Conditions: Power for gas engines is based on fuel having an LHV of 33.74 kJ/L (905 Btu/cu ft) at 101 kPa (29.91 in. Hg) and 15° C (59° F). Fuel rate is based on a cubic meter at 100 kPa (29.61 in. Hg) and 15.6° C (60.1° F). Air flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and 25° C (77° F). Exhaust flow is based on a cubic foot at 100 kPa (29.61 in g) and stack temperature.

Performance Numbers: DM5134-02, DM5309-05, DM5310-05, DM8607-01
LEHW0041-01 (2-10)

10497 Town & Country Way, Ste. 940
Houston, TX 77024
Office: 307.673.0883 | Direct: 307.675.5073
cparisi@emittechnologies.com

Prepared For:
Kyle Poycker
EXTERRAN

QUOTE: QUO-07132-H8J5
Expires: September 13, 2012

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3612
Horsepower:	3550
RPM:	1000
Compression Ratio:	9.0:1
Exhaust Flow Rate:	24013 CFM
Exhaust Temperature:	838 °F
Reference:	DM8607-02
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	0.50	3.91	17.14
CO:	2.75	21.52	94.27
THC:	6.46	50.56	221.45
NMHC	1.82	14.25	62.42
NMNEHC:	0.65	5.05	22.13
HCHO:	0.26	2.06	9.02

O2: 12.80 %

POST CATALYST EMISSIONS

	% Reduction	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	Unaffected by Oxidation Catalyst			
CO:	>90 %	<0.28	<2.15	<9.43
VOC:	>51 %	<0.32	<2.47	<10.80
HCHO:	>85 %	<0.04	<0.31	<1.37

CONTROL EQUIPMENT

Catalytic Converter

Model:	**ELH-5000Z-1820F-43CEE-36 (QTY 2 Housings)**
Catalyst Type:	Oxidation, Precious group metals
Manufacturer:	EMIT Technologies, Inc.
Element Size:	Rectangle 36 x 15 x 3.5
Catalyst Elements:	3 (6 Total)
Housing Type:	4 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	9 (0.5" NPT)
Inlet Connections:	18" Flat Face Flange
Outlet Connections:	20" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA

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Houston, TX 77024
Office: 307.673.0883 | Direct: 307.675.5073
cparisi@emittechnologies.com

PRICING

		Quantity
ELH-5000Z-1820F-43CEE-36	*Carbon Steel*	2

WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of one (1) year from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

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

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

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

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

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

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft3. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 100 hours prior to catalyst installation, otherwise the warranty is void.

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

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

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

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

EXTERRAN

Oct 23, 2012

Chip Fenske
Exterran Energy Solutions
114 Cornerstone Drive
Marietta, OH 45750

Exterran
QHSE and Operations Services
16666 Northchase Drive
Houston, Texas 77060 U.S.A.

Main 281.836.7000
Fax 281.836.8161
www.exterran.com

Re: Engine Pedigree for Exterran Compressor Unit 77434, Engine Serial Number 1YG00128

In order to better assist your company with any of its state and federal permitting needs, Exterran submits the following information in regards to the engine of the above-referenced compressor unit, which Exterran is currently utilizing to provide your company contract compression services. This letter should provide information necessary to answer questions pertaining to, but not limited to, the New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines, Subpart JJJJ. This information is current as of Oct 23, 2012.

Engine Make:	CATERPILLAR
Engine Model:	G3612LE
Engine Serial Number:	1YG00128
Engine Type:	4 Stroke LB
Engine Category:	Existing
Engine Subcategory:	Non Certified
Engine NSPS Status*:	Exempt
Exemption Justification*:	Overhauls since 6/12/06 have not triggered recon./modif.
Engine Speed:	1000.00
OEM Rated HP:	3550.00
Engine Manufacture Date:	Jan 09, 1998
Customer:	CAIMAN EASTERN MIDSTREAM LLC
Business Unit:	Northeast
Exterran Unit Number:	77434
Customer Lease Name:	FORT BEELER RECOMPRESSOR #1

Please contact Erin Badough with any questions at 281-836-7514 or erin.badough@exterran.com.

* The "Engine NSPS Status" and "Exemption Justification" entries herein are based on Exterran's present knowledge of the engine in question and its reading of U.S. EPA's regulations and guidance pursuant to 40 C.F.R. Part 60, Subpart JJJJ. Any change in law or in the federal, state, or local interpretation of existing law could result in this engine being subject to additional or different legal requirements. These conclusions are Exterran's and are not offered as legal opinions or advice to your company. Additionally, any reconstruction or modification respecting this engine (as those terms are defined in the applicable regulations) could result in the applicability of Subpart JJJJ or other legal requirements to this engine and create legal compliance responsibilities for your company.

EXTERRAN

Oct 23, 2012

Chip Fenske
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114 Cornerstone Drive
Marietta, OH 45750

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QHSE and Operations Services
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www.exterran.com

Re: Engine Pedigree for Exterran Compressor Unit 77476, Engine Serial Number 1YG00256

In order to better assist your company with any of its state and federal permitting needs, Exterran submits the following information in regards to the engine of the above-referenced compressor unit, which Exterran is currently utilizing to provide your company contract compression services. This letter should provide information necessary to answer questions pertaining to, but not limited to, the New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines, Subpart JJJJ. This information is current as of Oct 23, 2012.

Engine Make:	CATERPILLAR
Engine Model:	G3612LE
Engine Serial Number:	1YG00256
Engine Type:	4 Stroke LB
Engine Category:	Existing
Engine Subcategory:	Non Certified
Engine NSPS Status*:	Exempt
Exemption Justification*:	No overhauls since 6/12/06
Engine Speed:	1000.00
OEM Rated HP:	3550.00
Engine Manufacture Date:	Apr 02, 2002
Customer:	CAIMAN EASTERN MIDSTREAM LLC
Business Unit:	Northeast
Exterran Unit Number:	77476
Customer Lease Name:	FORT BEELER RECOMPRESSOR #2

Please contact Erin Badough with any questions at 281-836-7514 or erin.badough@exterran.com.

* The "Engine NSPS Status" and "Exemption Justification" entries herein are based on Exterran's present knowledge of the engine in question and its reading of U.S. EPA's regulations and guidance pursuant to 40 C.F.R. Part 60, Subpart JJJJ. Any change in law or in the federal, state, or local interpretation of existing law could result in this engine being subject to additional or different legal requirements. These conclusions are Exterran's and are not offered as legal opinions or advice to your company. Additionally, any reconstruction or modification respecting this engine (as those terms are defined in the applicable regulations) could result in the applicability of Subpart JJJJ or other legal requirements to this engine and create legal compliance responsibilities for your company.

EXTERRAN

Oct 23, 2012

Chip Fenske
Exterran Energy Solutions
114 Cornerstone Drive
Marietta, OH 45750

Exterran
QHSE and Operations Services
16666 Northchase Drive
Houston, Texas 77060 U.S.A.

Main 281.836.7000
Fax 281.836.8161
www.exterran.com

Re: Engine Pedigree for Exterran Compressor Unit 77757, Engine Serial Number BKE00301

In order to better assist your company with any of its state and federal permitting needs, Exterran submits the following information in regards to the engine of the above-referenced compressor unit, which Exterran is currently utilizing to provide your company contract compression services. This letter should provide information necessary to answer questions pertaining to, but not limited to, the New Source Performance Standards (NSPS) for Stationary Spark Ignition Internal Combustion Engines, Subpart JJJJ. This information is current as of Oct 23, 2012.

Engine Make:	CATERPILLAR
Engine Model:	G3612LE
Engine Serial Number:	BKE00301
Engine Type:	4 Stroke LB
Engine Category:	Existing
Engine Subcategory:	Non Certified
Engine NSPS Status*:	Exempt
Exemption Justification*:	No overhauls since 6/12/06
Engine Speed:	1000.00
OEM Rated HP:	3550.00
Engine Manufacture Date:	Jan 31, 2006
Customer:	CAIMAN EASTERN MIDSTREAM LLC
Business Unit:	Northeast
Exterran Unit Number:	77757
Customer Lease Name:	FORT BEELER RECOMPRESSOR #3

Please contact Erin Badough with any questions at 281-836-7514 or erin.badough@exterran.com.

* The "Engine NSPS Status" and "Exemption Justification" entries herein are based on Exterran's present knowledge of the engine in question and its reading of U.S. EPA's regulations and guidance pursuant to 40 C.F.R. Part 60, Subpart JJJJ. Any change in law or in the federal, state, or local interpretation of existing law could result in this engine being subject to additional or different legal requirements. These conclusions are Exterran's and are not offered as legal opinions or advice to your company. Additionally, any reconstruction or modification respecting this engine (as those terms are defined in the applicable regulations) could result in the applicability of Subpart JJJJ or other legal requirements to this engine and create legal compliance responsibilities for your company.

OLYMPIAN™

2014 EPA SPARK-IGNITED EXHAUST EMISSIONS DATA

Effective since 2009, the EPA has implemented exhaust emissions regulations on stationary spark-ignited (gaseous) engine generators for emergency applications. All Olympian spark-ignited gensets, including LG and LTA series gensets, that are built with engines manufactured in 2009 and later meet the requirements of 40CFR part 60 subpart JJJJ and are EPA certified. These generator sets are labeled as EPA Certified with decals affixed to the engines' valve cover(s).

The attached documents summarize the general information relevant to EPA certification on these generator sets. This information can be used for submittal data and for permitting purposes, if required. These documents include the following information:

EPA Engine Family
The EPA Engine Family is assigned by the Manufacturer under EPA guidelines for certification purposes and appears on the EPA certificate.

Catalyst Required
Indicates whether an exhaust catalyst and Air/Fuel Ratio control system are required on the generator set to meet EPA certification requirements. Generally, units rated 80kW and smaller do not require a catalyst to meet EPA certification requirements. Please note that some units that do not require a catalyst to meet EPA requirements do need a catalyst if the California SCAQMD option is selected. Please see "California SCAQMD" below for additional information on this option.

Combination Catalyst or Separate Catalyst
LG series generator sets typically utilize a single combination catalyst/silencer as part of meeting EPA certification requirements. Many LTA series generator sets use the same engines as LG series units, but have different exhaust configurations that require the use of conventional silencers with additional separate catalysts installed.

EPA Certificate Number
Upon certification by the EPA, a Certificate Number is assigned by the EPA.

Emissions Actuals - Grams/bhp-hr
Actual exhaust emission data for Total Hydrocarbons (THC), Nitrogen Oxides (NOx) and Carbon Monoxide (CO) that were submitted to EPA and are official data of record for certification. This data can be used for permitting if necessary. Values are expressed in grams per brake horsepower-hour; to convert to grams/kW-hr, multiply by 1.341. Please see advisory notes below for further information.

California Units, SCAQMD CEP Number
A separate low-emissions option is available on many Olympian gaseous-fueled generator sets to comply with the more stringent South Coast Air Quality Management District requirements that are recognized in certain areas in California. Gensets that include this option are also EPA Certified.

General Advisory Note to Dealers

The information provided here is proprietary to Olympian and its' authorized dealers. This information may only be disseminated upon request, to regulatory governmental bodies for emissions permitting purposes or to specifying organizations as submittal data when expressly required by project specifications, and shall remain confidential and not open to public viewing. This information is not intended for compilation or sales purposes and may not be used as such, nor may it be reproduced without the expressed written permission of Olympian Power Systems, Inc.

Advisory Notes on Emissions Actuals

- The stated values are actual exhaust emission test measurements obtained from units representative of the generator types and engines described.
- Values are official data of record as submitted to the EPA and SCAQMD for certification purposes. Testing was conducted in accordance with prevailing EPA protocols, which are typically accepted by SCAQMD and other regional authorities.
- No emission values provided are to be construed as guarantees of emissions levels for any given Olympian generator unit.
- Olympian Power Systems reserves the right to revise this information without prior notice.
- Consult state and local regulatory agencies for specific permitting requirements.
- The emissions performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and must be consulted by the permit applicant/equipment owner prior to equipment purchase or installation. The data supplied herein by Olympian Power Systems cannot be construed as a guarantee of installability of the generator set.
- The emission values provided are the result of multi-mode, weighted scale testing in accordance with EPA testing regulations, and may not be representative of any specific load point.
- The emission values provided are not to be construed as emission limits.

OLYMPIAN™

2014 EPA Certified Gas Industrial Generators - Non California Units

	Model	Engine	EPA Engine Family	Fuel	CAT Req'd	Comb Cat or Separate Cat	EPA Cert #	Grams/bhp-hr.			Rated RPM	BHP	Fuel Flow (lb/hr)
								THC	NOx	CO			
Small Spark Ignited Engines - SSIE (SORE)	G25LTA	2.4	EGNXB02.42NN	NG	No	NR	EGNXB02.42NN-008	2.14	2.37	93.95	1800	38.39	16.52
	G25LTA	2.4	EGNXB02.42NL	LPG	No	NR	EGNXB02.42NL-003	1.43	4.38	86.18	1800	43.29	17.59
	G35LG	5.4	EGNXB05.42NN	NG	No	NR	EGNXB05.42NN-012	1.60	2.52	95.32	1800	82.10	36.91
	G35LG	5.4	EGNXB05.42NL	LPG	No	NR	EGNXB05.42NL-013	1.24	3.45	112.01	1800	82.30	34.60
	G40LG	5.4	EGNXB05.42NN	NG	No	NR	EGNXB05.42NN-012	1.60	2.52	95.32	1800	82.10	36.91
	G40LG	5.4	EGNXB05.42NL	LPG	No	NR	EGNXB05.42NL-013	1.24	3.45	112.01	1800	82.30	34.60
	G45LG	5.4	EGNXB05.42NN	NG	No	NR	EGNXB05.42NN-012	1.60	2.52	95.32	1800	82.10	36.91
	G45LG	5.4	EGNXB05.42NL	LPG	No	NR	EGNXB05.42NL-013	1.24	3.45	112.01	1800	82.30	34.60
	G50LG	5.4	EGNXB05.42NN	NG	No	NR	EGNXB05.42NN-012	1.60	2.52	95.32	1800	82.10	36.91
	G50LG	5.4	EGNXB05.42NL	LPG	No	NR	EGNXB05.42NL-013	1.24	3.45	112.01	1800	82.30	34.60
	G50LG	6.8	EGNXB06.82NN	NG	No	NR	EGNXB06.82NN-001	1.46	6.57	30.88	1800	84.90	37.17
	G50LG	6.8	EGNXB06.82NL	LPG	No	NR	EGNXB06.82NN-002	1.86	2.67	172.30	1800	84.66	46.55
	G60LG	6.8	EGNXB06.82NN	NG	No	NR	EGNXB06.82NN-001	1.47	2.94	75.88	1800	96.67	38.76
	G60LG	6.8	EGNXB06.82NL	LPG	No	NR	EGNXB06.82NN-002	1.26	4.23	99.05	1800	96.60	41.20
	G70LG	6.8	EGNXB06.82NN	NG	No	NR	EGNXB06.82NN-001	1.46	3.55	68.40	1800	109.72	42.37
	G70LG	6.8	EGNXB06.82NL	LPG	No	NR	EGNXB06.82NN-002	1.26	3.28	111.49	1800	118.41	51.86
	G80LG	9.0	EGNXB08.92NN	NG	No	NR	EGNXB08.92NN-003	0.94	3.91	41.13	1800	125.96	44.32
	G80LG (DF)	9.0	EGNXB08.92NN	NG/LPV	No	NR	EGNXB08.92NN-003	0.76	2.81	42.10	1800	124.83	46.19
	G80LG (DF)	9.0	EGNXB08.92NN	NG/LPL	No	NR	EGNXB08.92NN-003	0.69	2.89	30.46	1800	124.61	44.16
	G80LG	9.0	EGNXB08.92NL	LPV	No	NR	EGNXB08.92NL-004	0.78	2.67	78.16	1800	126.21	49.55
	G80LG	9.0	EGNXB08.92NL	LPL	No	NR	EGNXB08.92NL-004	1.11	4.02	67.70	1800	120.57	50.62
Large Spark-Ignited Engines - (LSIE)	G130LG	6.8	EGNXB06.82C3	NG	Yes	Cat Muff	EGNXB06.82C3-031	0.06	0.05	0.92	3000	193.49	72.31
	G130LG	6.8	EGNXB06.82C4	LPG	Yes	Cat Muff	EGNXB06.82C4-032	0.03	0.21	1.06	3000	208.48	79.99
	G130LG (DF)	6.8	EGNXB06.82C3	NG & LP	Yes	Cat Muff	EGNXB06.82C3-031	0.06	0.05	0.92	3000	193.49	72.31
	G150LG	6.8	EGNXB06.82C3	NG	Yes	Cat Muff	EGNXB06.82C3-031	0.18	0.14	1.54	3600	231.00	91.34
	G150LG	6.8	EGNXB06.82C4	LPG	Yes	Cat Muff	EGNXB06.82C4-032	0.03	1.18	1.56	3600	230.13	89.41
	G150LG (DF)	6.8	EGNXB06.82C3	NG & LP	Yes	Cat Muff	EGNXB06.82C3-031	0.18	0.14	1.54	3600	231.00	91.34
	G100LG	9.0	EGNXB08.92C1	NG	Yes	Cat Muff	EGNXB08.92C1-034	0.17	0.003	0.06	1800	148.90	46.86
	G100LG (DF)	9.0	EGNXB08.92C1	NG/LPV	Yes	Cat Muff	EGNXB08.92C1-034	0.30	0.400	0.79	1800	133.16	45.36
	G100LG (DF)	9.0	EGNXB08.92C1	NG/LPL	Yes	Cat Muff	EGNXB08.92C1-034	0.34	0.006	1.10	1800	135.75	45.47
	G100LG	9.0	EGNXB08.92C2	LPG	Yes	Cat Muff	EGNXB08.92C2-035	0.03	0.08	0.13	1800	157.67	53.08
	G100LG	9.0	EGNXB08.92C2	LPL	Yes	Cat Muff	EGNXB08.92C2-035	0.07	0.04	0.30	1800	156.15	54.47
	G150LG	12.9	EGNXB12.92C2	NG	Yes	Cat Muff	EGNXB12.92C2-039	0.53	0.13	0.53	1800	307.87	107.99
	G175LG	12.9	EGNXB12.92C2	NG	Yes	Cat Muff	EGNXB12.92C2-039	0.53	0.13	0.53	1800	307.87	107.99
	G200LG	12.9	EGNXB12.92C2	NG	Yes	Cat Muff	EGNXB12.92C2-039	0.53	0.13	0.53	1800	307.87	107.99
	G230LG	12.9	EGNXB12.92C2	NG	Yes	Cat Muff	EGNXB12.92C2-039	0.38	0.03	0.53	1800	379.10	125.30
	G250LG	12.9	EGNXB12.92C2	NG	Yes	Cat Muff	EGNXB12.92C2-039	0.38	0.03	0.53	1800	379.10	125.30
	G275LG	12.9	EGNXB12.92C3	NG	Yes	Cat Muff	EGNXB12.92C3-041	0.06	0.06	0.81	2150	477.00	164.20
	G300LG	12.9	EGNXB12.92C3	NG	Yes	Cat Muff	EGNXB12.92C3-041	0.06	0.06	0.81	2150	477.00	164.20

(DF): Dual Fuel NR: Not Required

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

(Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.)

Source ID #[1]	Status[2]	Design Heat Input (MMBtu/hr)[3]	Hours of Operation (hrs/yr)[4]	Fuel Heating Value (Btu/scf)[5]	
H-01	**Exist**	**10.0**	**8,760**	**920 (LHV)**	
H-02	**Exist**	**4.74**	**8,760**	**920 (LHV)**	
H-03	**Exist**	**6.60**	**8,760**	**920 (LHV)**	
H-04	**Exist**	**6.60**	**8,760**	**920 (LHV)**	
H-05	**Exist**	**21.22**	**8,760**	**920 (LHV)**	
H-06	**Exist**	**21.22**	**8,760**	**920 (LHV)**	

Notes to NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

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

10.0 MMBtu/hr Hot Oil Heater
8.402 MMBtu/hr / 0.84 eff. = 10.0 MMBtu/hr

THOMAS RUSSELL CO.

Tulsa, Oklahoma

JOB NO: TRJ-211
CLIENT: Chesapeake Energy
SUBJECT: 120 MM Cryo Plant

DATE: 11/13/2008
BY: JRG

FIRED HEATER

Service:	HMO Heater			Tag No:	H-781
Design Duty, MBTU/Hr	8,402			Type:	Helical Coil
No. of Coils per Unit	One	No. Units:	One	Model:	Heatec HCI-8010-50-G

Fluid		Therminol 55		**Burners**			
		Inlet	Outlet			Gas	Oil
Liquids	Lbs/Hr	129,300	129,300	LHV (BTU/cf)		900	
Density	Lbs/CuFt	51.55	48.75	Mol. Wt.		16.2	
Molecular Weight		320	320	Gravity			
Specific Heat	BTU/Lb °F	0.5135	0.5695	Pressure Avail. (psig)		100	
Thermal Cond.	BTU/Hr-Ft-°F	0.0697	0.0652	Pressure Req'd (psig)			
Viscosity	cP	3.74	1.25	Steam for Atomizing			
Vapor	Lbs/Hr	0	0	Fuel Gas Req'd (MSCFD)		173.2	N/A
Density	Lbs/CuFt			Mfgr:	Eclipse Ratiomatic 2000		
Molecular Weight				Type:	Forced Draft - 20 Hp Blower		
Specific Heat	BTU/Lb °F			Number Req'd	One		
Thermal Cond.	BTU/HrFt °F			Pilots Req'd	Yes, electric ignition		
Viscosity	cP			Nox	< 65 ppmvd		
Operating Temp.	°F	190	310	**Structural Design**			
Operating Pressure	PSIA	75	55	Wind Load, MPH, (3)			
Velocity	Ft/Sec	Allow.	Calc.	Seismic Zone, (3)			
Pressure Drop	PSI	20 Allow.	Calc.	Ambient, °F	-20 / 110		
Fouling Resistance	SqFt*F/BTU	0.002		Elevation, Ft	3000		
Design Press. / Temp.		150 PSIG	400 °F	**Stack Design**			
Min. Design Mtl. Temp.		-20 °F @	150 PSIG	Self-supporting	Yes		
Corrosion Allowance		0.0625		Minimum Height	8 ft above top of heater		
Insulation Thickness		3" - 5" Ceramic Fiber on Interior		Minimum Wall Thickness:	0.125		
Efficiency-Based on LHV	(%)	84.0%	(Assume 3% Loss)	Lining Type	No		
Excess Air		15%		Lining Thickness:	No		
Firebox Unit Heat Release		25,300	BTU/Hr- Ft^3	Damper:	No		
Number of Passes		One - process, Two -fireside					

Coil Design		**Radiant**	**Convection-Bare**	**Convection-Finned**
Gas Temperature	In/Out	190 / 310		
Number Tubes		One		
Tube O.D.	In	5" Sch. 40	5"300# ANSI RFWN Flg.	Inlet and Outlet
Tube Length	Eff. Ft	----		
Bare Surface	Sq Ft	1,130		
Finned Surface	Sq Ft	N/A		
Avg. Heat Flux	BTU/Hr-Sq Ft	13,241		
Tube Materials		SA- 106 Gr. B	SA-	SA-

Convection Fins (inch):	Height:	Thickness:	No. / inch:	Material:	
Overall Dimension:	29' - 2" L x 8' - 9" W x 10' - 0" H (less stack)			28,300 lbs dry weight	
Code Requirements:	ASME VIII Div I		Stamp: Yes	Nat'l Board:	Yes

Notes:

1) Add 15% to duty and flow rates for design.
2) See attached Scope of Supply.
3) Wind design per ASCE 7-05, I=1.15, Exposure C. Seismic design per ASCE 7-05, I=1.25, Site D, S_S=100%, S_1=40%.
4) Electrical power to be 480 v / 3 ph / 60 hz. Control enclosures to be NEMA 4.
5) Add spare ignitor.

REVISION	A			
ENGINEER/DATE	JRG 11/13/08			
ISSUED FOR	RFQ			

4.74 MMBtu/hr Hot Oil Heater
4.079 MMBtu/hr / 0.86 eff. = 4.74 MMBtu/hr

THOMAS RUSSELL CO.

Tulsa, Oklahoma

JOB NO: TRJ-211
CLIENT: Chesapeake Energy
SUBJECT: 120 MM Cryo Plant

DATE: 7/31/2008
BY: AHO

FIRED HEATER

Service:	Regen Gas Heater			Tag No:	H-741
Design Duty, MBTU/Hr	4079			Type:	Helical Coil
No. of Coils per Unit	One	No. Units:	One	Model:	Heatec HCI-4010-40-G

Fluid		Regen Gas Inlet	Regen Gas Outlet
Liquids	Lbs/Hr		
Density	Lbs/CuFt		
Molecular Weight			
Specific Heat	BTU/Lb °F		
Thermal Cond.	BTU/Hr-Ft-°F		
Viscosity	cP		
Vapor	Lbs/Hr	15293	15293
Density	Lbs/CuFt	3.803	1.871
Molecular Weight		21.43	21.43
Specific Heat	BTU/Lb °F	0.6041	0.7047
Thermal Cond.	BTU/HrFt °F	0.02298	0.04196
Viscosity	cP	0.01427	0.0199
Operating Temp.	°F	130	550
Operating Pressure	PSIA	950	940
Velocity	Ft/Sec		Calc.
Pressure Drop	PSI	10 Allow.	2 Calc.
Fouling Resistance	SqFt*F/BTU	0.001	
Design Press. / Temp.		1095 PSIG	650 °F
Min. Design Mtl. Temp.		-20 °F @	1095 PSIG
Corrosion Allowance		0.0625	
Insulation Thickness		3-5" high temp ceramic fiber	
Efficiency-Based on LHV	(%)	86.0%	(Assume 3% Loss)
Excess Air		15	
Firebox Unit Heat Release		32,900	BTU/Hr- Ft^3
Number of Passes		One - process , Two fireside	

Burners		Gas	Oil
LHV	(BTU/cf)	905	
Mol. Wt.		16.2	
Gravity			
Pressure Avail.	(psig)	100	
Pressure Req'd	(psig)	10	
Steam for Atomizing			
Fuel Gas Req'd (MSCFD)		129.56	N/A
Mfgr:		Eclipse WiNOx	
Type:		Forced Draft - 20 Hp Blower	
Number Req'd		One	
Pilots Req'd		Yes, electric ignition	
NOx		40 ppmvd	

Structural Design	
Wind Load, MPH, (3)	
Seismic Zone, (3)	
Ambient, °F	-20 / 110
Elevation, Ft	3000

Stack Design	
Self-supporting	Yes
Minimum Height	8 ft above top of heater
Minimum Wall Thickness:	0.125
Lining Type	No
Lining Thickness:	No
Damper:	No

Coil Design		Radiant	Convection-Bare	Convection-Finned
Gas Temperature	In/Out	89 / 550		
Number Tubes		One		
Tube O.D.	In	Single Circuit 4"	4" 900# ANSI RTJ Flg	Inlet and Outlet
Tube Length	Eff. Ft	----		
Bare Surface	Sq Ft	569		
Finned Surface	Sq Ft	N/A		
Avg. Heat Flux	BTU/Hr-Sq Ft	8,084		
Tube Materials		SA-106 Gr.B Sch 80	SA-	SA-

Convection Fins (inch):	Height:	Thickness:	No. / inch:	Material:	
Overall Dimension:	20' - 4" L x 6' - 0" W x 7' - 0" H (Less Stack)			Dry Weight:	14,600 lbs
Code Requirements:	ASME VIII Div I		Stamp: Yes	Nat'l Board:	Yes

Notes:

1) Add 30% to duty and add 10% to flow rates for design.
2) See attached Scope of Supply.
3) Wind design per ASCE 7-05, I=1.15, Exposure C. Seismic design per ASCE 7-05, I=1.25, Site D. , S_S =100% , S_1 =40%
4) Electrical power to be 480 v / 3 ph / 60 hz. Control enclosures to be NEMA 4.
5) Add spare ignitor.

REVISION	A	0	1	
ENGINEER/DATE	AHO 7/31/08	DDO 9/3/08	JRG 12/9/08	
ISSUED FOR	Check Rate	Purchase	Revised Process	

6.59 MMBtu/hr Hot Oil Heater
5.605 MMBtu/hr / 0.85 eff. = 6.59 MMBtu/hr (each)

THOMAS RUSSELL CO.
Tulsa, Oklahoma

JOB NO: 231
CLIENT:
SUBJECT: 200 MMscfd Cryo Plant

DATE: 9/21/2010
BY: JRG
231-13

FIRED HEATER

Service: Regen Gas Heater
Design Duty, MBTU/Hr 5605
No. of Coils per Unit One No. Units: One

Tag No: H-741
Type: Helical Coil
Model: Heatec HCI-5010-40-G

Fluid		Regen Gas Inlet	Regen Gas Outlet
Liquids	Lbs/Hr	0	0
Density	Lbs/CuFt		
Molecular Weight			
Specific Heat	BTU/Lb °F		
Thermal Cond.	BTU/Hr-Ft-°F		
Viscosity	cP		
Vapor	Lbs/Hr	20840	20840
Density	Lbs/CuFt	3.824	1.885
Molecular Weight		21.57	21.57
Specific Heat	BTU/Lb °F	0.6169	0.7189
Thermal Cond.	BTU/HrFt °F	0.0232	0.0422
Viscosity	cP	0.0143	0.0198
Operating Temp.	°F	135	550
Operating Pressure	PSIA	949	939
Velocity	Ft/Sec	Allow.	28.7 Calc.
Pressure Drop	PSI	10 Allow.	6 Calc.
Fouling Resistance	SqFt*F/BTU	0.001	
Design Press. / Temp.		1095 PSIG	650 °F
Min. Design Mtl. Temp.		-20 °F @	1095 PSIG
Corrosion Allowance		0.0625	
Insulation Thickness		3" - 5" ceramic fiber on the interior	
Efficiency-Based on LHV	(%)	85.0%	(Assume 3% Loss)
Excess Air		15	
Firebox Unit Heat Release		27,800	BTU/Hr- Ft^3
Number of Passes		One - process, Two - fireside	

Burners	Gas	Oil
LHV (BTU/cf)	973	
Mol. Wt.	18.26	
Gravity		
Pressure Avail. (psig)	100	
Pressure Req'd (psig)	10	
Steam for Atomizing		
Fuel Gas Req'd (MSCFD)	167.53	N/A
Mfgr:	Eclipse WiNOX	
Type:	Forced Draft - 20 Hp Blower	
Number Req'd	One	
Pilots Req'd	Yes , electrical ignition	
NOx	40 ppm	

Structural Design	
Wind Load, MPH, (3)	90, Exp.C, I=1.15, Cf=0.7
Seismic Zone, (3)	I = 1.25
Ambient, °F	-20 / 110
Elevation, Ft	750

Stack Design	
Self-supporting	Yes
Minimum Height	8 ft above top of heater
Minimum Wall Thickness:	0.125
Lining Type	No
Lining Thickness:	No
Damper:	No

Coil Design		Radiant	Convection-Bare	Convection-Finned
Gas Temperature	In/Out	135 / 550		
Number Tubes		One		
Tube O.D.	In	Single Circuit 4"	4" 900# RTJ Flg	Inlet and Outlet
Tube Length	Eff. Ft	-----		
Bare Surface	Sq Ft	697		
Finned Surface	Sq Ft	N/A		
Avg. Heat Flux	BTU/Hr-Sq Ft	8,278		
Tube Materials		SA-106 Gr.B Sch 80	SA-	SA-

Convection Fins (inch): Height: Thickness: No. / inch: Material:
Overall Dimension: 25' - 8" L x 7' - 0" W x 8' - 6" H (less stack) Dry Weight: 18,450 lbs
Code Requirements: ASME VIII Div I Stamp: Yes Nat'l Board: Yes

Notes:
1) **Add 30% to duty and 10% flow rates for design.**
2) See attached Scope of Supply.
3) Wind design per ASCE 7-05, I=1.15, Exposure C. Seismic design per ASCE 7-05, I=1.25, Site D. , S_S =40% , S_1 =8%
4) Electric power to be 480 v / 3 ph / 60 hz. Control enclosures to be NEMA 4.
5) Add Spare ignitor.

REVISION	A		0			
ENGINEER/DATE	JRG	9/21/10	JRG	9/21/10		
ISSUED FOR	RFQ		Purchase			

21.22 MMBtu/hr Hot Oil Heater
17.4 MMBtu/hr / 0.82 eff. = 21.22 MMBtu/hr (each)

THOMAS RUSSELL CO.
Tulsa, Oklahoma

JOB NO: TRJ-231
CLIENT: Wilson Midstream Services
SUBJECT: 200 MMscfd Cryo Plant

DATE: 9/21/2010
BY: JRG

FIRED HEATER

Service: HMO Heater for E-207
Design Duty, MBTU/Hr 17,400
No. of Coils per Unit One No. Units: One

Tag No: H-781
Type: Helical Coil
▲ Model: HCI-10010-40(D)-G

Fluid		50:50 TEG - Water	
		Inlet	Outlet
Liquids	Lbs/Hr	333,142	333,142
Density	Lbs/CuFt	64.15	62.56
Molecular Weight		32.17	32.17
Specific Heat	BTU/Lb °F	0.859	0.882
Thermal Cond.	BTU/Hr-Ft-°F	0.223	0.220
Viscosity	cP	1.186	0.831
Vapor	Lbs/Hr	0	0
Density	Lbs/CuFt		
Molecular Weight			
Specific Heat	BTU/Lb °F		
Thermal Cond.	BTU/HrFt °F		
Viscosity	cP		
Operating Temp.	°F	195	255
Operating Pressure	PSIA	90	
Velocity	Ft/Sec		▲ 8 Calc.
Pressure Drop	PSI	20 Allow.	▲ 17 Calc.
Fouling Resistance	SqFt*F/BTU	0.0020	
Design Press. / Temp.		150 PSIG	400 °F
Min. Design Mtl. Temp.		-20 °F @	150 PSIG
Corrosion Allowance		0.125	
Insulation Thickness		3-5" high temp ceramic fiber	
Efficiency-Based on LHV	(%)	▲ 82.0%	(Assume 3% Loss)
Excess Air		15	
Firebox Unit Heat Release		▲ 28,834	BTU/Hr- Ft^3
Number of Passes		▲ Two - Process, Two - Fireside	

Burners	Gas	Oil
LHV (BTU/scf)	973	
Mol. Wt.	18.26	
Gravity		
Pressure Avail. (psig)	100	
Pressure Req'd (psig)		
Steam for Atomizing		
Fuel Gas Req'd (MSCFD)	539.10	N/A
Mfgr:	Eclipse Ratiomatic	
Type:	▲ Forced Draft - 40 HP Blower	
Number Req'd	One	
Pilots Req'd (Note 4)	Yes, electrical ignition	
NOx	▲ < 75 ppmvd	

Structural Design	
Wind Load, MPH, (3)	
Seismic Zone, (3)	
Ambient, °F	-20 / 110
Elevation, Ft	1300

Stack Design	
Self-supporting	Yes
Minimum Height	8 ft above top of heater
Minimum Wall Thickness:	0.125
Lining Type	No
Lining Thickness:	No
Damper:	No

Coil Design		Radiant	Convection-Bare	Convection-Finned	
Gas Temperature	In/Out	195 / 255			
Number Tubes		▲ Two			
Tube O.D.	In	▲ 4" Sch 40		Inlet and Outlet	▲ 8" 300# RFWN
Tube Length	Eff. Ft	-----			
Bare Surface	Sq Ft	▲ 1,453			
Finned Surface	Sq Ft	N/A			
Avg. Heat Flux	BTU/Hr-Sq Ft	▲ 15,235			
Tube Materials		SA- 106 Gr. B	SA-	SA-	

Convection Fins (inch): Height: Thickness: No. / inch: Material:
Overall Dimension: ▲ 25.9' L x 9.2' W x 10' H (Less Stack) ▲ 30,000 lbs Dry Weight
Code Requirements: ASME VIII Div I Stamp: Yes Nat'l Board: Yes

Notes:
1) Add 10% to duty and flow rates for design.
2) See attached Scope of Supply.
3) Wind design per ASCE 7-05, I=1.15, Exposure C. Seismic design per ASCE 7-05, I=1.25, Site D. , S_S =40% , S_1 =8%
4) Add Spare ignitor

REVISION	▲ 3		0		1		2	
ENGINEER/DATE	JRG	1/11/11	JRG	9/21/10	GER	11/22/10	JRG	1/10/11
ISSUED FOR	Revised - Purchase		Purchase		Revised		Revised	

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment L - Emission Unit Data Sheet

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		**KWI - TEG DEHYDRATOR**	
		Max Dry Gas Flow Rate (MMscf/day)		**5.0**	
		Design Heat Input (MMBtu/hr) - HHV		**0.22**	
		Design Type (DEG or TEG)		**TEG**	
		Source Status[2]		**ES**	
		Date Installed/Modified/Removed[3]		**2011/---**	
		Regenerator Still Vent APCD[4]		**NA**	
		Fuel HV (Btu/scf) - HHV		**1,020**	
		H_2S Content (gr/100 scf)		**0.2**	
		Operation (hrs/yr)		**8,760**	
Source ID #[1]	Vent	Reference[5]	PTE[6]	lbs/hr	tons/yr
DH-01/15E	**Dehydrator 01 (Flash Tank and Still Vent (Regenerator))**	**GRI-GLYCalc**	**VOC**	**3.88**	**17.00**
		GRI-GLYCalc	**Benzene**	**0.07**	**0.31**
		GRI-GLYCalc	**Ethylbenzene**	**---**	**---**
		GRI-GLYCalc	**Formaldehyde**	**---**	**---**
		GRI-GLYCalc	**n-Hexane**	**0.07**	**0.30**
		GRI-GLYCalc	**Toluene**	**0.31**	**1.34**
		GRI-GLYCalc	**2,2,4-TMP**	**---**	**---**
		GRI-GLYCalc	**Xylenes**	**0.98**	**4.27**
		GRI-GLYCalc	**Other HAPs**	**---**	**---**
		GRI-GLYCalc	**Total HAP**	**1.42**	**6.22**
		40CFR98	**CO2e**	**128**	**562**
Source ID #[1]	Vent	Reference[5]	PTE[6]	lbs/hr	tons/yr
BLR-01/16E	**Reboiler 01**	**AP**	**NOx**	**0.02**	**0.10**
		AP	**CO**	**0.02**	**0.08**
		AP	**VOC**	**1.2E-03**	**0.01**
		AP	**SO2**	**1.3E-04**	**5.7E-04**
		AP	**PM10/2.5**	**1.7E-03**	**0.01**
		Sum	**Benzene**	**4.6E-07**	**2.0E-06**
		AP	**Ethylbenzene**	**---**	**---**
		AP	**Formaldehyde**	**1.6E-05**	**7.1E-05**
		AP	**n-Hexane**	**3.9E-04**	**1.7E-03**
		AP	**Toluene**	**7.4E-07**	**3.2E-06**
		AP	**2,2,4-TMP**	**---**	**---**
		AP	**Xylenes**	**---**	**---**
		AP	**Other HAPs**	**4.1E-07**	**1.8E-06**
		SUM	**Total HAP**	**4.1E-04**	**1.8E-03**
		40CFR98	**CO2e**	**26**	**114**

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET (Continued)

Notes to **NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET**

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

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

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

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

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

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

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

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

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment L - Emission Unit Data Sheet

40 CFR Part 63; Subpart HH & HHH Registration Form

West Virginia Department of Environmental Protection **DH-01/17E**

Division of Air Quality DIVISION OF AIR QUALITY : (304) 926-0475

40 CFR Part 63; Subpart HH & HHH Registration Form 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):	**5.00**	
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	**na**	
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	☑ Yes	☐ No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	☑ Yes	☐ No
The affected facility is: ☑ prior to a NG processing plant ☐ NG processing plant ☐ prior to the point of custody transfer and there is no NG processing plant		
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	☐ Yes	☑ No
The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): **na** scf/bbl API gravity: **na** degrees	☐ Yes	☑ No

Section B: Dehydration Unit (if applicable)[1]					
Description: **5.0 MMscfd - DH-01/15E**					
Date of Installation: **2011**	Annual Operating Hours: **8,760**			Burner rating (MMBtu/hr): **0.20**	
Exhaust Stack Height (ft): **10.0**	Stack Diameter (ft): **0.6**			Stack Temp. (oF): **212**	
Glycol Type: ☑ TEG	☐ EG	☐ Other: **na**			
Glycol Pump Type: ☐ Elect	☑ Gas	If Gas, what is the volume ratio?: **0.08 acfm/gpm**			
Condenser installed? ☐ Yes	☑ No	Exit Temp: **na**		Condenser Pressure: **na**	
Incinerator/flare installed? ☐ Yes	☑ No	Destruction Eff.: **na**			
Other controls installed? ☐ Yes	☑ No	Describe: **na**			
Wet Gas[2]: (Upstream of Contact Tower)	Gas Temperature: **72 oF**		Gas Pressure: **832 psig**		
	Saturated Gas?: ☑ Yes	☐ No	If no, water content?: na		
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate: Actual: **5.0 MMscfd**		Design: **5.0 MMscfd**		
	Water Content: **7.0 lb/MMscf**				
Lean Glycol:	Circulation Rate: Actual[3]: **0.67 gpm**		Max[4]: **0.67 gpm**		
	Pump make/model: **Kimray 4020 PV**				
Glycol Flash Tank (if applicable):	Temp: **150 oF**	Pressure: **50 psig**	Vented: ☑ Yes	☐ No	
	If no, describe vapor control: **At least 50% of flash tank vapors used as reboiler fuel, the remainder is vented to atmosphere.**				
Stripping Gas (if applicable):	Source of Gas **na**	Rate: **na**			

40 CFR Part 63; Subpart HH & HHH Registration Form - DH-01/17E - Cont

Please attach the following required dehydration unit information:

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

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

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

4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

Affected facility status: (choose only one)

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

☐ Subject to Subpart HHH

☐ Not Subject Because:

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

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Groves TEG Dehydrator (Fort Beeler)
File Name: C:\projects2\wfs\OVM\Fort Beeler\Groves Dehy (Fort Beeler).ddf
Date: May 07, 2014

DESCRIPTION:

Description: 5 MMscfd TEG Dehydrator. Extended inlet gas analysis for Groves Master dated 07-02-13. Inlet gas temp = 72F, pressure=836 psig. Kimray 4020 PV glycol pump.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 72.00 deg. F
Pressure: 836.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1322
Nitrogen	0.3474
Methane	81.0242
Ethane	12.9568
Propane	3.5869
Isobutane	0.4831
n-Butane	0.7906
Isopentane	0.2243
n-Pentane	0.1722
n-Hexane	0.0535
Cyclohexane	0.0136
Other Hexanes	0.1051
Heptanes	0.0629
Methylcyclohexane	0.0112
Benzene	0.0012
Toluene	0.0030
Xylenes	0.0047
C8+ Heavies	0.0271

DRY GAS:

Flow Rate: 5.0 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: 150.0 deg. F
Pressure: 50.0 psig

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Groves TEG Dehydrator (Fort Beeler)
File Name: C:\projects2\wfs\OVM\Fort Beeler\Groves Dehy (Fort Beeler).ddf
Date: May 07, 2014

DESCRIPTION:

Description: 5 MMscfd TEG Dehydrator. Extended inlet gas analysis for Groves Master dated 07-02-13. Inlet gas temp = 72F, pressure=836 psig. Kimray 4020 PV glycol pump.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0683	1.639	0.2992
Ethane	0.0827	1.985	0.3623
Propane	0.0782	1.878	0.3427
Isobutane	0.0227	0.545	0.0994
n-Butane	0.0540	1.297	0.2367
Isopentane	0.0206	0.494	0.0902
n-Pentane	0.0222	0.534	0.0974
n-Hexane	0.0183	0.439	0.0800
Cyclohexane	0.0416	0.998	0.1822
Other Hexanes	0.0236	0.566	0.1032
Heptanes	0.0668	1.604	0.2928
Methylcyclohexane	0.0478	1.148	0.2094
Benzene	0.0551	1.322	0.2412
Toluene	0.2408	5.780	1.0548
Xylenes	0.7943	19.064	3.4792
C8+ Heavies	0.1718	4.123	0.7524
Total Emissions	1.8089	43.414	7.9231
Total Hydrocarbon Emissions	1.8089	43.414	7.9231
Total VOC Emissions	1.6579	39.790	7.2616
Total HAP Emissions	1.1085	26.604	4.8552
Total BTEX Emissions	1.0902	26.165	4.7752

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.2117	101.082	18.4474
Ethane	1.5360	36.864	6.7278
Propane	0.7116	17.078	3.1168
Isobutane	0.1427	3.425	0.6250
n-Butane	0.2655	6.371	1.1627
Isopentane	0.0925	2.220	0.4052
n-Pentane	0.0813	1.951	0.3560
n-Hexane	0.0385	0.924	0.1687
Cyclohexane	0.0222	0.533	0.0973
Other Hexanes	0.0653	1.567	0.2861

Heptanes	0.0717	1.721	0.3141
Methylcyclohexane	0.0206	0.495	0.0903
Benzene	0.0046	0.110	0.0201
Toluene	0.0135	0.324	0.0591
Xylenes	0.0190	0.455	0.0830
C8+ Heavies	0.0270	0.648	0.1183
Total Emissions	7.3237	175.769	32.0779
Total Hydrocarbon Emissions	7.3237	175.769	32.0779
Total VOC Emissions	1.5760	37.823	6.9027
Total HAP Emissions	0.0756	1.814	0.3310
Total BTEX Emissions	0.0371	0.889	0.1623

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	8.4235	202.163	36.8948
Ethane	3.0720	73.729	13.4555
Propane	1.4232	34.156	6.2335
Isobutane	0.2854	6.850	1.2501
n-Butane	0.5309	12.742	2.3254
Isopentane	0.1850	4.440	0.8104
n-Pentane	0.1626	3.902	0.7120
n-Hexane	0.0770	1.849	0.3374
Cyclohexane	0.0444	1.066	0.1946
Other Hexanes	0.1306	3.135	0.5721
Heptanes	0.1434	3.443	0.6283
Methylcyclohexane	0.0412	0.989	0.1806
Benzene	0.0092	0.221	0.0403
Toluene	0.0270	0.648	0.1182
Xylenes	0.0379	0.910	0.1661
C8+ Heavies	0.0540	1.296	0.2365
Total Emissions	14.6474	351.539	64.1558
Total Hydrocarbon Emissions	14.6474	351.539	64.1558
Total VOC Emissions	3.1519	75.646	13.8054
Total HAP Emissions	0.1511	3.627	0.6619
Total BTEX Emissions	0.0741	1.779	0.3246

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.2800	102.721	18.7466
Ethane	1.6187	38.850	7.0901
Propane	0.7898	18.956	3.4594
Isobutane	0.1654	3.970	0.7244
n-Butane	0.3195	7.668	1.3994
Isopentane	0.1131	2.714	0.4954
n-Pentane	0.1035	2.485	0.4534
n-Hexane	0.0568	1.363	0.2487
Cyclohexane	0.0638	1.531	0.2794
Other Hexanes	0.0889	2.133	0.3893
Heptanes	0.1386	3.326	0.6069
Methylcyclohexane	0.0684	1.642	0.2997
Benzene	0.0597	1.432	0.2614

Toluene	0.2543	6.103	1.1139
Xylenes	0.8133	19.519	3.5622
C8+ Heavies	0.1988	4.771	0.8707
Total Emissions	9.1326	219.183	40.0010
Total Hydrocarbon Emissions	9.1326	219.183	40.0010
Total VOC Emissions	3.2339	77.613	14.1643
Total HAP Emissions	1.1841	28.417	5.1862
Total BTEX Emissions	1.1273	27.055	4.9375

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	37.1940	18.7466	49.60
Ethane	13.8178	7.0901	48.69
Propane	6.5762	3.4594	47.39
Isobutane	1.3495	0.7244	46.32
n-Butane	2.5620	1.3994	45.38
Isopentane	0.9006	0.4954	44.99
n-Pentane	0.8094	0.4534	43.98
n-Hexane	0.4174	0.2487	40.41
Cyclohexane	0.3767	0.2794	25.82
Other Hexanes	0.6754	0.3893	42.36
Heptanes	0.9211	0.6069	34.11
Methylcyclohexane	0.3900	0.2997	23.15
Benzene	0.2815	0.2614	7.15
Toluene	1.1730	1.1139	5.04
Xylenes	3.6453	3.5622	2.28
C8+ Heavies	0.9890	0.8707	11.96
Total Emissions	72.0788	40.0010	44.50
Total Hydrocarbon Emissions	72.0788	40.0010	44.50
Total VOC Emissions	21.0670	14.1643	32.77
Total HAP Emissions	5.5172	5.1862	6.00
Total BTEX Emissions	5.0997	4.9375	3.18

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:	1.24	lbs. H2O/MMSCF
Temperature:	72.0	deg. F
Pressure:	836.0	psig
Dry Gas Flow Rate:	5.0000	MMSCF/day

Glycol Losses with Dry Gas: 0.0226 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 28.38 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 7.10 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.36%	95.64%
Carbon Dioxide	99.80%	0.20%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.96%	0.04%
Propane	99.93%	0.07%
Isobutane	99.91%	0.09%
n-Butane	99.87%	0.13%
Isopentane	99.87%	0.13%
n-Pentane	99.84%	0.16%
n-Hexane	99.73%	0.27%
Cyclohexane	98.74%	1.26%
Other Hexanes	99.80%	0.20%
Heptanes	99.50%	0.50%
Methylcyclohexane	98.63%	1.37%
Benzene	87.62%	12.38%
Toluene	82.46%	17.54%
Xylenes	69.73%	30.27%
C8+ Heavies	99.22%	0.78%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 50.00 %
Flash Temperature: 150.0 deg. F
Flash Pressure: 50.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.54%	0.46%
Carbon Dioxide	7.56%	92.44%
Nitrogen	0.79%	99.21%
Methane	0.80%	99.20%
Ethane	2.62%	97.38%
Propane	5.21%	94.79%
Isobutane	7.37%	92.63%
n-Butane	9.24%	90.76%
Isopentane	10.26%	89.74%
n-Pentane	12.30%	87.70%
n-Hexane	19.47%	80.53%
Cyclohexane	49.88%	50.12%
Other Hexanes	15.85%	84.15%
Heptanes	32.07%	67.93%
Methylcyclohexane	55.42%	44.58%
Benzene	86.41%	13.59%
Toluene	90.71%	9.29%
Xylenes	96.03%	3.97%
C8+ Heavies	78.65%	21.35%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	50.18%	49.82%
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	2.64%	97.36%
n-Pentane	2.48%	97.52%
n-Hexane	1.85%	98.15%
Cyclohexane	5.93%	94.07%
Other Hexanes	4.16%	95.84%
Heptanes	1.29%	98.71%
Methylcyclohexane	6.72%	93.28%
Benzene	5.74%	94.26%
Toluene	8.66%	91.34%
Xylenes	13.41%	86.59%
C8+ Heavies	13.66%	86.34%

STREAM REPORTS:

WET GAS STREAM

Temperature: 72.00 deg. F
Pressure: 850.70 psia
Flow Rate: 2.09e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.98e-002	5.92e+000
Carbon Dioxide	1.32e-001	3.20e+001
Nitrogen	3.47e-001	5.34e+001
Methane	8.10e+001	7.14e+003
Ethane	1.29e+001	2.14e+003
Propane	3.58e+000	8.69e+002
Isobutane	4.83e-001	1.54e+002
n-Butane	7.90e-001	2.52e+002
Isopentane	2.24e-001	8.89e+001
n-Pentane	1.72e-001	6.82e+001
n-Hexane	5.35e-002	2.53e+001
Cyclohexane	1.36e-002	6.29e+000
Other Hexanes	1.05e-001	4.97e+001
Heptanes	6.29e-002	3.46e+001
Methylcyclohexane	1.12e-002	6.04e+000
Benzene	1.20e-003	5.15e-001
Toluene	3.00e-003	1.52e+000
Xylenes	4.70e-003	2.74e+000
C8+ Heavies	2.71e-002	2.54e+001

Total Components	100.00	1.10e+004

DRY GAS STREAM

Temperature: 72.00 deg. F
Pressure: 850.70 psia
Flow Rate: 2.08e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.61e-003	2.58e-001
Carbon Dioxide	1.32e-001	3.19e+001
Nitrogen	3.47e-001	5.34e+001
Methane	8.10e+001	7.14e+003
Ethane	1.30e+001	2.14e+003
Propane	3.59e+000	8.68e+002
Isobutane	4.83e-001	1.54e+002
n-Butane	7.90e-001	2.52e+002
Isopentane	2.24e-001	8.88e+001
n-Pentane	1.72e-001	6.81e+001
n-Hexane	5.34e-002	2.53e+001
Cyclohexane	1.34e-002	6.21e+000
Other Hexanes	1.05e-001	4.96e+001
Heptanes	6.26e-002	3.44e+001
Methylcyclohexane	1.10e-002	5.96e+000
Benzene	1.05e-003	4.51e-001
Toluene	2.47e-003	1.25e+000
Xylenes	3.28e-003	1.91e+000
C8+ Heavies	2.69e-002	2.52e+001
Total Components	100.00	1.09e+004

LEAN GLYCOL STREAM

Temperature: 72.00 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	1.73e-012	6.51e-012
Nitrogen	2.11e-013	7.96e-013
Methane	8.18e-018	3.08e-017
Ethane	1.11e-007	4.17e-007
Propane	6.26e-009	2.36e-008
Isobutane	1.15e-009	4.33e-009
n-Butane	2.09e-009	7.86e-009
Isopentane	1.48e-004	5.59e-004
n-Pentane	1.50e-004	5.65e-004
n-Hexane	9.12e-005	3.44e-004
Cyclohexane	6.96e-004	2.62e-003
Other Hexanes	2.72e-004	1.02e-003
Heptanes	2.31e-004	8.72e-004
Methylcyclohexane	9.13e-004	3.44e-003
Benzene	8.90e-004	3.35e-003
Toluene	6.06e-003	2.28e-002
Xylenes	3.26e-002	1.23e-001

C8+ Heavies	7.21e-003	2.72e-002
Total Components	100.00	3.77e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 72.00 deg. F
Pressure: 850.70 psia
Flow Rate: 7.18e-001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.30e+001	3.71e+002
Water	2.84e+000	1.13e+001
Carbon Dioxide	2.48e-002	9.90e-002
Nitrogen	1.62e-002	6.47e-002
Methane	2.13e+000	8.49e+000
Ethane	7.90e-001	3.15e+000
Propane	3.76e-001	1.50e+000
Isobutane	7.72e-002	3.08e-001
n-Butane	1.47e-001	5.85e-001
Isopentane	5.16e-002	2.06e-001
n-Pentane	4.64e-002	1.85e-001
n-Hexane	2.40e-002	9.56e-002
Cyclohexane	2.22e-002	8.86e-002
Other Hexanes	3.89e-002	1.55e-001
Heptanes	5.29e-002	2.11e-001
Methylcyclohexane	2.32e-002	9.25e-002
Benzene	1.69e-002	6.76e-002
Toluene	7.28e-002	2.91e-001
Xylenes	2.39e-001	9.55e-001
C8+ Heavies	6.34e-002	2.53e-001
Total Components	100.00	3.99e+002

FLASH TANK OFF GAS STREAM

Temperature: 150.00 deg. F
Pressure: 64.70 psia
Flow Rate: 2.62e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.18e-001	5.21e-002
Carbon Dioxide	3.01e-001	9.15e-002
Nitrogen	3.31e-001	6.42e-002
Methane	7.59e+001	8.42e+000
Ethane	1.48e+001	3.07e+000
Propane	4.67e+000	1.42e+000
Isobutane	7.10e-001	2.85e-001
n-Butane	1.32e+000	5.31e-001
Isopentane	3.71e-001	1.85e-001
n-Pentane	3.26e-001	1.63e-001
n-Hexane	1.29e-001	7.70e-002
Cyclohexane	7.63e-002	4.44e-002
Other Hexanes	2.19e-001	1.31e-001
Heptanes	2.07e-001	1.43e-001
Methylcyclohexane	6.07e-002	4.12e-002

Benzene	1.70e-002	9.19e-003
Toluene	4.24e-002	2.70e-002
Xylenes	5.16e-002	3.79e-002
C8+ Heavies	4.58e-002	5.40e-002
Total Components	100.00	1.49e+001

FLASH TANK GLYCOL STREAM

Temperature: 150.00 deg. F
Flow Rate: 6.85e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.65e+001	3.71e+002
Water	2.93e+000	1.13e+001
Carbon Dioxide	1.95e-003	7.49e-003
Nitrogen	1.32e-004	5.08e-004
Methane	1.78e-002	6.83e-002
Ethane	2.15e-002	8.27e-002
Propane	2.04e-002	7.82e-002
Isobutane	5.90e-003	2.27e-002
n-Butane	1.41e-002	5.40e-002
Isopentane	5.50e-003	2.12e-002
n-Pentane	5.93e-003	2.28e-002
n-Hexane	4.84e-003	1.86e-002
Cyclohexane	1.15e-002	4.42e-002
Other Hexanes	6.40e-003	2.46e-002
Heptanes	1.76e-002	6.77e-002
Methylcyclohexane	1.33e-002	5.13e-002
Benzene	1.52e-002	5.84e-002
Toluene	6.86e-002	2.64e-001
Xylenes	2.39e-001	9.17e-001
C8+ Heavies	5.18e-002	1.99e-001
Total Components	100.00	3.84e+002

FLASH GAS EMISSIONS

Flow Rate: 6.21e+002 scfh
Control Method: Combustion Device
Control Efficiency: 50.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.99e+001	1.47e+001
Carbon Dioxide	2.91e+001	2.09e+001
Nitrogen	1.40e-001	6.42e-002
Methane	1.60e+001	4.21e+000
Ethane	3.12e+000	1.54e+000
Propane	9.86e-001	7.12e-001
Isobutane	1.50e-001	1.43e-001
n-Butane	2.79e-001	2.65e-001
Isopentane	7.84e-002	9.25e-002
n-Pentane	6.89e-002	8.13e-002
n-Hexane	2.73e-002	3.85e-002
Cyclohexane	1.61e-002	2.22e-002
Other Hexanes	4.63e-002	6.53e-002

Heptanes	4.37e-002	7.17e-002
Methylcyclohexane	1.28e-002	2.06e-002
Benzene	3.60e-003	4.60e-003
Toluene	8.95e-003	1.35e-002
Xylenes	1.09e-002	1.90e-002
C8+ Heavies	9.69e-003	2.70e-002
Total Components	100.00	4.30e+001

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.28e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.26e+001	5.61e+000
Carbon Dioxide	5.06e-002	7.49e-003
Nitrogen	5.39e-003	5.08e-004
Methane	1.27e+000	6.83e-002
Ethane	8.17e-001	8.27e-002
Propane	5.27e-001	7.82e-002
Isobutane	1.16e-001	2.27e-002
n-Butane	2.76e-001	5.40e-002
Isopentane	8.48e-002	2.06e-002
n-Pentane	9.16e-002	2.22e-002
n-Hexane	6.30e-002	1.83e-002
Cyclohexane	1.47e-001	4.16e-002
Other Hexanes	8.13e-002	2.36e-002
Heptanes	1.98e-001	6.68e-002
Methylcyclohexane	1.45e-001	4.78e-002
Benzene	2.09e-001	5.51e-002
Toluene	7.77e-001	2.41e-001
Xylenes	2.22e+000	7.94e-001
C8+ Heavies	3.00e-001	1.72e-001
Total Components	100.00	7.43e+000

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment L - Emission Unit Data Sheet

Storage Tank Data Sheet (Insignificant Emissions Units)

Source ID	Contents	Orientation	Volume (gal)	Thru-Put (gal/yr)	VOC		HAP	
					lb/hr	tpy	lb/hr	tpy
T-01	Condensate (Meter Prover Skid Tank)	Removed						
T-02	Condensate Tank (60 Site 880 Tank)	Vertical	8,400	8,400,000	---	---	---	---
T-03	Produced Water Tank (Tank 9913)	Vertical	8,820	8,400,000	See Attachment N			
T-04	Produced Water Tank (Tank 9914)	Vertical	8,820	8,400,000	See Attachment N			
T-05	Diesel Fuel	Horizontal	500	2,000	2.2E-05	9.5E-05	---	---
T-06	Gasoline	Horizontal	300	2,000	0.02	0.07	4.0E-03	0.02
T-07	Methanol (TXP1)	Horizontal	3,000	6,000	0.01	0.04	0.01	0.04
T-08	Lube Oil (Tank 4401)	Vertical	4,200	25,200	---	---	---	---
T-09	Glycol (TK-2902 Slop Tank)	Vertical	3,460	41,520	---	---	---	---
T-10	Glycol (TK-2902A Slop Tank)	Vertical	4,200	50,400	---	---	---	---
T-11	Glycol (Groves Tank)	Horizontal	225	2,700	---	---	---	---
T-12	Methanol (Groves Tank)	Horizontal	130	1,560	2.0E-03	0.01	2.0E-03	0.01
T-13	Oil (TXP1 ATM Slop Tank)	Horizontal	8,820	105,840	---	---	---	---
T-14	Lube Oil (TXP Residue Compressor)	Horizontal	2,000	24,000	---	---	---	---
T-15	Lube Oil (Engine Day Tank)	Horizontal	300	3,600	---	---	---	---
T-16	Lube Oil (Engine Day Tank)	Horizontal	300	3,600	---	---	---	---
T-17	Lube Oil (C-120)	Horizontal	300	3,600	---	---	---	---
T-18	Oil (60 Site)	Horizontal	2,000	24,000	---	---	---	---
T-19	Oil (TXP2/TXP3 Residue Compressors)	Horizontal	300	3,600	---	---	---	---
T-20	Heat Medium (Oil)	na	750	9,000	---	---	---	---
T-21	Heat Medium (Oil)	na	750	9,000	---	---	---	---
T-22	Heat Medium (Oil)	na	750	9,000	---	---	---	---
T-23	Lube Oil (Engine Day Tank)	Horizontal	300	3,600	---	---	---	---
T-24	Used Oil	na	100	1,200	---	---	---	---
T-25	Used Oil	na	100	1,200	---	---	---	---
			TOTAL:		**0.03**	**0.11**	**0.01**	**0.06**
			THRESHOLD:		**1.00**	**5.00**	**0.10**	**0.50**

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Fort Beeler 9913, 9914 Waste Tanks
City:	Moundsville
State:	West Virginia
Company:	Williams OVM
Type of Tank:	Vertical Fixed Roof Tank
Description:	210 bbl Waste Tanks

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	10.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	8.00
Volume (gallons):	8,820.00
Turnovers:	952.38
Net Throughput(gal/yr):	8,400,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	10.00

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

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

Fort Beeler 9913, 9914 Waste Tanks - Vertical Fixed Roof Tank
Moundsville, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Slop Liquids	All	56.69	48.70	64.69	52.55	0.2410	0.1804	0.3187	19.9891			18.28	
Heptane (-n)						0.5535	0.4327	0.7028	100.2000	0.0046	0.0097	100.20	Option 3: A=37358, B=8.2585
Hexane (-n)						1.7546	1.4148	2.1588	86.1700	0.0017	0.0113	86.17	Option 2: A=6.876, B=1171.17, C=224.41
iso-Butane						36.1072	31.2831	41.4341	58.1300	0.0001	0.0137	58.13	Option 1: VP50 = 31.982 VP60 = 38.144
Isopentane						9.3056	7.6276	11.1889	72.1500	0.0005	0.0177	72.15	Option 1: VP50 = 7.889 VP60 = 10.005
n-Butane						24.6056	21.0778	28.5399	58.1300	0.0004	0.0374	58.13	Option 1: VP50 = 21.583 VP60 = 26.098
n-Pentane						6.4112	5.3254	7.6555	72.1500	0.0006	0.0146	72.15	Option 1: VP50 = 5.476 VP60 = 6.873
Propane						103.0798	90.9417	116.2827	44.1100	0.0001	0.0391	44.11	Option 1: VP50 = 92.73 VP60 = 108.19
Residual oil no. 6						0.0000	0.0000	0.0000	190.0000	0.0096	0.0000	387.00	Option 1: VP50 = .00003 VP60 = .00004
Water						0.2297	0.1707	0.3057	18.0000	0.9824	0.8566	18.00	Option 1: VP50 = .178073 VP60 = .255246

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Fort Beeler 9913, 9914 Waste Tanks - Vertical Fixed Roof Tank
Moundsville, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Slop Liquids	190.93	11.79	202.72
Propane	7.47	0.46	7.93
iso-Butane	2.62	0.16	2.78
n-Butane	7.13	0.44	7.57
n-Pentane	2.79	0.17	2.96
Hexane (-n)	2.16	0.13	2.30
Water	163.54	10.10	173.64
Isopentane	3.37	0.21	3.58
Heptane (-n)	1.85	0.11	1.96
Residual oil no. 6	0.00	0.00	0.00

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Fort Beeler Diesel Tank
City:	Moundsville
State:	West Virginia
Company:	Williams OVM
Type of Tank:	Horizontal Tank
Description:	500 gallon diesel tank

Tank Dimensions

Shell Length (ft):		5.80
Diameter (ft):		4.00
Volume (gallons):		500.00
Turnovers:		4.00
Net Throughput(gal/yr):		2,000.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

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

Fort Beeler Diesel Tank - Horizontal Tank
Moundsville, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	56.69	48.70	64.69	52.55	0.0064	0.0043	0.0082	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0074

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Fort Beeler Diesel Tank - Horizontal Tank
Moundsville, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.04	0.15	0.19

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Fort Beeler Gasoline Tank
City:	Moundsville
State:	West Virginia
Company:	Williams OVM
Type of Tank:	Horizontal Tank
Description:	300 gallon gasoline tank

Tank Dimensions

Shell Length (ft):		5.13
Diameter (ft):		3.20
Volume (gallons):		300.00
Turnovers:		6.67
Net Throughput(gal/yr):		2,000.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

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

Fort Beeler Gasoline Tank - Horizontal Tank
Moundsville, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 12)	All	56.69	48.70	64.69	52.55	5.9671	5.1083	6.9373	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Fort Beeler Gasoline Tank - Horizontal Tank
Moundsville, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 12)	18.19	122.44	140.63

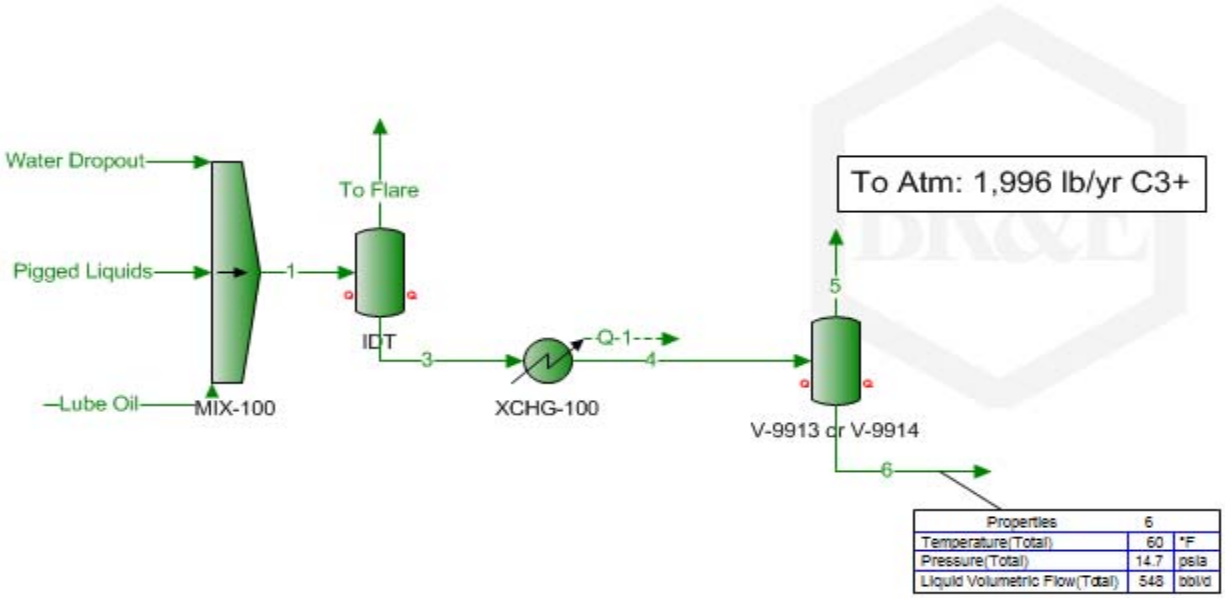
TANKS 4.0.9d
Emissions Report - Summary Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: Annual

Tank Identification				Losses (lbs)	
Fort Beeler 9913, 9914 Waste Tanks	Williams OVM	Vertical Fixed Roof Tank	Moundsville, West Virginia	202.72	each tank
Fort Beeler Diesel Tank	Williams OVM	Horizontal Tank	Moundsville, West Virginia	0.19	
Fort Beeler Gasoline Tank	Williams OVM	Horizontal Tank	Moundsville, West Virginia	140.63	
Total Emissions for all Tanks:				343.54	

VOC emissions from each tank (9913 and 9914) are 29.08 lbs (working and breathing) + 1,996 lbs (flash) = 2,025.08 lbs

Ft Beeler 9913 or 9914 Tank Flash Emissions as Proposed for Permit Revision May 2014



Location: Ft Beeler 9913 or 9914 tank Flash Emissions
Condensate Volume: 200020 bbl/yr
Total VOC's: 0.998 ton/yr

Emissions to Atmosphere		
Temperature	°F	60
Pressure	psig	0
Mole Fraction Vapor	%	100

Produced Liquids		
Temperature	°F	60
Pressure	psig	0
Std Liquid Volumetric Flow	bbl/d	548

Emissions to Atmosphere	
Component	**tons/year**
Carbon Dioxide	0.05
Nitrogen	0.00
Methane	0.36
Ethane	0.23
Propane	0.23
Isobutane	0.10
Butane	0.26
Isopentane	0.13
Pentane	0.12
Hexane	0.09
Heptane	0.08
Octane	0.00
Nonane	0.00
Decane	0.00
Water	0.02
Therminol 55	0.00

Produced Liquids	
Component	**mass fraction %**
Carbon Dioxide	0.00
Nitrogen	0.00
Methane	0.00
Ethane	0.00
Propane	0.01
Isobutane	0.01
Butane	0.04
Isopentane	0.05
Pentane	0.06
Hexane	0.17
Heptane	0.46
Octane	0.00
Nonane	0.00
Decane	0.00
Water	98.23
Therminol 55	0.96

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 *Equipment List Form*): **TLO**

1. Loading Area Name: **FORT BEELER**

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

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

3. Loading Rack or Transfer Point Data:

Number of pumps	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?

☐ Yes ☐ No ☒ **Does not apply**

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

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

☐ Yes ☐ No ☒ **Does not apply**

If YES, describe:
NA

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/ Oil					
Max. daily throughput (1000 gal/day)		69					
Max. annual throughput (1000 gal/yr)		25200					
Loading Method [1]		SP					
Max. Fill Rate (gal/min)		200					
Average Fill Time (min/loading)		60					
Max. Bulk Liquid Temperature (^{o}F)		50					
True Vapor Pressure [2]		0.24					
Cargo Vessel Condition [3]		U					
Control Equipment or Method [4]		None					
Minimum control efficiency (%)		N/A					
Maximum Emission Rate (VOC)	Loading (lb/hr)	---					
	Annual (lb/yr)	3920					
Estimation Method [5]		EPA					

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

[2] At maximum bulk liquid temperature

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

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

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

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 PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

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

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

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

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

ATTACHMENT M

Air Pollution Control Device Sheet(s)

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

- **225 bhp Caterpillar G342NA compressor engine (CE-01/1E)**
- **625 bhp Caterpillar G398TA compressor engine (CE-02/2E)**
- **3550 bhp Caterpillar G3612LE compressor engines (CE-03/3E thru CE-05/5E)**
- **Old Process Flare (FL-01/17E) – TCI 4800 5.0 MMscf/yr - MODIFIED**
- **New Process Flare (FL-02/18E) – Zeeco AFTA-20/56 90.0 MMscf/yr - MODIFIED**

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

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

Equipment Information

1. Manufacturer: EMIT Model No. EAS-1700T-0606F-22CEE (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 (≥99.2%), CO (≥85.4%), VOC (≥25.3%), HCHO (≥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 of disposal.	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☐ Particulate (type): ☒ Other NOx, CO, VOC and HCHO

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
851 ACFM @ 1170°F and PSIA

20. Gas stream temperature:
Inlet: 1170 °F
Outlet: °F

21. Gas flow rate:
Design Maximum: 851 ACFM
Average Expected: 851 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	
NOx	12.90		100	0.10		99.2%
CO	13.70		100	2.00		85.4%
VOC	0.75		100	0.56		25.3%
HCHO	0.25		100	0.06		76%

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.

NOx (≥99.2%), CO (≥85.4%), VOC (≥25.3%), HCHO (≥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.

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): 02-NSCR

Equipment Information

1. Manufacturer: EMIT Model No. EAS-2500T-0808F-21 CEE (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 (≥94.9%), CO (≥95.3%), VOC (≥78.7%), HCHO (≥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 of disposal.	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☐ Particulate (type): ☒ Other NOx, CO, VOC and HCHO

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
3043 ACFM @ 1112°F and PSIA

20. Gas stream temperature:
Inlet: 1112 °F
Outlet: °F

21. Gas flow rate:
Design Maximum: 3043 ACFM
Average Expected: 3043 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	
NOx	9.80		100	0.50		94.9%
CO	10.70		100	0.50		95.3%
VOC	0.30		100	0.06		78.7%
HCHO	0.10		100	0.02		76%

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.

NOx (≥94.9%), CO (≥95.3%), VOC (≥78.7%), HCHO (≥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.

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): 01-OxCat, 02-OxCat, 03-OxCat

Equipment Information

1. Manufacturer: EMIT Technologies Model No. ELH-5000Z-1820F-43CEE-36 (or equiv.)	2. Control Device Name: Catalytic Converter Type: OxCat
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: CO (≥90%), VOC (≥60%) and HCHO (≥85%)	
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 of disposal.	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☐ Particulate (type): ☒ Other CO, VOC and HCHO

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
24013 ACFM @ 838°F and PSIA

20. Gas stream temperature:
Inlet: 838 °F
Outlet: °F

21. Gas flow rate:
Design Maximum: 24013 ACFM
Average Expected: 24013 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	
CO	2.75		100	0.28		90
VOC	0.91		100	0.36		60
HCHO	0.26		100	0.04		85

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.

CO (≥90%), VOC (≥60%) and HCHO (≥85%)

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

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

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): FL-01

Equipment Information

1. Manufacturer: TCI USA, Inc

   Model No. 4800

2. Method: ☒ Elevated flare ☐ Ground flare ☐ Other Describe

3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.

4. Method of system used:
   ☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted

5. Maximum capacity of flare:
   scf/min
   240,000 scf/hr

6. Dimensions of stack:
   Diameter 7.83 ft.
   Height 26.83 ft.

7. Estimated combustion efficiency:
   (Waste gas destruction efficiency)
   Estimated: 98 %
   Minimum guaranteed: 98 %

8. Fuel used in burners:
   ☒ Natural Gas
   ☐ Fuel Oil, Number
   ☐ Other, Specify:

9. Number of burners: 6
   Rating: 240 MMBTU/hr (Total)

10. Will preheat be used? ☐ Yes ☒ No

11. Describe method of controlling flame:

12. Flare height: ft

13. Flare tip inside diameter: ft

14. Natural gas flow rate to flare pilot flame per pilot light: scf/min
    18 scf/hr

15. Number of pilot lights:
    Total 2

16. Will automatic re-ignition be used?
    ☒ Yes ☐ No

17. If automatic re-ignition will be used, describe the method:
    Two (2) Profire 1100i flame failure ignition systems.

18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No
    If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, Describe:

19. Hours of unit operation per year: 8760 hr/yr.

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
Natural Gas and NGL	<1	25 MMscf/yr	Cryogenic Plants

30. Estimate total combustible to flare: 25.0 MMscf/yr LB/hr or ACF/hr
(Maximum mass flow rate of waste gas) scfm

31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:
Variable LB/hr or ACF/hr

32. Give composition of carrier gases:
Variable, typically 75-90% Methane, 5-10% Ethane, and 5-8% C3+.
Worst case is assumed to be 100% Propane.

33. Temperature of emission stream: Extremely Variable °F Heating value of emission stream: Max Variable BTU/ft^3 Mean molecular weight of emission stream: Max Variable lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: Variable scf/min
37. Flare gas heat content: Variable BTU/ft^3	38. Flare gas exit velocity: Variable scf/min

39. Maximum rate during emergency for one major piece of equipment or process unit: 4,000 scf/min

40. Maximum rate during emergency for one major piece of equipment or process unit: 4 MM BTU/min

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

42. Describe the collection material disposal system:
na

43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet? Yes

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

MONITORING: Presence of Pilot Flame (Daily)	RECORDKEEPING: MMscf/mo of Waste Gas
REPORTING: MMscf/yr of Waste Gas	TESTING: na

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

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

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

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

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): FL-02

Equipment Information

1. Manufacturer: Zeeco

   Model No. AFTA-20/56

2. Method: ☒ Elevated flare ☐ Ground flare ☐ Other
   Describe

3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.

4. Method of system used:
   ☐ Steam-assisted ☒ Air-assisted ☐ Pressure-assisted ☐ Non-assisted

5. Maximum capacity of flare:
   scf/min
   425,950 scf/hr

6. Dimensions of stack:
   Diameter
   Height 190 feet

7. Estimated combustion efficiency:
   (Waste gas destruction efficiency)
   Estimated: 98 %
   Minimum guaranteed: 98 %

8. Fuel used in burners:
   ☒ Natural Gas
   ☐ Fuel Oil, Number
   ☐ Other, Specify:

9. Number of burners: 1
   Rating: 541.2 MMBTU/hr (Max)

10. Will preheat be used? ☐ Yes ☒ No

11. Describe method of controlling flame:

12. Flare height: ft

13. Flare tip inside diameter: ft

14. Natural gas flow rate to flare pilot flame per pilot light: scf/min
    65 scf/hr

15. Number of pilot lights:
    Total 3

16. Will automatic re-ignition be used?
    ☒ Yes ☐ No

17. If automatic re-ignition will be used, describe the method:
    Manual/Automatic Flame Front Generator (FFG) Ignition System with Fuel Gas Train

18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No
    If yes, what type? ☒ Thermocouple ☐ Infra-Red
    ☐ Ultra Violet ☐ Camera with monitoring control room
    ☐ Other, Describe:

19. Hours of unit operation per year: 8760 hr/yr.

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
Natural Gas and NGL	<1.0	< 90 MMscf/yr	Cryogenic Plants

30. Estimate total combustible to flare: (Maximum mass flow rate of waste gas)	90 MMscf/yr	LB/hr or ACF/hr scfm

31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:
Variable LB/hr or ACF/hr

32. Give composition of carrier gases:
Variable, typically 75-90% Methane, 5-10% Ethane, and 5-8% C3+.

33. Temperature of emission stream: Extremely Variable °F Heating value of emission stream: Max Variable BTU/ft^3 Mean molecular weight of emission stream: Max Variable lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: Variable scf/min
37. Flare gas heat content: Variable BTU/ft^3	38. Flare gas exit velocity: Variable scf/min

39. Maximum rate during emergency for one major piece of equipment or process unit: 7,099 scf/min

40. Maximum rate during emergency for one major piece of equipment or process unit: 8.9 MM BTU/min

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

42. Describe the collection material disposal system:
na

43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet? Yes

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

MONITORING: Presence of Pilot Flame (Daily)	RECORDKEEPING: MMscf/mo of Waste Gas
REPORTING: MMscf/yr of Waste Gas	TESTING: na

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

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

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
98% VOC/HAP

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

COMMERCIAL PROPOSAL

Scope of Supply - BASE

Our scope of supply will include:

1) General Arrangement Drawings for customer approval.
2) Operation & Maintenance Manual.
3) The equipment necessary for flaring the waste streams as specified in the inquiry documents, including:

190-ft Tall Air Flare Package Identical to the Williams Moundsville Flare:

Air Assisted Flare Tip with Integral Velocity Seal & 3 Pilots
Self-supported Flare Stack
Manual/Automatic FFG Ignition System with Fuel Gas Train
Process Engineering & Design Work for the Complete Flare System
Utility Piping & Supports Along Flare Stack from Tip to Near Grade
Retractable Thermocouple System with JB Near Grade
One (1) Vane Axial Air Blower with Bird Screen / Inlet Bell and VFD Suitable Motor
Blower Silencer
Flare Stack Baseplate Template

We have considered the following changes in our Design/Offer:

- Smokeless capacity as listed for each case.
- Blower quantity increased to 2 blowers
- Thermocouples changed to dual element type
- Allowable nozzle loads increased to 2 x API 537 values
- Gas riser reduced to 20" diameter.
- Wind and Seismic Design Changed to the Following:

For IBC 2012 / ASCE 7-10 use the following wind and seismic design criteria:

WIND:
Risk Category = III
Basic Wind Speed = 120 mph
Exposure Category = C
Topographic Factor (K_{zt}) = 1.0

NOTE: Additional changes (changes in i nlet elevation, orientation, materials, etc) will increase the delivery time for

SEISMIC:
Risk Category = III
Importance Factor (I_E) = 1.25
Mapped Spectral Response Accelerations:
S_S = 0.103g
S_1 = 0.055g
Site Class: D
Spectral Response Coefficients:
S_{DS} = 0.110g
S_{D1} = 0.087g
Seismic Design Category = B
Mapped Long Period Transition Period (T_L) = 12 sec

Scope of Supply (Continued)

Our Scope of Supply does NOT include:

1) Stack or Piping External Insulation, Fireproofing, or Heat Tracing.
2) Field Assembly and / or Erection.
3) Commissioning, Start-up, Supervision, Training, etc. (PER DIEM BASIS).
4) Foundation Design / Supply or Civil Engineering.
5) Interconnecting Piping, Wiring or Conduit Between Stack Base and LCP.
6) Ocean or Inland Freight to Jobsite.
7) Shop Details / Fabrication Drawings of Proprietary Equipment.
8) Any Containerization of Equipment for Shipment or Storage Purposes.
9) Blank
10) Foundation Imbedded Anchor Bolts.
11) Spare Parts Quoted Separately and Priced Lists Included in Proposal.
12) Any Motor Starters or Motor Drivers or Motor Controls.
13) Any Third Party Inspection / Testing / Certification Services.
14) Flare KO drum.
15) Aircraft Warning Light System
16) HEI Ignition System

New Flare (FL-02)
Zeeco Process Flare

BASE OFFER

Process Conditions -- English Units

Client:	Williams	Zeeco Ref.: T33007F		Date:	13-Mar-14
Location:	West Virginia	Client Ref.: Ft. Beeler Flare		Rev.	3

	Mol %					
	Case 1	Case 2	Case 3	Case 4	Case E	Case F
METHANE	24.30	0.00	79.31	80.19		
ETHANE	8.66	1.38	13.60	14.71		
PROPANE	56.94	96.22	4.15	3.89		
BUTANE	8.08	2.40	1.58	0.71		
PENTANE	1.46	0.00	0.52	0.04		
HEXANE	0.19	0.00	0.13			
HEPTANE	0.05	0.22	0.03			
OCTANE	0.08		0.01			
NONANE	0.05					
DECANE						
DODECANE						
TRIDECANE						
CYCLOPENTANE						
ETHYLENE						
PROPYLENE						
BUTYLENE						
ACETYLENE						
BENZENE						
TOLUENE						
XYLENE						
CARBON MONOXIDE						
CARBON DIOXIDE	0.07		0.15	0.16		
HYDROGEN SULFIDE						
SULFUR DIOXIDE						
AMMONIA						
AIR						
HYDROGEN						
OXYGEN						
NITROGEN	0.11	0.07	0.30	0.30		
WATER						
BUTADIENE						
METHANOL						
Total	**100**	**100**	**100**	**100**		
Mol. Wt.	37.79	44.48	20.24	19.60		
L. H. V. (BTU/SCF):	1,995	2,334	1,112	1,080		
Temperature (Deg. F):	317.0	98.5	24.4	-31.8		
Avail. Static Pressure (psig):	27.00	6.70	0.10	2.00		
Flow Rate (lbs/hr):	383,000	229,194	9,115	97,470		
Smokeless Rate (lbs/hr):	70,000	57,299	9,115	22,000		

New Flare (FL-02)
Zeeco Process Flare

Air Assisted Flare Tip Specification Sheet

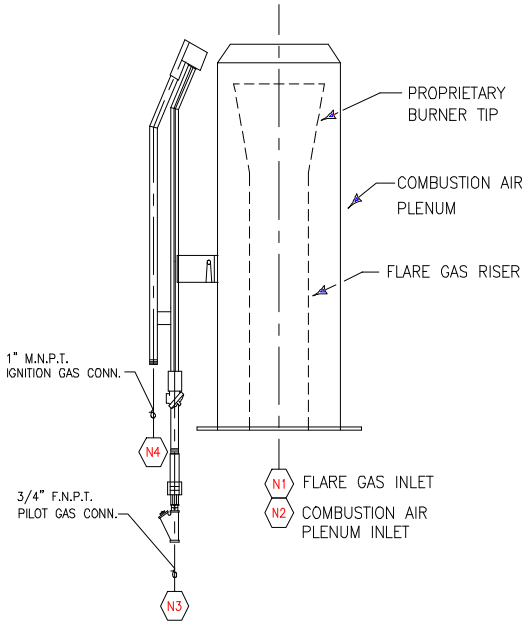
Client:	Williams	Zeeco Ref.:	T33007F	Date:	13-Mar-14
Location:	West Virginia	Client Ref.:	Ft. Beeler Flare	Rev.	3

General Information:

Tag No.:	FLR-01		
Model:	AFTA-20/56	Type:	Air-Assisted
Length:	10'- 0 "		
Weight:	4000 lbs		
No. of pilots:	3		

Design Case:

Governing Case:	Case 1	
Molecular weight:	37.8	
L. H. V. :	1,995	BTU/SCF
Temperature:	317	Deg. F
Available Static Pressure:	27	psig
Design Flow Rate:	383,000	lbs/hr
Governing Smokeless Case:	Case 2	
Design Smokeless Rate:	70000	lbs/hr
Approx Exit Velocity (per 40 CFR):	859	ft/s
Approx Exit Velocity:	1074	ft/s
Mach No.:	1.00	
Approx. Tip Press. Drop:	24.00	psig



(Typical drawing only)

Construction:

Upper Section:	310 SS	Windshield:	NO
Lower Section:	Carbon Steel	Flame retention Ring:	310 SS
Refractory:	NA	Lifting Lugs:	NO
Refractory Thk:	NA		

Surface Finish (Carbon Steel Surfaces):

Surface Preparation:	SSPC-SP6	Primer:	Inorganic Zinc
Paint (c. s. surfaces):	High Heat Aluminum		

Connections:

	Qty.	Size	Type	Material
N1 - Flare Gas Inlet:	1	20 "	Beveled ; Weld	LTCS
N2 - Combustion Air Inlet:	1	56 "	Fab. Plate Flange	Carbon Steel
N3 - Pilot Gas Manifold:	1	1.00	FNPT	Carbon Steel
N4 - Ignition Line:	3	1 "	SW	304 SS

Miscellaneous Notes:

1. Includes Integral Purge Reducing Velocity Seal.
2. Required Fuel Gas Purge Rate = 870 SCFH.
3. Flare system is designed for 99% destruction efficiency or better.

New Flare (FL-02)
Zeeco Process Flare

Pre-Mix Flare Pilot Assembly Specification Sheet

Client:	Williams	Zeeco Ref.:	T33007F	Date:	13-Mar-14
Location:	West Virginia	Client Ref.:	Ft. Beeler Flare	Rev.	3

General Information:

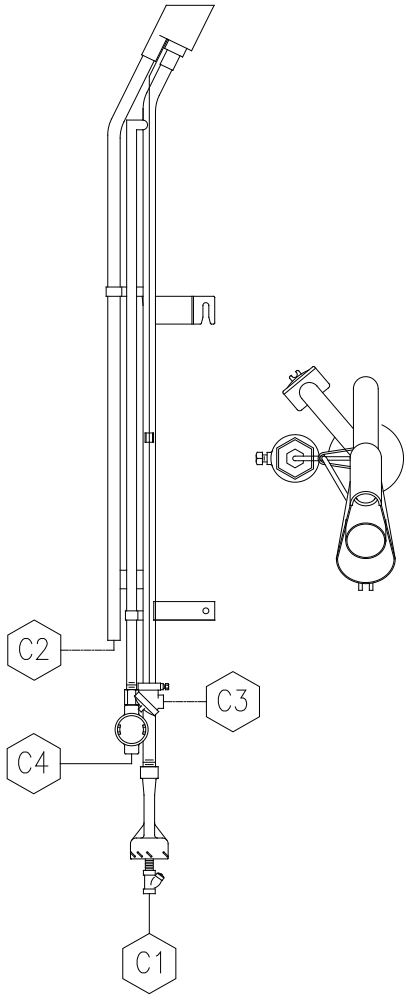
Tag No.:	FP-1	
Model:	HSLF	
Length:	9.135	feet
Weight:	68	lbs.
Pilot Type:	Pre-Mix	High Stability
Ignition Type:	Flame Front Generator	

Process Design Data:

Design Heat Release:	65,000	BTU/hr
Fuel Gas MW:	18.00	
Fuel Gas LHV:	1,000	BTU/SCF
Fuel Gas Temperature:	100	Deg. F
Fuel Gas Inlet Pressure:	15.00	psig
Fuel Gas Flow rate:	65.0	SCFH
Design Wind Velocity:	150	mph
Design Rainfall:	10.00	inches/hr
Mounting Position:	Vertical	
Thermocouple Type:	K	Ungrounded

Construction:

Pilot Firing Tip:	HK
Windshield Assembly:	HK
Integral Thermowell:	HK
FFG Ignition Line:	310 SS
Mounting Brackets:	HK
Premix Fuel Line:	310 SS
Thermocouple Sheath:	310 SS
Thermocouple Head:	Cast Iron w/ Ceramic Term.
Fuel Mixer / Spud Assembly:	CF-3M / 18-8
Fuel Strainer Assembly:	CF-8M



Connections:	Qty.	Size	Type	Material
C1 - Fuel Gas Inlet:	1	1/2"	FNPT	CF8M
C2 - FFG Ignition Inlet:	1	1 "	150# RFSW	310 SS
C3 - Thermocouple:	1	1/2"	Tube	316SS

Misc. Notes: (see ignition system datasheet for type applicable to this quote)

1. Upper mounting bracket is reinforced hook type for pilot removal from platform.
2. Pilot mounting brackets and thermocouple mounting brackets are investment cast assemblies.
3. Pilot mixer assembly is investment cast, high efficiency computer modeled venturi section.
4. Thermocouples are retractable type (replaceable from grade).

New Flare (FL-02)
Zeeco Process Flare

Flame Front Generator Specification Sheet

Client:	Williams	Zeeco Ref.:	T33007F	Date:	13-Mar-14
Location:	West Virginia	Client Ref.:	Ft. Beeler Flare	Rev.	3

General Information:

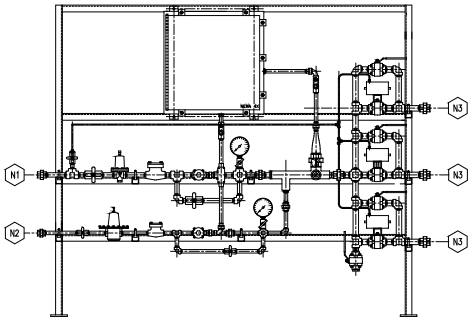
Tag No.:	IGN-1
Model No.:	LMC-3-T/S
Operation:	Manual/Automatic
No. of Pilots Ignited:	3
Area Classification:	Class 1, Div 2, Gr C/D

Fuel Gas Data:

Molecular Weight:	18.0
L. H. V.:	1,000 BTU/SCF
Temperature:	100 deg. F
Pressure:	15 psig

Utility Consumption:

Pilot Gas (Per Pilot):	65 SCFH
Pilot Gas (Total):	195 SCFH
Ignition Gas (Intermittent):	110 SCFH
Ignition Air (Intermittent):	1,100 SCFH
Power Available:	120 Volt, 1 Phase, 60 Hertz



(Typical drawing only)

Construction:

Ignition Line Piping:	Carbon Steel	Ignition Chamber:	Cast Iron
Fuel Gas Piping:	Carbon Steel	No. Thermocouples/Pilot:	1
Mounting Rack:	Carbon Steel	Thermocouple Type:	K
Enclosure:	NEMA 4X w/ Z-Purge	Propane Backup:	No
Sun / Rain Shield:	Yes	Ignition Air PCV:	Yes
Pilot Gas PCV:	Yes		

Surface Finish (Carbon Steel Surfaces):

Surface Preparation:	SSPC-SP1	Primer:	Red Oxide
Paint (c. s. surfaces):	Grey Enamel		

Connections:	Qty.	Size	Type	Material
N1 - Instrument Air Inlet:	1	1/2"	3000# Thrd. Union	Galvanized C.S.
N2 - Pilot Gas Inlet:	1	1/2"	3000# Thrd. Union	Carbon Steel
N3 - Ignition Gas Outlet:	3	1 "	3000# Thrd. Union	Carbon Steel
Pilot Gas Out. (Not Shown):	1	1 "	3000# Thrd. Union	Carbon Steel

Miscellaneous Notes:

1. Ignition panel includes AB Controllogix PLC w/ Ethernet Communication.

New Flare (FL-02)
Zeeco Process Flare

Blower Specification Sheet - BASE

Client:	Williams	Zeeco Ref.:	T33007F	Date:	13-Mar-14
Location:	West Virginia	Client Ref.:	Ft. Beeler Flare	Rev.	3

General Information:

Tag No.:	BLW-1/2
Purpose of Blower:	Smokeless Flaring
Blower Type:	Vane Axial
Qty of Blowers:	2
Hosepower (each):	125
Blower Speeds:	1-speed VFD Suitable

Controls / Electrical:

Haz Rating:	Class 1, Div 2, Gr C/D	
Motor Horsepower:	125.0	hp
Motor Voltage:	460	volts
Motor Power Frequency:	60	hertz
Motor Power Phase:	3	phase
Motor Type:	NEC	
Motor Enclosure:	TEAO	
Motor Safety Factor:	1.0	

(Typical Picture)

Construction and Mounting:

Mounting	Hang from Stack
Rotor Material:	Aluminum
Housing Material:	Carbon Steel
Paint:	Manuf Std.

Accessories:

Bird Screen
Inlet Bell
240V space heater
Silencer Included
Backflow Damper for 2nd Stage Blower

Misc. Notes:

1. Blower staging logic is in customer DCS
2. Blower VFD supplied by others.
3. Stage 1 blower operates on VFD (by others)
4. Stage 2 Blower is 1-speed on/off only

ATTACHMENT N

Supporting Emissions Calculations

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

- **Emission Summary Spreadsheets**
  - Criteria Pollutants - Controlled Emissions Summary
  - Hazardous Air Pollutants - Controlled Emissions Summary
  - Greenhouse Gas (GHG) - Emissions Summary
  - Pre-Controlled Emissions Summary
- **Unit-Specific Emission Spreadsheets**
  - Recovery Compressor Engine 01 - 225 bhp CAT G342NA (CE-01 (1E))
  - Recovery Compressor Engine 02 - 625 bhp CAT G398TA (CE-02 (2E))
  - TXP1 Compressor Engines 03 thru 05 - 3,550 bhp CAT G3612LE (CE-03 (3E) thru CE-05 (5E))
  - Startup/Shutdown/Maintenance (Including Blowdown) (SSM (6E))
  - Compressor Rod Packing and Engine Crankcase (RPC (7E))
  - Emergency Generator Engine - 118 bhp Olympian G70LG (GE-01 (8E))
  - TXP1 Hot Oil Heater - 10.0 MMBtu/hr (H-01 (9E))
  - TXP1 Regenerator Gas Heater - 4.74 MMBtu/hr (H-02 (10E))
  - R TXP2 and TXP3 Regenerator Gas Heater - 6.60 MMBtu/hr (H-03 (11E) and H-04 (12E))
  - TXP2 and TXP3 Heat Medium Heater - 21.22 MMBtu/hr (H-05 (13E) and H-06 (14E))
  - Groves Dehydrator Flash Tank and Still Vent - 5.0 MMscfd (DH-01 (15E))
  - Groves Dehydrator Reboiler - 0.20 MMBtu/hr (BLR-01 (16E))
  - Old Process Flare (FL-01 (17E)) (MODIFIED)
  - New Process Flare (FL-02 (18E)) (MODIFIED)
  - Truck Load-Out (TLO (20E))
  - Process Piping Fugitive Emissions (FUG (21E))
  - Produced H2O Storage Tank Emissions (T-03 (22E) and T-04 (23E))
- **AP-42 and GHG Emission Factors**
- **GRI-GLYCalc Model Runs**
  - Groves Dehydrator Flash Tank and Still Vent - 5.0 MMscfd (DH-01 (15E))

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment N - Supporting Emissions Calculations

Criteria Pollutants - Controlled Emissions Summary

Unit ID	Point ID	Description	Site Rating	NOX		CO		VOC		SO2		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	CAT G342NA Compressor Engine	225 bhp	0.05	0.22	0.99	4.35	0.28	1.22	1.2E-03	0.01	0.04	0.18	272	1,191
CE-02	2E	CAT G398TA Compressor Engine	625 bhp	0.69	3.02	0.69	3.04	0.09	0.39	3.4E-03	0.01	0.11	0.49	712	3,117
CE-03	3E	CAT G3612LE Compressor Engine	3,550 bhp	3.91	17.14	2.15	9.43	2.85	12.48	0.02	0.07	0.26	1.14	4,523	19,813
CE-04	4E	CAT G3612LE Compressor Engine	3,550 bhp	3.91	17.14	2.15	9.43	2.85	12.48	0.02	0.07	0.26	1.14	4,523	19,813
CE-05	5E	CAT G3612LE Compressor Engine	3,550 bhp	3.91	17.14	2.15	9.43	2.85	12.48	0.02	0.07	0.26	1.14	4,523	19,813
SSM	**6E**	**Start/Stop/Maintenance (MODIFIED)**	**na**	**---**	**---**	**---**	**---**	**---**	**13.96**	**---**	**---**	**---**	**---**	**---**	**4,095**
RPC	**7E**	**Rod Packing/Crankcase (MODIFIED)**	**na**	**---**	**---**	**---**	**---**	**4.62**	**20.23**	**---**	**---**	**---**	**---**	**1,115**	**4,884**
GE-01	8E	Olympian G70LG EmGen Engine	118 bhp	0.93	0.23	29.10	7.28	0.38	0.10	8.9E-04	2.2E-04	0.03	0.01	168	42
H-01	9E	TXP1 Hot Oil Heater	10.0 MMBtu/hr	1.09	4.76	0.91	4.00	0.06	0.27	0.01	0.03	0.08	0.36	1,298	5,686
H-02	10E	TXP1 Regen Gas Heater	4.74 MMBtu/hr	0.52	2.26	0.43	1.90	0.03	0.13	3.1E-03	0.01	0.04	0.17	615	2,695
H-03	11E	TXP2 Regen Gas Heater	6.60 MMBtu/hr	0.72	3.14	0.60	2.64	0.04	0.18	4.3E-03	0.02	0.05	0.24	857	3,753
H-04	12E	TXP3 Regen Gas Heater	6.60 MMBtu/hr	0.72	3.14	0.60	2.64	0.04	0.18	4.3E-03	0.02	0.05	0.24	857	3,753
H-05	13E	TXP2 Heat Medium Heater	21.22 MMBtu/hr	2.31	10.10	1.94	8.49	0.13	0.57	0.01	0.06	0.18	0.77	2,755	12,067
H-06	14E	TXP3 Heat Medium Heater	21.22 MMBtu/hr	2.31	10.10	1.94	8.49	0.13	0.57	0.01	0.06	0.18	0.77	2,755	12,067
DH-01	15E	Groves Dehydrator - Flash Tank/Still Vent*	5.0 MMscfd	---	---	---	---	3.88	17.00	---	---	---	---	128	562
BLR-01	16E	Groves Dehydrator - Reboiler*	0.20 MMBtu/hr	0.02	0.10	0.02	0.08	1.2E-03	0.01	1.3E-04	5.7E-04	1.7E-03	0.01	26	114
FL-01	**17E**	**Old Process Flare (MODIFIED)**	**25.0 MMscf/yr**	**16.32**	**0.96**	**74.40**	**4.36**	**8.63**	**0.51**	**0.14**	**8.3E-03**	**1.79**	**0.10**	**33,204**	**1,947**
FL-02	**18E**	**New Process Flare (MODIFIED)**	**90.0 MMscf/yr**	**31.28**	**3.95**	**142.61**	**17.99**	**89.68**	**11.31**	**0.27**	**0.03**	**3.43**	**0.43**	**63,547**	**8,016**
TLO	20E	Truck Load-Out - Prod H2O/Condensate	600,000 bbl/yr	---	---	---	---	---	1.96	---	---	---	---	---	---
FUG	**21E**	**Process Piping Fugitives (MODIFIED)**	**na**	**---**	**---**	**---**	**---**	**16.16**	**70.76**	**---**	**---**	**---**	**---**	**386**	**1,689**
T-03	22E	Produced Water Tank (9913)	400 bbl	---	---	---	---	0.23	1.01	---	---	---	---	---	---
T-04	23E	Produced Water Tank (9914)	400 bbl	---	---	---	---	0.23	1.01	---	---	---	---	---	---
		TOTAL FACILITY-WIDE PTE:		**68.68**	**93.40**	**260.70**	**93.51**	**133.16**	**178.79**	**0.51**	**0.47**	**6.76**	**7.20**	**122,265**	**125,115**
		NNSR/PSD Threshold:			**250**		**250**		**250**		**250**		**250**		**na**
		TVOP Threshold:			**100**		**100**		**100**		**100**		**100**		**100,000**

Notes: * - Emission Units DH-01/15E and BLR-01/16E are authorized by Permit R13-3212, issued 12/16/14; all other Emission Units are authorized by Permit R13-2826I, issued 12/03/14.

1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr; except GE-01, TLO and SSM emissions are intermittent (and infrequent).

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 - CO2e is aggregated Greenhouse Gas (GHG), comprised of carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), as adjusted for Global Warming Potential (GWP).

Hazardous Air Pollutants - Controlled Emissions Summary

Unit ID	Point ID	Acetaldehyde		Acrolein		Benzene		Ethylbenzene		Formaldehyde (HCHO)		n-Hexane		Methanol (MeOH)		Toluene		2,2,4-Trimethyl-pentane (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	lb/hr	tpy	lb/hr	tpy
CE-01	1E	0.01	0.03	0.01	0.02	3.4E-03	0.01	5.3E-05	2.3E-04	0.03	0.13	---	---	0.01	0.03	1.2E-03	0.01	---	---	4.1E-04	1.8E-03	2.0E-03	0.01	**0.05**	**0.24**
CE-02	2E	3.2E-03	0.01	3.1E-03	0.01	1.8E-03	0.01	2.9E-05	1.3E-04	0.03	0.14	---	---	3.6E-03	0.02	6.5E-04	2.8E-03	---	---	2.3E-04	9.9E-04	1.1E-03	4.8E-03	**0.05**	**0.20**
CE-03	3E	0.11	0.48	0.07	0.29	0.01	0.03	5.2E-04	2.3E-03	0.31	1.34	0.01	0.06	0.03	0.14	0.01	0.02	3.3E-03	0.01	2.4E-03	0.01	0.01	0.05	**0.56**	**2.44**
CE-04	4E	0.11	0.48	0.07	0.29	0.01	0.03	5.2E-04	2.3E-03	0.31	1.34	0.01	0.06	0.03	0.14	0.01	0.02	3.3E-03	0.01	2.4E-03	0.01	0.01	0.05	**0.56**	**2.44**
CE-05	5E	0.11	0.48	0.07	0.29	0.01	0.03	5.2E-04	2.3E-03	0.31	1.34	0.01	0.06	0.03	0.14	0.01	0.02	3.3E-03	0.01	2.4E-03	0.01	0.01	0.05	**0.56**	**2.44**
SSM	**6E**	**---**	**---**	**---**	**---**	**---**	**0.11**	**---**	**0.11**	**---**	**---**	**---**	**1.43**	**---**	**---**	**---**	**0.11**	**---**	**0.11**	**---**	**0.11**	**---**	**---**	**---**	**1.96**
RPC	**7E**	**---**	**---**	**---**	**---**	**0.09**	**0.39**	**0.09**	**0.39**	**0.05**	**0.22**	**0.09**	**0.39**	**---**	**---**	**0.09**	**0.39**	**0.09**	**0.39**	**0.09**	**0.39**	**---**	**---**	**0.58**	**2.55**
GE-01	8E	4.2E-03	1.1E-03	4.0E-03	9.9E-04	2.4E-03	6.0E-04	3.7E-05	9.4E-06	0.03	0.01	---	---	4.6E-03	1.2E-03	4.6E-03	2.1E-04	---	---	2.9E-04	7.4E-05	1.4E-03	3.5E-04	**0.05**	**0.01**
H-01	9E	---	---	---	---	2.3E-05	1.0E-04	---	---	8.2E-04	3.6E-03	0.02	0.09	---	---	3.7E-05	1.6E-04	---	---	---	---	2.1E-05	9.0E-05	**0.02**	**0.09**
H-02	10E	---	---	---	---	1.1E-05	4.7E-05	---	---	3.9E-04	1.7E-03	0.01	0.04	---	---	1.8E-05	7.7E-05	---	---	---	---	9.8E-06	4.3E-05	**0.01**	**0.04**
H-03	11E	---	---	---	---	1.5E-05	6.6E-05	---	---	5.4E-04	2.4E-03	0.01	0.06	---	---	2.4E-05	1.1E-04	---	---	---	---	1.4E-05	6.0E-05	**0.01**	**0.06**
H-04	12E	---	---	---	---	1.5E-05	6.6E-05	---	---	5.4E-04	2.4E-03	0.01	0.06	---	---	2.4E-05	1.1E-04	---	---	---	---	1.4E-05	6.0E-05	**0.01**	**0.06**
H-05	13E	---	---	---	---	4.8E-05	2.1E-04	---	---	1.7E-03	0.01	0.04	0.18	---	---	7.8E-05	3.4E-04	---	---	---	---	4.4E-05	1.9E-04	**0.04**	**0.19**
H-06	14E	---	---	---	---	4.8E-05	2.1E-04	---	---	1.7E-03	0.01	0.04	0.18	---	---	7.8E-05	3.4E-04	---	---	---	---	4.4E-05	1.9E-04	**0.04**	**0.19**
DH-01	15E	---	---	---	---	0.07	0.31	---	---	---	---	0.07	0.30	---	---	0.31	1.34	---	---	0.98	4.27	---	---	**1.42**	**6.22**
BLR-01	16E	---	---	---	---	4.6E-07	2.0E-06	---	---	1.6E-05	7.1E-05	3.9E-04	1.7E-03	---	---	7.4E-07	3.2E-06	---	---	---	---	4.1E-07	1.8E-06	**4.1E-04**	**1.8E-03**
FL-01	**17E**	**---**	**---**	**---**	**---**	**0.11**	**0.01**	**0.11**	**0.01**	**0.02**	**1.0E-03**	**1.28**	**0.08**	**---**	**---**	**0.11**	**0.01**	**---**	**---**	**0.11**	**0.01**	**4.5E-04**	**2.6E-05**	**1.72**	**0.10**
FL-02	**18E**	**---**	**---**	**---**	**---**	**0.07**	**0.01**	**0.07**	**0.01**	**0.03**	**4.3E-03**	**1.57**	**0.20**	**---**	**---**	**0.07**	**0.01**	**---**	**---**	**0.07**	**0.01**	**8.6E-04**	**1.1E-04**	**1.89**	**0.24**
TLO	20E	---	---	---	---	---	0.10	---	0.10	---	---	---	0.10	---	---	---	0.10	---	---	---	0.10	---	---	---	**0.49**
FUG	**21E**	**---**	**---**	**---**	**---**	**0.03**	**0.15**	**0.03**	**0.15**	**---**	**---**	**0.66**	**2.88**	**---**	**---**	**0.03**	**0.15**	**---**	**---**	**0.03**	**0.15**	**---**	**---**	**0.79**	**3.47**
T-03	22E	---	---	---	---	0.01	0.05	0.01	0.05	---	---	0.01	0.05	---	---	0.01	0.05	---	---	0.01	0.05	---	---	**0.06**	**0.25**
T-04	23E	---	---	---	---	0.01	0.05	0.01	0.05	---	---	0.01	0.05	---	---	0.01	0.05	---	---	0.01	0.05	---	---	**0.06**	**0.25**
TOTAL PTE:		**0.34**	**1.47**	**0.21**	**0.92**	**0.42**	**1.27**	**0.33**	**0.86**	**1.12**	**4.54**	**3.87**	**6.26**	**0.11**	**0.47**	**0.65**	**2.27**	**0.10**	**0.54**	**1.31**	**5.17**	**0.04**	**0.17**	**8.49**	**23.96**
NNSR/PSD:			**na**		**na**		**na**		**na**		**na**		**na**		**na**		**na**		**na**		**na**		**na**		**na**
TVOP:			**10**		**10**		**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; except GE-01, TLO and SSM emissions are intermittent (and infrequent).

Greenhouse Gas (GHG) - Emissions Summary

Unit ID	Point ID	Description	Site Rating	Operating Hours	Heat Input		CO2 kg/MMBtu: GWP:	CO2e 53.06 1	CH4 kg/MMBtu: GWP:	CO2e 1.00E-03 25	N2O kg/MMBtu: GWP:	CO2e 1.00E-04 298	TOTAL CO2e
				hr/yr	LHV MMBtu/hr	HHV MMBtu/hr	tpy	tpy	tpy	tpy	tpy	tpy	tpy
CE-01	1E	CAT G342NA Compressor Engine	225 bhp	8,760	1.91	2.12	1,093	1,093	3.91	97.77	2.0E-03	0.61	**1,191**
CE-02	2E	CAT G398TA Compressor Engine	625 bhp	8,760	5.24	5.81	2,995	2,995	4.83	120.70	0.01	1.67	**3,117**
CE-03	3E	CAT G3612LE Compressor Engine	3,550 bhp	8,760	23.53	26.09	15,117	15,117	187.51	4,688	0.03	7.51	**19,813**
CE-04	4E	CAT G3612LE Compressor Engine	3,550 bhp	8,760	23.53	26.09	15,117	15,117	187.51	4,688	0.03	7.51	**19,813**
CE-05	5E	CAT G3612LE Compressor Engine	3,550 bhp	8,760	23.53	26.09	15,117	15,117	187.51	4,688	0.03	7.51	**19,813**
SSM	**6E**	**Start/Stop/Maintenance (MODIFIED)**	**na**	**8,760**	**---**	**---**	**---**	**---**	**164**	**4,095**	**---**	**---**	**4,095**
RPC	**7E**	**Rod Packing/Crankcase (MODIFIED)**	**na**	**8,760**	**---**	**---**	**372**	**372**	**180**	**4,511**	**---**	**---**	**4,884**
GE-01	8E	Olympian G70LG EmGen Engine	118 bhp	500	0.91	1.01	34	34	0.31	8	3.3E-04	0.10	**42**
H-01	9E	TXP1 Hot Oil Heater	10.0 MMBtu/hr	8,760	10.00	11.09	5,681	5,681	0.11	3	0.01	3	**5,686**
H-02	10E	TXP1 Regen Gas Heater	4.74 MMBtu/hr	8,760	4.74	5.26	2,693	2,693	0.05	1	0.01	2	**2,695**
H-03	11E	TXP2 Regen Gas Heater	6.60 MMBtu/hr	8,760	6.60	7.32	3,749	3,749	0.07	2	0.01	2	**3,753**
H-04	12E	TXP3 Regen Gas Heater	6.60 MMBtu/hr	8,760	6.60	7.32	3,749	3,749	0.07	2	0.01	2	**3,753**
H-05	13E	TXP2 Heat Medium Heater	21.22 MMBtu/hr	8,760	21.22	23.53	12,054	12,054	0.23	6	0.02	7	**12,067**
H-06	14E	TXP3 Heat Medium Heater	21.22 MMBtu/hr	8,760	21.22	23.53	12,054	12,054	0.23	6	0.02	7	**12,067**
DH-01	15E	Groves Dehydrator - Flash Tank/Still Vent*	5.0 MMscfd	8,760	---	---	---	---	22.50	562.4	---	---	**562**
BLR-01	16E	Groves Dehydrator - Reboiler*	0.20 MMBtu/hr	8,760	0.20	0.22	114	114	2.1E-03	0.05	2.1E-04	0.06	**114**
FL-01	**17E**	**Old Process Flare (MODIFIED)**	**25.0 MMscf/yr**	**8,760**	**2.89**	**3.21**	**1,680**	**1,680**	**10.57**	**264.22**	**7.0E-03**	**2.08**	**1,947**
FL-02	**18E**	**New Process Flare (MODIFIED)**	**90.0 MMscf/yr**	**8,760**	**11.92**	**13.25**	**7,150**	**7,150**	**34.11**	**853**	**0.04**	**13.34**	**8,016**
TLO	20E	Truck Load-Out - Prod H2O/Condensate	600,000 bbl/yr	---	---	---	---	---	---	---	---	---	**---**
FUG	**21E**	**Process Piping Fugitives (MODIFIED)**	**na**	**8,760**	**---**	**---**	**---**	**---**	**68**	**1,688**	**---**	**---**	**1,688**
T-03	22E	Produced Water Tank (9913)	400 bbl	8,760	---	---	---	---	---	---	---	---	**---**
T-04	23E	Produced Water Tank (9914)	400 bbl	8,760	---	---	---	---	---	---	---	---	**---**

TOTAL POINT SOURCE EMISSIONS:	**181.92**	**98,769**	**98,769**	**1,051**	**26,282**	**0.21**	**63**	**125,114**
NNSR/PSD Major Source Threshold:		**na**	**(OR)**	**na**	**(OR)**	**na**	**(AND)**	**na**
TVOP Major Source Threshold:		**na**		**na**		**na**		**100,000**

Notes: * - Emission Units DH-01/15E and BLR-01/16E are authorized by Permit R13-3212, issued 12/16/14; all other Emission Units are authorized by Permit R13-2826I, issued 12/03/14.

1 - Emissions shown are based on operation at 100% of rated load and capacity for 8,760 hrs/yr, except:

i. GE-01/8E potential to emit is based on 500 hr/yr (operation is unlimited during emergencies); and

ii. SSM/6E and TLO/20E emissions are infrequent and intermittent.

2 - Engine CO2 and CH4 emissions are based on vendor specifications.

3 - Dehydrator CH4 emissions are based on "Worst Case" GRI-GLYCalc Model Output.

4 - SSM CH4 emissions are based on vendor specifications and operational experience.

5 - Fugitive CH4 emissions are based on EPA Fugitive Emission Factors for Oil and Gas Production Operations.

6 - All other GHG emissions are based on the most conservative values in either AP-42 or 40CFR98, Subpart C, Table C-1.

7 - CO2e is aggregated Greenhouse Gas (GHG), comprised of carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), as adjusted for Global Warming Potential (GWP).

8 - GHG TVOP and NSR/PSD Major Source Thresholds are applicable only if other regulated air pollutants exceed the corresponding Thresholds.

Pre-Controlled Emissions Summary

Unit ID	Point ID	Description	Site Rating	NOX		CO		VOC		HCHO		Xylenes		Total HAP		CO2e	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	CAT G342NA Compressor Engine	225 bhp	6.40	28.03	6.80	29.77	0.37	1.63	0.12	0.54	4.1E-04	1.8E-03	0.15	0.65	272	1,191
CE-02	2E	CAT G398TA Compressor Engine	625 bhp	13.50	59.14	14.74	64.58	0.41	1.81	0.14	0.60	1.1E-03	5.0E-03	0.21	0.90	712	3,117
CE-03	3E	CAT G3612LE Compressor Engine	3,550 bhp	3.91	17.14	21.52	94.27	7.12	31.19	2.03	8.91	4.8E-03	0.02	2.54	11.13	4,523	19,813
CE-04	4E	CAT G3612LE Compressor Engine	3,550 bhp	3.91	17.14	21.52	94.27	7.12	31.19	2.03	8.91	4.8E-03	0.02	2.54	11.13	4,523	19,813
CE-05	5E	CAT G3612LE Compressor Engine	3,550 bhp	3.91	17.14	21.52	94.27	7.12	31.19	2.03	8.91	4.8E-03	0.02	2.54	11.13	4,523	19,813
SSM	**6E**	**Start/Stop/Maintenance (MODIFIED)**	**na**	**---**	**---**	**---**	**---**	**---**	**16.26**	**---**	**---**	**---**	**0.14**	**---**	**2.57**	**---**	**5,617**
RPC	**7E**	**Rod Packing/Crankcase (MODIFIED)**	**na**	**---**	**---**	**---**	**---**	**4.62**	**20.23**	**0.05**	**0.22**	**0.09**	**0.39**	**0.58**	**2.55**	**1,115**	**4,884**
GE-01	8E	Olympian G70LG EmGen Engine	118 bhp	0.93	0.23	29.10	7.28	0.38	0.10	3.1E-02	7.7E-03	1.4E-03	3.5E-04	0.05	0.01	168	42
H-01	9E	TXP1 Hot Oil Heater	10.0 MMBtu/hr	1.09	4.76	0.91	4.00	0.06	0.27	8.2E-04	3.6E-03	---	---	0.02	0.09	1,298	5,686
H-02	10E	TXP1 Regen Gas Heater	4.74 MMBtu/hr	0.52	2.26	0.43	1.90	0.03	0.13	3.9E-04	1.7E-03	---	---	0.01	0.04	615	2,695
H-03	11E	TXP2 Regen Gas Heater	6.60 MMBtu/hr	0.72	3.14	0.60	2.64	0.04	0.18	5.4E-04	2.4E-03	---	---	0.01	0.06	857	3,753
H-04	12E	TXP3 Regen Gas Heater	6.60 MMBtu/hr	0.72	3.14	0.60	2.64	0.04	0.18	5.4E-04	2.4E-03	---	---	0.01	0.06	857	3,753
H-05	13E	TXP2 Heat Medium Heater	21.22 MMBtu/hr	2.31	10.10	1.94	8.49	0.13	0.57	1.7E-03	7.6E-03	---	---	0.04	0.19	2,755	12,067
H-06	14E	TXP3 Heat Medium Heater	21.22 MMBtu/hr	2.31	10.10	1.94	8.49	0.13	0.57	1.7E-03	7.6E-03	---	---	0.04	0.19	2,755	12,067
DH-01	15E	Groves Dehydrator - Flash Tank/Still Vent*	5.0 MMscfd	---	---	---	---	5.77	25.28	---	---	1.00	4.37	1.51	6.62	255	1,116
BLR-01	16E	Groves Dehydrator - Reboiler*	0.20 MMBtu/hr	0.02	0.10	0.02	0.08	1.2E-03	0.01	1.6E-05	7.1E-05	---	---	4.1E-04	1.8E-03	26	114
FL-01	**17E**	**Old Process Flare (MODIFIED)**	**25.0 MMscf/yr**	**---**	**---**	**---**	**---**	**431.57**	**25.31**	**---**	**---**	**5.33**	**0.31**	**85.25**	**5.00**	**225,241**	**13,211**
FL-02	**18E**	**New Process Flare (MODIFIED)**	**90.0 MMscf/yr**	**---**	**---**	**---**	**---**	**4,484.07**	**565.65**	**---**	**---**	**3.57**	**0.45**	**92.75**	**11.70**	**338,000**	**42,638**
TLO	20E	Truck Load-Out - Prod H2O/Condensate	600,000 bbl/yr	---	---	---	---	---	1.96	---	---	---	0.10	---	0.49	---	---
FUG	**21E**	**Process Piping Fugitives (MODIFIED)**	**na**	**---**	**---**	**---**	**---**	**32.42**	**142.00**	**---**	**---**	**0.07**	**0.30**	**1.60**	**7.03**	**844**	**3,697**
T-03	22E	Produced Water Tank (9913)	400 bbl	---	---	---	---	0.23	1.01	---	---	0.01	0.05	0.06	0.25	---	---
T-04	23E	Produced Water Tank (9914)	400 bbl	---	---	---	---	0.23	1.01	---	---	0.01	0.05	0.06	0.25	---	---
		TOTAL FACILITY-WIDE:		**40.24**	**172.43**	**121.65**	**412.65**	**4,981.88**	**897.75**	**6.45**	**28.14**	**10.09**	**6.24**	**189.98**	**72.05**	**589,339**	**175,084**
		NNSR/PSD Threshold:			**250**		**250**		**250**		**na**		**na**		**na**		**na**
		TVOP Threshold:			**100**		**100**		**100**		**10**		**10**		**25**		**100,000**

Notes: * - Emission Units DH-01/15E and BLR-01/16E are authorized by Permit R13-3212, issued 12/16/14; all other Emission Units are authorized by Permit R13-2826I, issued 12/03/14.

1 - Emission estimates are based on operation at 100% of rated load for 8,760 hr/yr, unless a Federally Enforceable Limitation (FEL) is established on hours of operation.

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 - CO2e is aggregated Greenhouse Gas (GHG), comprised of carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O).

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment N - Supporting Emissions Calculations

Recovery Compressor Engine 01 - 225 bhp CAT G342NA (CE-01/1E)

Unit ID (Point ID)	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions			
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/MMBtu	lb/hr	tpy
CE-01/1E	**Caterpillar (CAT) G342NA Engine 4SRB w/ NSCR**	Vendor Specs	NOx	12.90	3.02	6.40	28.03	99.2%	0.10	0.02	**0.05**	**0.22**
		Vendor Specs	CO	13.70	3.20	6.80	29.77	85.4%	2.00	0.47	**0.99**	**4.35**
		Vendor Specs	THC	1.80	0.42	0.89	3.91	---	1.80	0.42	**0.89**	**3.91**
		Est = 50% x THC	NMHC	0.90	0.21	0.45	1.96	---	0.90	0.21	**0.45**	**1.96**
		Vendor Specs	NMNEHC	0.50	0.12	0.25	1.09	---	0.50	0.12	**0.25**	**1.09**
	225 bhp	NMNEHC+HCHO	VOC	0.75	0.18	0.37	1.63	25.3%	0.56	0.13	**0.28**	**1.22**
	1,200 rpm	AP-42 Table 3.2-3	SO2	2.5E-03	5.9E-04	1.2E-03	0.01	---	2.5E-03	5.9E-04	**1.2E-03**	**0.01**
		AP-42 Table 3.2-3	PM10/2.5	0.08	0.02	0.04	0.18	---	0.08	0.02	**0.04**	**0.18**
	Manufacture Date:	AP-42 Table 3.2-3	Acetaldehyde	0.01	2.8E-03	5.9E-03	0.03	---	0.01	2.8E-03	**0.01**	**0.03**
	Before 06/12/06	AP-42 Table 3.2-3	Acrolein	0.01	2.6E-03	5.6E-03	0.02	---	0.01	2.6E-03	**0.01**	**0.02**
	NESHAP ZZZZ (Existing)	AP-42 Table 3.2-3	Benzene	0.01	1.6E-03	3.4E-03	0.01	---	0.01	1.6E-03	**3.4E-03**	**0.01**
		AP-42 Table 3.2-3	Ethylbenzene	1.1E-04	2.5E-05	5.3E-05	2.3E-04	---	1.1E-04	2.5E-05	**5.3E-05**	**2.3E-04**
	8,760 hr/yr	Vendor Specs (Est.)	Formaldehyde	0.25	0.06	0.12	0.54	76.0%	0.06	0.01	**0.03**	**0.13**
		AP-42 Table 3.2-3	n-Hexane	---	---	---	---	---	---	---	**---**	**---**
	8,500 Btu/bhp-hr (LHV)	AP-42 Table 3.2-3	Methanol	1.3E-02	3.1E-03	6.5E-03	0.03	---	1.3E-02	3.1E-03	**0.01**	**0.03**
	9,424 Btu/bhp-hr (HHV)	AP-42 Table 3.2-3	Toluene	2.4E-03	5.6E-04	1.2E-03	0.01	---	2.4E-03	5.6E-04	**1.2E-03**	**0.01**
	1.91 MMBtu/hr (LHV)	AP-42 Table 3.2-3	2,2,4-TMP	---	---	---	---	---	---	---	**---**	**---**
	2.12 MMBtu/hr (HHV)	AP-42 Table 3.2-3	Xylenes	8.3E-04	2.0E-04	4.1E-04	1.8E-03	---	8.3E-04	2.0E-04	**4.1E-04**	**1.8E-03**
	16,754 MMBtu/yr (LHV)	AP-42 Table 3.2-3	Other HAPs	4.0E-03	9.4E-04	2.0E-03	0.01	---	4.0E-03	9.4E-04	**2.0E-03**	**0.01**
	2,079 scf/hr	Sum	Total HAP	0.30	0.07	0.15	0.65	63.3%	0.11	0.03	**0.05**	**0.24**
	18.21 MMscf/yr	40CFR98 - Table C-1	CO2	503	118	249	1,093	---	503	118	**249**	**1,093**
	920 Btu/scf (LHV)	Vendor Specs (THC)	CH4	1.80	0.42	0.89	3.91	---	1.80	0.42	**0.89**	**3.91**
	1,020 Btu/scf (HHV)	40CFR98 - Table C-2	N2O	9.4E-04	2.2E-04	4.7E-04	2.0E-03	---	9.4E-04	2.2E-04	**4.7E-04**	**2.0E-03**
		Weighted Sum	CO2e	548	128	272	1,191	---	548	128	**272**	**1,191**

Notes: 1 - The emissions are based on operation at 100% of rated load for 8,760 hr/yr.

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment N - Supporting Emissions Calculations

Recovery Compressor Engine 02 - 625 bhp CAT G398TA (CE-02/2E)

Unit ID (Point ID)	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions			
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/MMBtu	lb/hr	tpy
CE-02/2E	**Caterpillar (CAT) G398TA Engine 4SRB w/ NSCR**	Vendor Specs	NOx	9.80	2.32	13.50	59.14	94.9%	0.50	0.12	**0.69**	**3.02**
		Vendor Specs	CO	10.70	2.54	14.74	64.58	95.3%	0.50	0.12	**0.69**	**3.04**
		Vendor Specs	THC	0.80	0.19	1.10	4.83	20.0%	0.64	0.15	**0.88**	**3.86**
		Est = 50% x THC	NMHC	0.40	0.09	0.55	2.41	10.0%	0.32	0.09	**0.44**	**1.93**
		Vendor Specs	NMNEHC	0.20	0.05	0.28	1.21	80.0%	0.04	0.01	**0.06**	**0.24**
	625 bhp	NMNEHC+HCHO	VOC	0.30	0.07	0.41	1.81	78.7%	0.06	0.02	**0.09**	**0.39**
	1,200 rpm	AP-42 Table 3.2-3	SO2	2.5E-03	5.9E-04	3.4E-03	0.01	---	2.5E-03	5.9E-04	**3.4E-03**	**0.01**
		AP-42 Table 3.2-3	PM10/2.5	0.08	0.02	0.11	0.49	---	0.08	0.02	**0.11**	**0.49**
	Manufacture Date:	AP-42 Table 3.2-3	Acetaldehyde	0.01	2.8E-03	0.02	0.07	80.0%	0.00	5.6E-04	**3.2E-03**	**0.01**
	Before 06/12/06	AP-42 Table 3.2-3	Acrolein	0.01	2.6E-03	0.02	0.07	80.0%	0.00	5.3E-04	**3.1E-03**	**0.01**
	NESHAP ZZZZ (Existing)	AP-42 Table 3.2-3	Benzene	0.01	1.6E-03	0.01	0.04	80.0%	1.3E-03	3.2E-04	**1.8E-03**	**0.01**
		AP-42 Table 3.2-3	Ethylbenzene	1.0E-04	2.5E-05	1.4E-04	6.3E-04	80.0%	2.1E-05	5.0E-06	**2.9E-05**	**1.3E-04**
	8,760 hr/yr	Vendor Specs (Est.)	Formaldehyde	0.10	0.02	0.14	0.60	76.0%	0.02	0.01	**0.03**	**0.14**
		AP-42 Table 3.2-3	n-Hexane	---	---	---	---	80.0%	---	---	**---**	**---**
	8,387 Btu/bhp-hr (LHV)	AP-42 Table 3.2-3	Methanol	0.01	3.1E-03	0.02	0.08	80.0%	2.6E-03	6.1E-04	**3.6E-03**	**0.02**
	9,299 Btu/bhp-hr (HHV)	AP-42 Table 3.2-3	Toluene	2.4E-03	5.6E-04	3.2E-03	0.01	80.0%	4.7E-04	1.1E-04	**6.5E-04**	**2.8E-03**
	5.24 MMBtu/hr (LHV)	AP-42 Table 3.2-3	2,2,4-TMP	---	---	---	---	80.0%	---	---	**---**	**---**
	5.81 MMBtu/hr (HHV)	AP-42 Table 3.2-3	Xylenes	8.2E-04	2.0E-04	1.1E-03	5.0E-03	80.0%	1.6E-04	3.9E-05	**2.3E-04**	**9.9E-04**
	45,919 MMBtu/yr (LHV)	AP-42 Table 3.2-3	Other HAPs	4.0E-03	9.4E-04	0.01	0.02	80.0%	7.9E-04	1.9E-04	**1.1E-03**	**4.8E-03**
	5,698 scf/hr	Sum	Total HAP	0.15	0.04	0.21	0.90	77.3%	0.03	0.01	**0.05**	**0.20**
	49.91 MMscf/yr	40CFR98 - Table C-1	CO2	496	118	684	2,995	---	496	118	**684**	**2,995**
	920 Btu/scf (LHV)	Vendor Specs (THC)	CH4	0.80	0.19	1.10	4.83	---	0.80	0.19	**1.10**	**4.83**
	1,020 Btu/scf (HHV)	40CFR98 - Table C-2	N2O	9.3E-04	2.2E-04	1.3E-03	0.01	---	9.3E-04	2.2E-04	**1.3E-03**	**0.01**
		Weighted Sum	CO2e	516	122	712	3,117	---	516	122	**712**	**3,117**

Notes: 1 - The emissions are based on operation at 100% of rated load for 8,760 hr/yr.

Williams Ohio Valley Midstream LLC

FORT BEELER GAS PROCESSING PLANT

Application for 45CSR13 NSR Modification Permit

Attachment N - Supporting Emissions Calculations

TXP1 Compressor Engines 03 thru 05 - 3,550 bhp CAT G3612LE (CE-03/3E thru CE-05/5E)

Unit ID (Point ID)	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions			
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/MMBtu	lb/hr	tpy
CE-03/3E CE-04/4E CE-05/5E	**Caterpillar (CAT) G3612LE Engine 4SLB w/ OxCat** **3,550 bhp (Each)** 1,000 rpm Commenced Construction After 06/12/06 NESHAP ZZZZ (New) **8,760 hr/yr (Each)** 6,629 Btu/bhp-hr (LHV) 7,350 Btu/bhp-hr (HHV) 23.53 MMBtu/hr (LHV) 26.09 MMBtu/hr (HHV) 206,149 MMBtu/yr (LHV) 25,579 scf/hr 224.07 MMscf/yr 920 Btu/scf (LHV) 1,020 Btu/scf (HHV)	Vendor Specs	NOx	0.50	0.15	3.91	17.14	0.0%	0.50	0.15	**3.91**	**17.14**
		Vendor Specs	CO	2.75	0.82	21.52	94.27	90.0%	0.28	0.08	**2.15**	**9.43**
		Vendor Specs	THC	6.46	1.94	50.56	221.45	5.0%	6.14	1.84	**48.02**	**210.31**
		Vendor Specs	NMHC	1.82	0.55	14.24	62.39	17.9%	1.50	0.45	**11.70**	**51.25**
		Vendor Specs	NMNEHC	0.65	0.19	5.09	22.28	50.0%	0.33	0.10	**2.54**	**11.14**
		NMNEHC+HCHO	VOC	0.91	0.27	7.12	31.19	60.0%	0.36	0.11	**2.85**	**12.48**
		AP-42 Table 3.2-2	SO2	2.0E-03	5.88E-04	0.02	0.07	---	2.0E-03	5.9E-04	**0.02**	**0.07**
		AP-42 Table 3.2-2	PM10/2.5	0.03	0.01	0.26	1.14	---	0.03	0.01	**0.26**	**1.14**
		AP-42 Table 3.2-2	Acetaldehyde	0.03	0.01	0.22	0.96	50.0%	0.01	4.2E-03	**0.11**	**0.48**
		AP-42 Table 3.2-2	Acrolein	0.02	0.01	0.13	0.59	50.0%	0.01	2.6E-03	**0.07**	**0.29**
		AP-42 Table 3.2-2	Benzene	1.5E-03	4.40E-04	0.01	0.05	50.0%	7.3E-04	2.2E-04	**0.01**	**0.03**
		AP-42 Table 3.2-2	Ethylbenzene	1.3E-04	3.97E-05	1.0E-03	4.5E-03	50.0%	6.6E-05	2.0E-05	**5.2E-04**	**2.3E-03**
		Vendor Specs	Formaldehyde	0.26	0.08	2.03	8.91	85.0%	0.04	0.01	**0.31**	**1.34**
		AP-42 Table 3.2-2	n-Hexane	3.7E-03	1.11E-03	0.03	0.13	50.0%	1.9E-03	5.6E-04	**0.01**	**0.06**
		AP-42 Table 3.2-2	Methanol	0.01	2.50E-03	0.07	0.29	50.0%	4.2E-03	1.3E-03	**0.03**	**0.14**
		AP-42 Table 3.2-2	Toluene	1.4E-03	4.08E-04	0.01	0.05	50.0%	6.8E-04	2.0E-04	**0.01**	**0.02**
		AP-42 Table 3.2-2	2,2,4-TMP	8.3E-04	2.50E-04	0.01	0.03	50.0%	4.2E-04	1.3E-04	**3.3E-03**	**0.01**
		AP-42 Table 3.2-2	Xylenes	6.1E-04	1.84E-04	4.8E-03	0.02	50.0%	3.1E-04	9.2E-05	**2.4E-03**	**0.01**
		AP-42 Table 3.2-2	Other HAPs	3.1E-03	9.34E-04	0.02	0.11	50.0%	1.6E-03	4.7E-04	**0.01**	**0.05**
		Sum	Total HAP	0.32	0.10	2.54	11.13	78.0%	0.07	0.02	**0.56**	**2.44**
		Vendor Specs	CO2	441	132.29	3,451	15,117	---	441	132	**3,451**	**15,117**
		Vendor Specs	CH4	5.47	1.64	42.81	187.51	---	5.47	1.64	**42.81**	**187.51**
		40CFR98 - Table C-2	N2O	7.3E-04	2.20E-04	0.01	0.03	---	7.3E-04	2.2E-04	**0.01**	**0.03**
		Weighted Sum	CO2e	578	173	4,523	19,813	---	578	173	**4,523**	**19,813**

Notes: 1 - The emissions are based on operation at 100% of rated load for 8,760 hr/yr.

Startup/Shutdown/Maintenance (Including Blowdown) (SSM/6E) (MODIFIED)

Unit		No of Comp-ressor Units	Total bhp	a. Engine "Cold-Start" Gas Volume scf/SSM	b. Blowdown Gas Volume scf/SSM	SSM and Blowdown Events/yr	Total Gas Vented MMscf/yr	VOC 22,600 (Inlet) 1,600 (Residue) lb/MMscf tpy	n-Hexane 1,000 (Inlet) 300 (Residue) lb/MMscf tpy	BTEX,TMP 45 (Inlet) 25 (Residue) lb/MMscf tpy	Total HAP 1,225 (Inlet) 425 (Residue) lb/MMscf tpy	CH4 37,300 (Inlet) 42,275 (Residue) lb/MMscf tpy	CO2e GWP = 25 tpy
CE-01 and CE-02	a. Cold Start (Engines)	2	na	1,400	na	104	0.15	1.65	0.07	0.00	0.09	2.7	68
	b. Blowdown (Recip Comp)	2	850	na	5,283	104	0.55	6.21	0.27	0.01	0.34	10.2	256
CE-03 thru CE-05	a. Cold Start (Engines)	3	na	2,100	na	104	0.22	0.17	0.03	0.00	0.05	4.6	115
	b. Blowdown (Recip Comp)	3	10,650	na	66,192	104	6.88	5.51	1.03	0.09	1.46	145.5	3,638
CM-01	a. Cold Start (Electric Motor)	na	na	na	na	na	na	na	na	na	na	na	na
	b. Blowdown (Recip Comp)	1	500	na	3,108	12	0.04	0.42	0.02	8.4E-04	0.02	0.7	17
CM-02 thru CM-07	a. Cold Start (Electric Motor)	na	na	na	na	na	na	na	na	na	na	na	na
	b. Blowdown (Recip Comp)	6	38,630	na	240,094	12	2.88	2.30	0.43	0.04	0.61	60.9	1,522
TOTAL FACILITY-WIDE PRE-CONTROLLED SSM EMISSIONS:								**16.26**	**1.86**	**0.14**	**2.57**	**225**	**5,617**
BLOWDOWN EMISSIONS FROM CM-02 THRU CM-07 INCLUED IN OLD FLARE (FL-01/17E):								(2.30)	(0.43)	(0.04)	(0.61)	(60.90)	(1,522)
TOTAL FACILITY-WIDE CONTROLLED SSM EMISSIONS:								**13.96**	**1.43**	**0.11**	**1.96**	**164**	**4,095**

Notes: 1 - SSM Emissions are the sum of: a. Unburned fuel resulting from "cold-start" of idle gas-fired engines and b. Natural gas that is purged (aka blowdown) from the compressors and associated piping and equipment.

2 - CM-01 and CM-02 thru CM-07 are gas compressors driven by electric motors. CM-01 is the Columbia compressor, CM-02 thru CM-07 are the residue gas compressors.

3 - 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.)

Engines	a. Unburned "Cold-Start" Gas is Constant at:	700 scf/start
	b. Blowdown Gas is Related to bhp at:	6.22 scf/bhp/B-D

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

Pollutant	Inlet Gas Analysis	Estimated	Residue Gas Analysis	Estimated
Carbon Dioxide	218.85 lb/MMscf	500.00 lb/MMscf	203.37 lb/MMscf	500.00 lb/MMscf
Methane	31,049.14 lb/MMscf	37,300.00 lb/MMscf	35,798.08 lb/MMscf	42,275.00 lb/MMscf
VOC (Propane)	11,267.63 lb/MMscf	22,600.00 lb/MMscf	771.50 lb/MMscf	1,600.00 lb/MMscf
n-Hexane	117.63 lb/MMscf	1,000.00 lb/MMscf	17.34 lb/MMscf	300.00 lb/MMscf
Benzene	1.65 lb/MMscf	50.00 lb/MMscf	0.21 lb/MMscf	25.00 lb/MMscf
Toluene	3.16 lb/MMscf	100.00 lb/MMscf	0.24 lb/MMscf	25.00 lb/MMscf
Ethylbenzene	0.28 lb/MMscf	25.00 lb/MMscf	0.28 lb/MMscf	25.00 lb/MMscf
Xylenes	0.28 lb/MMscf	25.00 lb/MMscf	0.28 lb/MMscf	25.00 lb/MMscf
2,2,4-TMP	0.30 lb/MMscf	25.00 lb/MMscf	0.30 lb/MMscf	25.00 lb/MMscf
Total HAP:	123.30 lb/MMscf	1,225.00 lb/MMscf	18.65 lb/MMscf	425.00 lb/MMscf

5 - Emission estimates are conservatively based on:

2.0	Starts-Stops per week per Engine.
2.0	Blowdown(s) per week per Compressor (except electrically driven compressors, see above).

6 - CE-01, CE-02, and CM-01 are in Inlet Gas service. CE-03 thru CE-05 and CM-02 thru CM-07 are in Residue Gas service.

Compressor Rod Packing and Engine Crankcase (RPC/7E) (MODIFIED)

Compressor Rod Packing Leaks (Natural Gas)

Unit Description	No. of Recip Comp-ressors	Cyl per Recip Comp-ressor	scfh per Cylinder	Contin-gency	Total Leak Rate	VOC 22,600 (Inlet) 1,600 (Residue) lb/MMscf		HCHO na na lb/MMscf		BTEX,Hex,TMP (Ea) 204 (Inlet) 71 (*Residue) lb/MMscf		Total HAP 1,225 (Inlet) 425 (*Residue) lb/MMscf		CO2 500 (Inlet) 500 (Residue) lb/MMscf		CH4 37,300 (Inlet) 42,275 (Residue) lb/MMscf		CO2e 933,000 (Inlet) 1,057,375 (Residue) 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
Rod Packing - CM-01(Inlet)	1	2	15	15%	0.30	0.78	3.42	na	na	7.0E-03	0.03	0.04	0.19	0.02	0.08	1	6	32	141
Rod Packing - CE-04 (inlet)	1	4	15	15%	0.60	1.56	6.83	na	na	0.01	0.06	0.08	0.37	0.03	0.15	3	11	64	282
Rod Packing - CE-05 (Inlet)	1	2	15	15%	0.30	0.78	3.42	na	na	7.0E-03	0.03	0.04	0.19	0.02	0.08	1	6	32	141
Rod Packing* - CM-02 thru -07	6	6	15	15%	5.44	0.99	4.35	na	na	0.04	0.19	0.26	1.16	0.31	1.36	26	115	657	2,876
Rod Packing* - CE-01 thru -03	3	4	15	15%	1.81	0.33	1.45	na	na	0.01	0.06	0.09	0.39	0.10	0.45	9	38	219	959

*Residue (aka, Outlet) Gas - CM-02 thru -07 and CE-01 thru -03

Crankcase Emissions (Combustion Gas from CE-01 thru -05)

Unit Description	Total Effective (Prorated for hr/yr) Recip Horsepower (bhp)	Leak Rate 0.50 scf/bhp-hr MMscf/yr	Safety Factor	VOC 12.13 lb/MMscf		HCHO 3.47 lb/MMscf		BTEX,Hex,TMP (Ea) 0.14 lb/MMscf		Total HAP 4.33 lb/MMscf		CO2 5,879 lb/MMscf		CH4 73 lb/MMscf		CO2e 7,702 lb/MMscf	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Crankcase Emissions**	11,500	50.37	250%	0.17	0.76	0.05	0.22	2.1E-03	0.01	0.06	0.27	85	370	1	5	111	485

**Crankcase - CE-01 thru -05

CM-01 thru CM-07 are Electric Motor Driven Compressors.
CE-01 thru CE-05 are Gas-Fired Engine Driven Compressors.

	VOC		HCHO		BTEX,Hex,TMP (Ea)		Total HAP		CO2		CH4		CO2e	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Total RPC:	**4.62**	**20.23**	**0.05**	**0.22**	**0.09**	**0.39**	**0.58**	**2.55**	**85**	**372**	**41**	**180**	**1,115**	**4,884**

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" gas characteristics were assumed:

Pollutant	Worst-Case Assumption (Inlet)	Worst-Case Assumption (Outlet)
CO2	500 lb/MMscf	500 lb/MMscf
CH4	37,300 lb/MMscf	42,275 lb/MMscf
VOC	22,600 lb/MMscf	1,600 lb/MMscf
BTEX,Hex,TMP (ea)	204 lb/MMscf	71 lb/MMscf
Total HAP	1,225 lb/MMscf	425 lb/MMscf

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

4 - Total Effective Recip BHP is determined as follows:

Unit ID	Utilization	BHP	Prorated
CE-01	8,760 hr/yr	225	225
CE-02	8,760 hr/yr	625	625
CE-03	8,760 hr/yr	3,550	3,550
CE-04	8,760 hr/yr	3,550	3,550
CE-05	8,760 hr/yr	3,550	3,550
TOTAL		**11,500**	**11,500**

5 - 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".

6 - Crankcase emissions are estimated as follows:

(Data from CAT G3612 Data Sheet and Emissions Calculation Spreadsheet.)

Tot Eng Exhaust (TEEx) (Vol) 24,053 acf/min 5,143 MMscf/yr TEEx*

Pollutant	G3612LE PTE	Crankcase Emission Factor**
Crankcase THC emissions (Mass)	221.45 tpy THC	86.12 lb THC / MMscf TEEx
Crankcase VOC emissions (Mass)	31.19 tpy VOC	12.13 lb VOC / MMscf TEEx
Crankcase HCHO emissions (Mass)	8.91 tpy HCHO	3.47 lb HCHO / MMscf TEEx
Crankcase BTEX (ea) emissions (Ma	0.37 tpy BTEX	0.14 lb BTEX / MMscf TEEx
Crankcase HAP (tot) emissions (Ma	11.13 tpy HAP	4.33 lb HAP / MMscf TEEx
Crankcase CO2 emissions (Mass)	15,117 tpy CO2	5,879 lb CO2 / MMscf TEEx
Crankcase CH4 emissions (Mass)	188 tpy CH4	73 lb CH4 / MMscf TEEx
Crankcase CO2e emissions (Mass)	19,813 tpy CO2e	7,705 lb CO2e /MMscf TEEx

* Conversion from acf/min to scf/yr based 838 oF exhaust temp, and 68 oF std temp.

** Crankcase EmFact = PTE (tpy) from G3612LE ÷ Tot Engine Exhaust (TEEx) (MMsfy/yr).

7 - There are a total of 12 gas compressors; two are inlet gas compressors driven by the CAT G342NA and G398TA engines (CE-01 and -02), three are residue gas compressors driven by CAT G3612LE engines (CE-03 thru -05), one is an inlet gas compressor (Columbia) that is electrically driven (CM-01), and six are electrically driven residue gas compressors (CM-02 thru -07).

Emergency Generator Engine - 118 bhp Olympian G70LG (GE-01/8E)

Unit ID (Point ID)	Description	Reference	Pollutant	Pre-Controlled Emissions				Control Efficiency	Controlled Emissions			
				g/bhp-hr	lb/MMBtu	lb/hr	tpy		g/bhp-hr	lb/MMBtu	lb/hr	tpy
GE-01/8E	**Olympian G70LG (4SRB)**	Vendor Data	NOx	3.55	0.92	0.93	0.23	---	3.55	0.92	**0.93**	**0.23**
	4SRB - EPA Certified	Vendor Data	CO	111.49	28.92	29.10	7.28	---	111.49	28.92	**29.10**	**7.28**
		Vendor Data	THC	1.46	0.38	0.38	0.10	---	1.46	0.38	**0.38**	**0.10**
		Conservative Est.	NMHC	1.46	0.38	0.38	0.10	---	1.46	0.38	**0.38**	**0.10**
	118 bhp	Conservative Est.	NMNEHC	1.46	0.38	0.38	0.10	---	1.46	0.38	**0.38**	**0.10**
	1,800 rpm	Conservative Est.	VOC	1.46	0.38	0.38	0.10	---	1.46	0.38	**0.38**	**0.10**
		AP-42 Table 3.2-3	SO2	2.3E-03	5.88E-04	8.9E-04	2.2E-04	---	2.3E-03	5.88E-04	**8.9E-04**	**2.2E-04**
	Manufacture Date:	AP-42 Table 3.2-3	PM10/2.5	0.07	0.02	0.03	0.01	---	0.07	0.02	**0.03**	**0.01**
	After 01/01/09	AP-42 Table 3.2-3	Acetaldehyde	0.01	2.79E-03	4.2E-03	1.1E-03	---	0.01	2.79E-03	**4.2E-03**	**1.1E-03**
	NSPS Affected	AP-42 Table 3.2-3	Acrolein	0.01	2.63E-03	4.0E-03	9.9E-04	---	0.01	2.63E-03	**4.0E-03**	**9.9E-04**
	NESHAP ZZZZ (New)	AP-42 Table 3.2-3	Benzene	0.01	1.58E-03	2.4E-03	6.0E-04	---	0.01	1.58E-03	**2.4E-03**	**6.0E-04**
		AP-42 Table 3.2-3	Ethylbenzene	9.6E-05	2.48E-05	3.7E-05	9.4E-06	---	9.6E-05	2.48E-05	**3.7E-05**	**9.4E-06**
	500 hr/yr	AP-42 Table 3.2-3	Formaldehyde	0.08	0.02	0.03	0.01	---	0.08	0.02	**0.03**	**0.01**
		AP-42 Table 3.2-3	n-Hexane	---	---	---	---	---	---	---	**---**	**---**
	7,650 Btu/bhp-hr (LHV)	AP-42 Table 3.2-3	Methanol	0.01	3.06E-03	4.6E-03	1.2E-03	---	0.01	3.06E-03	**4.6E-03**	**1.2E-03**
	8,500 Btu/bhp-hr (HHV)	AP-42 Table 3.2-3	Toluene	2.2E-03	5.58E-04	8.4E-04	2.1E-04	---	2.2E-03	5.58E-04	**8.4E-04**	**2.1E-04**
	0.91 MMBtu/hr (LHV)	AP-42 Table 3.2-3	2,2,4-TMP	---	---	---	---	---	---	---	**---**	**---**
	1.01 MMBtu/hr (HHV)	AP-42 Table 3.2-3	Xylenes	7.5E-04	1.95E-04	2.9E-04	7.4E-05	---	7.5E-04	1.95E-04	**2.9E-04**	**7.4E-05**
	453 MMBtu/yr (LHV)	AP-42 Table 3.2-3	Other HAPs	3.6E-03	9.39E-04	1.4E-03	3.5E-04	---	3.6E-03	9.39E-04	**1.4E-03**	**3.5E-04**
	985 scf/hr	Sum	Total HAP	0.12	0.03	0.05	0.01	---	0.12	0.03	**0.05**	**0.01**
	0.49 MMscf/yr	40CFR98 Table C-1	CO2	522	135	136	34	---	522	135.46	**136**	**34**
	920 Btu/scf (LHV)	AP-42 Table 3.2-3	CH4	4.82	1.25	1.26	0.31	---	4.82	1.25	**1.26**	**0.31**
	1,020 Btu/scf (HHV)	40CFR98 Table C-1	N2O	0.01	1.32E-03	1.3E-03	3.3E-04	---	0.01	1.3E-03	**1.3E-03**	**3.3E-04**
		Weighted Sum	CO2e	644	167	168	42	---	644	167	**168**	**42**

Notes:
1 - The emission estimates are based on operation at 100% of rated load for operation of 500 hours per year.
2 - The generator set will burn propane or natural gas fuel.
3 - PM10/2.5 is Filterable and Condensable Particulate Matter; including PM10 and PM2.5
4 - HCHO is Formaldehyde; Total HAP includes HCHO, Acetaldehyde, Acrolein, BTEX (Benzene, Toluene, Ethylbenzene, Xylene), Methanol, and n-Hexane.
5 - NOx, CO and VOC emissions are based on vendor data and are the highest numbers for wither natural gas or propane. Other pollutant emissions are based on EPA AP-42 or 40 CFR Part 98.
6 - SO2, PM and HAP emissions are based on EPA AP-42 emission factors for an uncontrolled four-stroke rich-burn engine.

TXP1 Hot Oil Heater - 10.0 MMBtu/hr (H-01/9E)

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
H-01/9E	TXP1 Hot Oil Heater **10.00 MMBtu/hr (LHV)** **11.09 MMBtu/hr (HHV)** **8,760 hr/yr** 10,870 scf/hr 260.87 Mscfd 95.22 MMscf/yr 920 Btu/scf (LHV) 1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-2	NOx	100.00	9.80E-02	1.09	4.76	---	**1.09**	**4.76**
		EPA AP-42 Table 1.4-2	CO	84.00	8.24E-02	0.91	4.00	---	**0.91**	**4.00**
		EPA AP-42 Table 1.4-2	THC	11.00	1.08E-02	0.12	0.52	---	**0.12**	**0.52**
		EPA AP-42 Table 1.4-2	NMHC	8.75	8.53E-03	0.09	0.41	---	**0.09**	**0.41**
		EPA AP-42 Table 1.4-2	NMNEHC	5.60	5.49E-03	0.06	0.27	---	**0.06**	**0.27**
		EPA AP-42 Table 1.4-2	VOC	5.68	5.56E-03	0.06	0.27	---	**0.06**	**0.27**
		EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	0.01	0.03	---	**0.01**	**0.03**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	7.45E-03	0.08	0.36	---	**0.08**	**0.36**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Acrolein	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	2.3E-05	1.0E-04	---	**2.3E-05**	**1.0E-04**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	0.08	7.35E-05	8.2E-04	3.6E-03	---	**8.2E-04**	**3.6E-03**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	0.02	0.09	---	**0.02**	**0.09**
		EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	3.7E-05	1.6E-04	---	**3.7E-05**	**1.6E-04**
		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 HAPs	1.9E-03	1.86E-06	2.1E-05	9.0E-05	---	**2.1E-05**	**9.0E-05**
		EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	0.02	0.09	---	**0.02**	**0.09**
		40CFR98 - Table C-1	CO2	119,317	1.17E+02	1,297	5,681	---	**1,297**	**5,681**
		40CFR98 - Table C-2	CH4	2.25	2.20E-03	0.02	0.11	---	**0.02**	**0.11**
		40CFR98 - Table C-2	N2O	0.22	2.20E-04	2.4E-03	0.01	---	**2.4E-03**	**0.01**
		Weighted Sum	CO2e	119,440	1.17E+02	1,298	5,686	---	**1,298**	**5,686**

Notes: 1 - 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.
2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.

TXP1 Regenerator Gas Heater - 4.74 MMBtu/hr (H-02/10E)

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
H-02/10E	**TXP1 Regen Gas Heater** **4.74 MMBtu/hr (LHV)** **5.26 MMBtu/hr (HHV)** **8,760 hr/yr** 5,152 scf/hr 123.65 Mscfd 45.13 MMscf/yr 920 Btu/scf (LHV) 1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-2	NOx	100.00	9.80E-02	0.52	2.26	---	**0.52**	**2.26**
		EPA AP-42 Table 1.4-2	CO	84.00	8.24E-02	0.43	1.90	---	**0.43**	**1.90**
		EPA AP-42 Table 1.4-2	THC	11.00	1.08E-02	0.06	0.25	---	**0.06**	**0.25**
		EPA AP-42 Table 1.4-2	NMHC	8.75	8.53E-03	0.04	0.20	---	**0.04**	**0.20**
		EPA AP-42 Table 1.4-2	NMNEHC	5.60	5.49E-03	0.03	0.13	---	**0.03**	**0.13**
		EPA AP-42 Table 1.4-2	VOC	5.68	5.56E-03	0.03	0.13	---	**0.03**	**0.13**
		EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	3.1E-03	0.01	---	**0.00**	**0.01**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	7.45E-03	0.04	0.17	---	**0.04**	**0.17**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Acrolein	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	1.1E-05	4.7E-05	---	**1.1E-05**	**4.7E-05**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	0.08	7.35E-05	3.9E-04	1.7E-03	---	**3.9E-04**	**1.7E-03**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	0.01	0.04	---	**0.01**	**0.04**
		EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	1.8E-05	7.7E-05	---	**1.8E-05**	**7.7E-05**
		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 HAPs	1.9E-03	1.86E-06	9.8E-06	4.3E-05	---	**9.8E-06**	**4.3E-05**
		EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	0.01	0.04	---	**0.01**	**0.04**
		40CFR98 - Table C-1	CO2	119,317	1.17E+02	615	2,693	---	**615**	**2,693**
		40CFR98 - Table C-2	CH4	2.25	2.20E-03	0.01	0.05	---	**0.01**	**0.05**
		40CFR98 - Table C-2	N2O	0.22	2.20E-04	1.2E-03	0.01	---	**1.2E-03**	**0.01**
		Weighted Sum	CO2e	119,440	1.17E+02	615	2,695	---	**615**	**2,695**

Notes: 1 - 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.
2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.

TXP2 and TXP3 Regenerator Gas Heater - 6.60 MMBtu/hr (H-03/11E and H-04/12E)

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
H-03/11E and H-04/12E	**TXP2 Regen Gas Heater and TXP3 Regen Gas Heater**	EPA AP-42 Table 1.4-2	NOx	100.00	9.80E-02	0.72	3.14	---	**0.72**	**3.14**
		EPA AP-42 Table 1.4-2	CO	84.00	8.24E-02	0.60	2.64	---	**0.60**	**2.64**
		EPA AP-42 Table 1.4-2	THC	11.00	1.08E-02	0.08	0.35	---	**0.08**	**0.35**
		EPA AP-42 Table 1.4-2	NMHC	8.75	8.53E-03	0.06	0.27	---	**0.06**	**0.27**
		EPA AP-42 Table 1.4-2	NMNEHC	5.60	5.49E-03	0.04	0.18	---	**0.04**	**0.18**
	6.60 MMBtu/hr (LHV) (ea)	EPA AP-42 Table 1.4-2	VOC	5.68	5.56E-03	0.04	0.18	---	**0.04**	**0.18**
	7.32 MMBtu/hr (HHV) (ea)	EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	4.3E-03	0.02	---	**4.3E-03**	**0.02**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	7.45E-03	0.05	0.24	---	**0.05**	**0.24**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	---	---	---	**---**	**---**
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Acrolein	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	1.5E-05	6.6E-05	---	**1.5E-05**	**6.6E-05**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	0.08	7.35E-05	5.4E-04	2.4E-03	---	**5.4E-04**	**2.4E-03**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	0.01	0.06	---	**0.01**	**0.06**
	7,174 scf/hr	EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	**---**	**---**
	172.17 Mscfd	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	2.4E-05	1.1E-04	---	**2.4E-05**	**1.1E-04**
	62.84 MMscf/yr	EPA AP-42 Table 1.4-3	2,2,4-TMP	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Xylenes	---	---	---	---	---	**---**	**---**
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	Other HAPs	1.9E-03	1.86E-06	1.4E-05	6.0E-05	---	**1.4E-05**	**6.0E-05**
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	0.01	0.06	---	**0.01**	**0.06**
		40CFR98 - Table C-1	CO2	119,317	1.17E+02	856	3,749	---	**856**	**3,749**
		40CFR98 - Table C-2	CH4	2.25	2.20E-03	0.02	0.07	---	**0.02**	**0.07**
		40CFR98 - Table C-2	N2O	0.22	2.20E-04	1.6E-03	0.01	---	**1.6E-03**	**0.01**
		40CFR98 - Table A-1	CO2e	119,440	1.17E+02	857	3,753	---	**857**	**3,753**

Notes: 1 - 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.

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

TXP2 and TXP3 Heat Medium Heater - 21.22 MMBtu/hr (H-05/13E and H-06/14E)

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
H-05/13E and H-06/14E	**TXP2 Heat Medium Heater and TXP3 Heat Medium Heater**	EPA AP-42 Table 1.4-2	NOx	100.00	9.80E-02	2.31	10.10	na	**2.31**	**10.10**
		EPA AP-42 Table 1.4-2	CO	84.00	8.24E-02	1.94	8.49	na	**1.94**	**8.49**
		EPA AP-42 Table 1.4-2	THC	11.00	1.08E-02	0.25	1.11	na	**0.25**	**1.11**
		EPA AP-42 Table 1.4-2	NMHC	8.75	8.53E-03	0.20	0.88	na	**0.20**	**0.88**
		EPA AP-42 Table 1.4-2	NMNEHC	5.60	5.49E-03	0.13	0.57	na	**0.13**	**0.57**
	21.22 MMBtu/hr (LHV) (ea)	EPA AP-42 Table 1.4-2	VOC	5.68	5.56E-03	0.13	0.57	na	**0.13**	**0.57**
	23.53 MMBtu/hr (HHV) (ea)	EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	1.4E-02	0.06	na	**1.4E-02**	**0.06**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	7.45E-03	0.18	0.77	na	**0.18**	**0.77**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	---	---	na	---	---
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Acrolein	---	---	---	---	na	---	---
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	4.8E-05	2.1E-04	na	**4.8E-05**	**2.1E-04**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	0.08	7.35E-05	1.7E-03	0.01	na	**1.7E-03**	**0.01**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	0.04	0.18	na	**0.04**	**0.18**
	23,065 scf/hr	EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	---	---
	553.57 Mscfd	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	7.8E-05	3.4E-04	na	**7.8E-05**	**3.4E-04**
	202.05 MMscf/yr	EPA AP-42 Table 1.4-3	2,2,4-TMP	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Xylenes	---	---	---	---	---	**---**	**---**
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	Other HAPs	1.9E-03	1.86E-06	4.4E-05	1.9E-04	na	**4.4E-05**	**1.9E-04**
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	0.04	0.19	---	**0.04**	**0.19**
		40CFR98 - Table C-1	CO2	119,317	1.17E+02	2,752	12,054	na	**2,752**	**12,054**
		40CFR98 - Table C-2	CH4	2.25	2.20E-03	0.05	0.23	na	**0.05**	**0.23**
		40CFR98 - Table C-2	N2O	0.22	2.20E-04	0.01	0.02	na	**0.01**	**0.02**
		40CFR98 - Table A-1	CO2e	119,440	1.17E+02	2,755	12,067	na	**2,755**	**12,067**

Notes: 1 - 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.
2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.

Groves Dehydrator Flash Tank and Still Vent - 5.0 MMscfd (DH-01/15E)

Authorized by R13-3212 - Groves Dehydration Station

Unit ID	Description	Reference	Pollutant	Emission Factor		Pre-Recycle Emissions		Recycle	Post-Recycle Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
DH-01/15E	**Dehydrator 01** **(No Combustion Emissions Shown) (See BLR-01)** 5.00 MMscfd 8,760 hr/yr 0.21 MMscf/hr 1,825 MMscf/yr NESHAP HH - Exempt	See BLR-01	NOx	---	---	---	---	---	**---**	**---**
		See BLR-01	CO	---	---	---	---	---	**---**	**---**
		GRI-GLYCalc 4.0	THC	---	---	19.75	86.49	45%	**10.96**	**48.00**
		GRI-GLYCalc 4.0	NMHC	---	---	9.56	41.85	39%	**5.82**	**25.51**
		GRI-GLYCalc 4.0	NMNEHC	---	---	5.77	25.28	33%	**3.88**	**17.00**
		GRI-GLYCalc 4.0	VOC	---	---	5.77	25.28	33%	**3.88**	**17.00**
		See BLR-01	SO2	---	---	---	---	---	**---**	**---**
		See BLR-01	PM10/2.5	---	---	---	---	---	**---**	**---**
		See BLR-01	Acetaldehyde	---	---	---	---	---	---	---
		See BLR-01	Acrolein	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	Benzene	---	---	0.08	0.34	7%	**0.07**	**0.31**
		GRI-GLYCalc 4.0	Ethylbenzene	---	---	---	---	---	**---**	**---**
		See BLR-01	Formaldehyde	---	---	---	---	---	**---**	**---**
		GRI-GLYCalc 4.0	n-Hexane	---	---	0.11	0.50	40%	**0.07**	**0.30**
		See BLR-01	Methanol	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	Toluene	---	---	0.32	1.41	5%	**0.31**	**1.34**
		GRI-GLYCalc 4.0	2,2,4-TMP	---	---	---	---	---	**---**	**---**
		GRI-GLYCalc 4.0	Xylenes	---	---	1.00	4.37	2%	**0.98**	**4.27**
		See BLR-01	Other HAPs	---	---	---	---	---	**---**	**---**
		GRI-GLYCalc 4.0	Total HAP	---	---	1.51	6.62	6%	**1.42**	**6.22**
		See BLR-01	CO2	---	---	---	---	---	**---**	**---**
		GRI-GLYCalc 4.0	CH4	---	---	10.19	44.63	50%	**5.14**	**22.50**
		See BLR-01	N2O	---	---	---	---	---	**---**	**---**
		40CFR98 - Table A-1	CO2e	---	---	255	1,116	50%	**128**	**562**

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 off-gases are used as reboiler fuel.

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

	GRI-GLYCalc 4.0*	Worst-Case Assumption
THC	40.00 tpy	48.00 tpy
NMHC	21.25 tpy	25.51 tpy
NMNEHC = VOC	14.16 tpy	17.00 tpy
Benzene	0.26 tpy	0.31 tpy
Ethylbenzene	--- tpy	--- tpy
HCHO	--- tpy	--- tpy
n-Hexane	0.25 tpy	0.30 tpy
Toluene	1.11 tpy	1.34 tpy
2,2,4-TMP	--- tpy	--- tpy
Xylenes	3.56 tpy	4.27 tpy
Total HAP	5.19 tpy	6.22 tpy
CH4	18.75 tpy	22.50 tpy

***Dehydrator Operating Parameters (See Attachment L)**

Flow Rate:	5.0 gal/lb-H2O	Gas Analysis:	07/02/13
Wet Gas Temperature:	72 oF	Flash Tank Temperature:	150 oF
Wet Gas Presssure:	836 psig	Flash Tank Pressure:	50 psig
Wet Gas Water Content:	Saturated	Flash Tank Off-Gas Control:	50% Recycle
Dry Gas Water Content:	7.0 lb-H2O/MMscf	Stripping Gas:	na
Lean Glycol Water Content:	1.5 wt% H2O	Condenser Temperature:	na
Glycol Circulation Rate:	0.67 gpm	Condenser Pressure:	na
Glycol Pump:	Gas Injection	Regen/Cond Off-Gas Control:	na

Additional Model Results:

Glycol Recirculation Ratio:	7.1 gal/lb-H2O	Flash Tank Off-Gas Flow:	262 scfh
Rich Glycol Water Content:	2.8 gal/lb-H2O	Regen/Cond Off-Gas Flow:	128 scfh

Groves Dehydrator Reboiler - 0.20 MMBtu/hr (BLR-01/16E)

Authorized by R13-3212 - Groves Dehydration Station

Unit ID	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
BLR-01/16E	**Reboiler 01 (Combustion Only)** **0.20 MMBtu/hr (LHV)** **0.22 MMBtu/hr (HHV)** **8,760 hr/yr** 217 scf/hr 5.22 Mscfd 1.90 MMscf/yr 920 Btu/scf (LHV) 1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-2	NOx	100.00	9.80E-02	0.02	0.10	---	**0.02**	**0.10**
		EPA AP-42 Table 1.4-2	CO	84.00	8.24E-02	0.02	0.08	---	**0.02**	**0.08**
		EPA AP-42 Table 1.4-2	THC	11.00	1.08E-02	2.4E-03	0.01	---	**2.4E-03**	**0.01**
		EPA AP-42 Table 1.4-2	NMHC	8.75	8.53E-03	1.9E-03	0.01	---	**1.9E-03**	**0.01**
		EPA AP-42 Table 1.4-2	NMNEHC	5.60	5.49E-03	1.2E-03	0.01	---	**1.2E-03**	**0.01**
		EPA AP-42 Table 1.4-2	VOC	5.68	5.56E-03	1.2E-03	0.01	---	**1.2E-03**	**0.01**
		EPA AP-42 Table 1.4-2	SO2	0.60	5.88E-04	1.3E-04	5.7E-04	---	**1.3E-04**	**5.7E-04**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	7.45E-03	1.7E-03	0.01	---	**1.7E-03**	**0.01**
		EPA AP-42 Table 1.4-3	Acetaldehyde	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	Acrolein	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.06E-06	4.6E-07	2.0E-06	---	**4.6E-07**	**2.0E-06**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Formaldehyde	0.08	7.35E-05	1.6E-05	7.1E-05	---	**1.6E-05**	**7.1E-05**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.76E-03	3.9E-04	1.7E-03	---	**3.9E-04**	**1.7E-03**
		EPA AP-42 Table 1.4-3	Methanol	---	---	---	---	---	---	---
		EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.33E-06	7.4E-07	3.2E-06	---	**7.4E-07**	**3.2E-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 HAPs	1.9E-03	1.86E-06	4.1E-07	1.8E-06	---	**4.1E-07**	**1.8E-06**
		EPA AP-42 Table 1.4-3	Total HAP	1.88	1.85E-03	4.1E-04	1.8E-03	---	**4.1E-04**	**1.8E-03**
		40CFR98 - Table C-1	CO2	119,317	1.17E+02	26	114	---	**26**	**114**
		40CFR98 - Table C-2	CH4	2.25	2.20E-03	4.9E-04	2.1E-03	---	**4.9E-04**	**2.1E-03**
		40CFR98 - Table C-2	N2O	0.22	2.20E-04	4.9E-05	2.1E-04	---	**4.9E-05**	**2.1E-04**
		40CFR98 - Table A-1	CO2e	119,440	1.17E+02	26	114	---	**26**	**114**

Notes: 1 - 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.

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

Old Process Flare (FL-01/17E) (MODIFIED)

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
FL-01/17E	**TCI 4800 Old Process Flare (Waste Gas and Combustion)**	EPA AP-42 Table 13.5-1	NOx	76.58	0.07	---	---	---	**16.32**	**0.96**
		EPA AP-42 Table 13.5-1	CO	349.10	0.31	---	---	---	**74.40**	**4.36**
		Mass Balance	THC	55,500	49.28	11,828.13	693.75	98.0%	**236.56**	**13.88**
		Mass Balance	NMHC	13,225	11.74	2,818.50	165.31	98.0%	**56.37**	**3.31**
	98% Control Efficiency	Mass Balance	NMNEHC	2,025	1.80	431.57	25.31	98.0%	**8.63**	**0.51**
		Mass Balance	VOC	2,025	1.80	431.57	25.31	98.0%	**8.63**	**0.51**
		EPA AP-42 Table 1.4-2	SO2	0.66	5.88E-04	---	---	---	**0.14**	**8.3E-03**
	240.00 MMBtu/hr (HHV) (max)	EPA AP-42 Table 1.4-2	PM10/2.5	8.39	7.45E-03	---	---	---	**1.79**	**0.10**
	3.21 MMBtu/hr (HHV) (ave)	Mass Balance	Acetaldehyde	---	---	---	---	---	**---**	**---**
		Mass Balance	Acrolein	---	---	---	---	---	**---**	**---**
	8,760 hr/yr	Mass Balance	Benzene	25.00	0.02	5.33	0.31	98.0%	**0.11**	**6.3E-03**
		Mass Balance	Ethylbenzene	25.00	0.02	5.33	0.31	98.0%	**0.11**	**6.3E-03**
	25.00 MMscf/yr (Was 5.0 MMscy/yr)	EPA AP-42 Table 1.4-2	Formaldehyde	0.08	7.35E-05	---	---	---	**0.02**	**1.0E-03**
		Mass Balance	n-Hexane	300.00	0.27	63.94	3.75	98.0%	**1.28**	**7.5E-02**
		EPA AP-42 Table 1.4-2	Methanol	---	---	---	---	---	**---**	**---**
	2,854 scf/hr (ave)	Mass Balance	Toluene	25.00	0.02	5.33	0.31	98.0%	**0.11**	**6.3E-03**
	68.49 Mscfd (ave)	EPA AP-42 Table 1.4-2	2,2,4-TMP	---	---	---	---	---	**---**	**---**
		Mass Balance	Xylenes	25.00	0.02	5.33	0.31	98.0%	**0.11**	**6.3E-03**
		EPA AP-42 Table 1.4-2	Other HAPs	2.1E-03	1.86E-06	4.5E-04	2.6E-05	---	**4.5E-04**	**2.6E-05**
	1,126 Btu/scf (HHV) - avg	Mass Balance	Total HAP	400.08	0.36	85.25	5.00	98.0%	**1.72**	**0.10**
		40CFR98 - Table C-1	CO2	134,496	119.43	---	---	---	**28,664**	**1,680**
		Mass Balance	CH4	42,275	116.98	9,010	528.44	98.0%	**180**	**11**
		40CFR98 - Table C-2	N2O	0.56	4.96E-04	---	---	---	**0.12**	**0.01**
		40CFR98 - Table A-1	CO2e	1,191,538	3044.01	225,241	13,211	85.3%	**33,204**	**1,947**

Notes: 1 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.

2 - Flare design capacity and short-term (lb/hr) emissions are based on all electrically driven TXP2/TXP3 residue gas compressors blowing down to the flare at the same time.

3 - Waste gas composition and CO2 emission factors determined as follows:

Component	Waste Gas (to Flare)						CO2 (40CFR98)		
	Mol% (Vol%)	MMscf/yr	scf/hr	Btu/scf (HHV)	MMBtu/hr	lb/MMscf	Wgt%	kg/MMBtu	lb/MMBtu
Nitrogen	0.4%	0.10	11.56	---	---	---	0.6%	---	---
Carbon Dioxide	0.2%	0.04	5.00	---	---	---	0.4%	---	---
Methane	84.7%	21.17	2,416.66	1,010	2.44	42,275	74.2%	53.06	116.98
Ethane	14.1%	3.52	402.15	1,799	0.72	11,200	23.1%	59.60	131.40
VOC (Non-HAP)	0.6%	0.15	17.62	2,611	0.05	1,600	1.5%	62.87	138.60
n-Hexane	0.0076%	0.00191	0.218	4,893	0.00107	300	0.0359%	---	---
Benzene	0.0001%	0.00003	0.003	3,989	0.00001	25	0.0004%	---	---
Toluene	0.0001%	0.00003	0.003	4,749	0.00001	25	0.0005%	---	---
Ethylenzene	0.0001%	0.00003	0.003	5,523	0.00002	25	0.0006%	---	---
Xylenes	0.0001%	0.00003	0.003	5,509	0.00002	25	0.0006%	---	---
2,2,4-TMP	0.0081%	0.00203	0.232	6,924	0.00161	25	0.0387%	---	---
Total HAP	0.01%	0.002	0.23	4,893	0.001	425	0.04%	68.02	149.96
TOTAL	**100.0%**	**25.00**	**2,854**	**1,126**	**3.21**	**55,500**	**99.9%**	**54.17**	**119.43**

3.21

New Process Flare (FL-02/18E) (MODIFIED)

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
FL-02/18E	**Zeeco AFTA-20/56 New Process Flare (Waste Gas and Combustion)**	EPA AP-42 Table 13.5-1	NOx	87.69	0.07	---	---	---	**31.28**	**3.95**
		EPA AP-42 Table 13.5-1	CO	399.77	0.31	---	---	---	**142.61**	**17.99**
		Mass Balance	THC	66,570	51.62	23,747	2,996	98.0%	**474.95**	**59.91**
		Mass Balance	NMHC	28,670	22.23	10,227	1,290	98.0%	**204.55**	**25.80**
	98% Control Efficiency	Mass Balance	NMNEHC	12,570	9.75	4,484	566	98.0%	**89.68**	**11.31**
		Mass Balance	VOC	12,570	9.75	4,484	566	98.0%	**89.68**	**11.31**
		EPA AP-42 Table 1.4-2	SO2	0.76	5.88E-04	---	---	---	**0.27**	**0.03**
	460.03 MMBtu/hr (HHV) (max)	EPA AP-42 Table 1.4-2	PM10/2.5	9.61	7.45E-03	---	---	---	**3.43**	**0.43**
	13.25 MMBtu/hr (HHV) (avg)	Mass Balance	Acetaldehyde	---	---	---	---	---	**---**	**---**
		Mass Balance	Acrolein	---	---	---	---	---	**---**	**---**
	8,760 hr/yr	Mass Balance	Benzene	10.00	7.75E-03	3.57	0.45	98.0%	**0.07**	**0.01**
		Mass Balance	Ethylbenzene	10.00	7.75E-03	3.57	0.45	98.0%	**0.07**	**0.01**
	90.00 MMscf/yr	EPA AP-42 Table 1.4-2	Formaldehyde	0.09	7.35E-05	---	---	---	**0.03**	**4.3E-03**
	(Was 59.21 MMscy/yr)	Mass Balance	n-Hexane	220.00	0.17	78.48	9.90	98.0%	**1.57**	**0.20**
		EPA AP-42 Table 1.4-2	Methanol	---	---	---	---	---	**---**	**---**
	10,274 scf/hr (avg)	Mass Balance	Toluene	10.00	7.75E-03	3.57	0.45	98.0%	**0.07**	**0.01**
	246.58 Mscfd (avg)	EPA AP-42 Table 1.4-2	2,2,4-TMP	---	---	---	---	---	**---**	**---**
		Mass Balance	Xylenes	10.00	7.75E-03	3.57	0.45	98.0%	**0.07**	**0.01**
		EPA AP-42 Table 1.4-2	Other HAPs	2.4E-03	1.86E-06	8.6E-04	1.1E-04	---	**8.6E-04**	**1.1E-04**
	1,290 Btu/scf (HHV) - avg	Mass Balance	Total HAP	260.10	0.20	92.75	11.70	98.0%	**1.89**	**0.24**
		40CFR98 - Table C-1	CO2	158,892	123.21	---	---	---	**56,681**	**7,150**
		Mass Balance	CH4	37,900	29.39	13,520	1,706	98.0%	**270**	**34**
		40CFR98 - Table C-2	N2O	1.00	7.72E-04	---	---	---	**0.35**	**0.04**
		40CFR98 - Table A-1	CO2e	1,106,689	858.18	338,000	42,638	81.2%	**63,547**	**8,016**

Notes: 1 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.

2 - Flare design capacity and short-term (lb/hr) emissions are based on flare vendor Case 4 (TXP2 plant maintenance) - flow rate of 22,000 lb/hr, MW = 19.6 lb/lb-mol and heating value = 1,080 Btu/scf (LHV).

3 - Heat Input and CO2 emission factors determined as follows:

Component	Waste Gas (to Flare)						CO2 (40CFR98)		
	Mol% (Vol%)	MMscf/yr	scf/hr	Btu/scf (HHV)	MMBtu/hr	lb/MMscf	Wgt%	kg/MMBtu	lb/MMBtu
Nitrogen	0.5%	0.44	49.95	---	---	---	0.6%	---	---
Carbon Dioxide	0.2%	0.17	19.24	---	---	---	0.4%	---	---
Methane	74.6%	67.15	7,665.31	1,010	7.75	37,900	56.6%	53.06	116.98
Ethane	16.9%	15.23	1,738.73	1,799	3.13	16,100	24.1%	59.60	131.40
VOC (Non-HAP)	7.7%	6.97	795.42	2,957	2.35	12,300	18.1%	62.87	138.60
n-Hexane	0.0472%	0.0425	4.85	4,893	0.0237	220	0.193%	---	---
Benzene	0.0007%	0.0007	0.07	3,989	0.0003	10	0.003%	---	---
Toluene	0.0012%	0.0011	0.12	4,749	0.0006	10	0.005%	---	---
Ethylenzene	0.0001%	0.0001	0.01	5,523	0.0001	10	0.001%	---	---
Xylenes	0.0001%	0.0001	0.01	5,509	0.0001	10	0.001%	---	---
2,2,4-TMP	0.0001%	0.0001	0.01	6,924	0.0001	10	0.001%	---	---
Total HAP	0.05%	0.04	5.08	4,869	0.02	270	0.2%	68.02	149.96
TOTAL	**100.0%**	**90.00**	**10,274**	**1,290**	**13.25**	**66,570**	**100.0%**	**55.89**	**123.21**

13.17

Truck Load-Out (TLO/20E)

Unit ID	Description	S sat. fac.	P psia	M lb/lb-mol	T oR	CE %	L_L lb/Mgal	T-Put Mgal/yr	VOC AP-42 Sect 5.2 tpy	BTEX, n-hexane (Ea) 5.00% of VOC tpy	Total HAP 25.00% of VOC tpy
TLO/20E	Truck Load-Out - Prod H2O/Condensa	1.45	0.24	18.28	510	0.0%	0.16	25,200	1.96	0.10	0.49
								TOTAL TLO:	**1.96**	**0.10**	**0.49**

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

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

where:
- L_L = Loading loss, lb/1,000 gal of liquid loaded.
- S = Saturation factor, used 1.45 for "splash loading".
- P = True vapor pressure of liquid loaded, psia. The vapor pressure is taken from EPA TANKS 4.0.9d.
- M = Molecular weight of vapors, lb/lb-mole. Used 18.28 lb/lb-mol from EPA TANKS 4.0.9d output.
- T = Temperature of bulk liquid loaded, °R = °F + 460. (Conservatively assumed 50 °F.)
- CE = Overall emission reduction efficiency (collection efficiency x control efficiency).

Process Piping Fugitive Emissions (FUG/21E) (MODIFIED)

Unit	Description	Component (Unit) Type (Gas/Vapor)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	THC Emissions lb/hr	VOC 39.95 Wgt%		n-Hexane 1.77 Wgt%		BTEX (Ea) 0.10 Wgt%		Total HAP 2.17 Wgt%		CO2 0.88 Wgt%		CH4 75.00 Wgt%		CO2e GWP = 25	
							lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG/21E	Process Piping Fugitives (Gas/Vapor)	Valves	3,676	0.00992	67%	12.03	4.81	21.06	0.21	0.93	0.01	0.05	0.26	1.14	0.11	0.47	9.03	39.53	226	989
		Pump Seals	---	0.00529	0%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Other	202	0.01940	0%	3.92	1.57	6.86	0.07	0.30	0.00	0.02	0.08	0.37	0.03	0.15	2.94	12.87	74	322
		Connectors	4,394	0.00044	0%	1.94	0.77	3.39	0.03	0.15	1.9E-03	0.01	0.04	0.18	0.02	0.08	1.45	6.36	36	159
		Flanges	3,000	0.00086	0%	2.58	1.03	4.51	0.05	0.20	2.6E-03	0.01	0.06	0.24	0.02	0.10	1.93	8.47	48	212
		Open-ended lines	20	0.00441	0%	0.09	0.04	0.15	1.6E-03	6.8E-03	8.8E-05	3.8E-04	1.9E-03	8.4E-03	7.8E-04	3.4E-03	0.07	0.29	2	7

Unit	Description	Component (Unit) Type (Light Liquid)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	THC Emissions lb/hr	VOC 100.00 Wgt%		n-Hexane 3.69 Wgt%		BTEX (Ea) 0.17 Wgt%		Total HAP 4.36 Wgt%		CO2 --- Wgt%		CH4 --- Wgt%		CO2e GWP = 25	
							lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG/21E	Process Piping Fugitives (Light Liquid)	Valves	1,827	0.00551	61%	3.93	3.93	17.20	0.15	0.64	6.5E-03	0.03	0.17	0.75	---	---	---	---	---	---
		Pump Seals	28	0.02866	45%	0.44	0.44	1.93	0.02	0.07	7.3E-04	3.2E-03	0.02	0.08	---	---	---	---	---	---
		Other	105	0.01653	0%	1.74	1.74	7.60	0.06	0.28	2.9E-03	0.01	0.08	0.33	---	---	---	---	---	---
		Connectors	2,470	0.00046	0%	1.14	1.14	5.01	0.04	0.19	1.9E-03	8.3E-03	0.05	0.22	---	---	---	---	---	---
		Flanges	2,738	0.00024	0%	0.66	0.66	2.91	0.02	0.11	1.1E-03	4.8E-03	0.03	0.13	---	---	---	---	---	---
		Open-ended lines	10	0.00309	0%	0.03	0.03	0.14	1.1E-03	5.0E-03	5.1E-05	2.2E-04	1.3E-03	5.9E-03	---	---	---	---	---	---
		TOTAL FUGITIVE EMISSIONS:					**16.16**	**70.76**	**0.66**	**2.88**	**0.03**	**0.15**	**0.79**	**3.47**	**0.18**	**0.80**	**15.42**	**67.54**	**386**	**1,689**

Notes:
1 - Assumed 8,760 hours per year of fugitive emissions.
2 - Gas/Vapor emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, 1995, EPA-453/R-95-017

TABLE 2.4 O&G PROD (AVE)	Gas/Vapor		Light Liquid	
	kg/hr	lb/hr	kg/hr	lb/hr
Valves	0.00450	0.00992	0.00250	0.00551
Pump Seals	0.00240	0.00529	0.01300	0.02866
Others	0.00880	0.01940	0.00750	0.01653
Connectors	0.00020	0.00044	0.00021	0.00046
Flanges	0.00039	0.00086	0.00011	0.00024
Open-End Lines	0.00200	0.00441	0.00140	0.00309

3 - Component counts from site-specific LDAR program.
4 - "Other" components include compressor seals, relief valves, diaphragms, drains, meters, etc.
5 - THC = total hydrocarbons, including methane (CH4) and ethane (C2H6).
6 - VOC = non-methan 6 - VOC = non-methane/non-ethane THC (C3+).
7 - HAP = hazardous a 7 - HAP = hazardous air pollutants as designated by EPA, primarily n-hexane/BTEX.
8 - To be conservative 8 - To be conservative, the following gas characteristics were assumed:

Pollutant	Gas/Vapor Estimated	Light Liquid Estimated
Carbon Dioxide	0.88 Wgt%	--- Wgt%
Methane	75.00 Wgt%	--- Wgt%
VOC (Propane)	39.95 Wgt%	100.00 Wgt%
n-Hexane	1.77 Wgt%	3.69 Wgt%
Benzene	0.09 Wgt%	0.11 Wgt%
Toluene	0.18 Wgt%	0.18 Wgt%
Ethylbenzene	0.04 Wgt%	0.04 Wgt%
Xylenes	0.04 Wgt%	0.22 Wgt%
Total HAP:	2.17 Wgt%	4.36 Wgt%

Produced Water Storage Tank Emissions (T-03/22E and T-04/23E)

Unit ID	Material Stored	Capacity		Turnovers per Year	Throughput		Emission Factor	VOC		n Hex, BTEX (Ea) 5.00% of VOC **		Total HAP 25.00% of VOC **	
		gal	bbl		gal/yr	bbl/yr		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
T-03/22E	Produced Water (9913)	16,800	400	500.0	8,400,000	200,000	0.0101 lb/bbl	0.23	1.01	0.01	0.05	0.06	0.25
T-04/23E	Produced Water (9914)	16,800	400	500.0	8,400,000	200,000	0.0101 lb/bbl	0.23	1.01	0.01	0.05	0.06	0.25
TOTAL VOLUME:		**33,600**	**800**	**500.0**	**16,800,000**	**400,000**	**TOTAL EMISSIONS:**	**0.46**	**2.03**	**0.02**	**0.10**	**0.12**	**0.51**

Notes: 1 - The produced water tank emissions are based on EPA TANKS 4.0.9d (working and breathing losses) and a VMGSim model simulation (flashing losses).
2 - There are other storage tanks at the site but they are not listed above as they have de-minimis emissions as defined in West Virigina Air quality regulation 45CSR13.

Potentially Applicable

AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

	Pollutant	GAS-FIRED ENGINE AP-42 Table 3.2-1; 3.2-2; 3.2-3 07/00			GAS-FIRED TURBINE 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	3.40E-03	3.40E-03	3.40E-03
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPs	Acetaldehyde	7.76E-03	8.36E-03	2.79E-03	4.00E-05	4.00E-05	4.00E-05
	Acrolein	7.78E-03	5.14E-03	2.63E-03	6.40E-06	6.40E-06	6.40E-06
	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Ethylbenzene	1.08E-04	3.97E-05	2.48E-05	3.20E-05	3.20E-05	3.20E-05
	Formaldehyde (HCHO)	5.52E-02	5.28E-02	2.05E-02	7.10E-04	7.10E-04	2.00E-05
	n-Hexane	4.45E-04	1.11E-03	---	---	---	---
	Methanol (MeOH)	2.48E-03	2.50E-03	3.06E-03	---	---	---
	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
	Other HAPs	1.61E-03	9.34E-04	9.39E-04	5.97E-05	5.97E-05	5.97E-05
GHG	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
	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 AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98			FLARE 13.5-1 04/15	DIESEL ENGINE 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	3.10E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	*≥ 98% Destruction and Removal Efficiency*	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03		3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03		3.53E-01
	VOC (NMNEHC+HCHO)	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	*5.882E-04*	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	*7.451E-03*	3.10E-01
HAPs	Acetaldehyde	---	---	---	*≥98% Destruction and Removal Efficiency*	7.67E-04
	Acrolein	---	---	---		9.25E-05
	Benzene	2.06E-06	2.06E-06	2.06E-06		9.33E-04
	Ethylbenzene	---	---	---		---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05		1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03		---
	Methanol (MeOH)	---	---	---		---
	Toluene	3.33E-06	3.33E-06	3.33E-06		4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---		---
	Xylenes	---	---	---		2.85E-04
	Other HAPs	1.86E-06	1.86E-06	1.86E-06		1.91E-04
GHG	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	*99% DRE*	*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		Table C-1 to Subpart C of Part 98	Table C-2 to Subpart C of Part 98	
Fuel Type	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	161.489	6.61E-03	1.32E-03
Propane	0.091 MMBtu/gal	138.605	6.61E-03	1.32E-03
Natural Gas	1,028 MMBtu/scf	116.977	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

*Converted Ext Comb Emission Factors to lb/MMBtu by dividing lb/MMscf by the AP-42 default high heating value (HHV) of 1,02

**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.

Conversion Factors

http://www.onlineconversion.com/

1.0 lb	=	453.5924 g
1.0 kg	=	2.2046 lb
1.0 hp	=	746.0000 Watt
1.0 hp-hr	=	2,545.4577 Btu
1.0 kW	=	3,412.1416 Btu/hr
1.0 kW-hr	=	1.3400 hp-hr
1.0 cf	=	7.4805 gal
1.0 gal H2O	=	8.3378 lb
1.0 cf H2O	=	62.3711 lb
1.0 m	=	3.2808 ft
1.0 km	=	0.6214 mi
1.0 acre	=	43,560.1742 ft2
1.0 °F	=	(°C*9/5)+32
1.0 °R	=	°F+459.67
1.0 %	=	10,000 ppm
UGC (stp)	=	379.5 scf/lb-mol

Rev 10/06/15 - New Flare EFs and Moved Acetaldehyde, Acrolein, and Methanol from hidden rows.
Rev 08/22/14 - Moved 2,2,4-TMP (i-octane) from hidden rows.
Rev 12/30/13 - Revised Flare Emission Factors. Revised GWP Emission Factors. Rewrote the *Notes.
Rev 10/31/13 - Recalculated THC, NMHC, NMNEHC and VOC. Added "Other Pollutants" (Hidden Rows). Misc edits.
Rev 09/27/13 - Added NMHC and NMNEHC. Show only 6 primary HAPs. Converted units for Ext Comb and GHG to lb/MMBTU.

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

"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."

Williams Ohio Valley Midstream LLC proposes that all monitoring, recordkeeping, reporting and testing requirements remain unchanged from the current permit; except for modifications to the emissions limitations and waste gas thru-put limitations as specified in Attachment N – Supporting Emission Calculations.

The increases in Criteria Pollutants, GHG, and Total HAP are due to:

1) An increase in waste gas thru-put in the Flares (FL-01/17E and FL-02/18E), and
2) More conservative gas characteristic assumptions (SSM/6E, RPC/7E, and FUG/21E).

The changes in speciated HAP emissions are due to:

1) Improvements in estimating protocols, and
2) More conservative gas characteristic assumptions (SSM/6E, RPC/7E, and FUG/21E).

ATTACHMENT P

Public Notice

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

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

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.

Attachment P - Public Notice

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Williams Ohio Valley Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 NSR Modification Permit for the existing Fort Beeler Gas Processing Plant, located south of the intersection of County Highway 34 and US Route 250, near Cameron, in Marshall County, West Virginia.

The latitude and longitude coordinates are 39.8783^{O} North and -80.5907^{O} West.

The applicant estimates the increase in the potential to discharge regulated air pollutants will be as follows:

2.15	tons of nitrogen oxides per year
7.37	tons of carbon monoxide per year
22.92	tons of volatile organic compounds per year
0.02	tons of sulfur dioxide per year
0.24	tons of particulate matter per year
2.11	tons of total hazardous air pollutants per year
4,430	tons of carbon dioxide equivalent per year

Startup of modifications are anticipated upon permit issuance.

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

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

Dated this the _____ day of _____ 2015.

By: Williams Ohio Valley Midstream LLC
Paul Hunter
General Manager Ohio River Supply Hub
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

ATTACHMENT Q

Business Confidential Claims

(NOT APPLICABLE)

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also

ATTACHMENT R

Authority Forms

(NOT APPLICABLE)

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also

ATTACHMENT S

Title V Permit Revision Information

(NOT APPLICABLE)

APPLICATION FEE

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:	**$1,000**	**Applicable**
NESHAP Requirements:	$2,500	Not Applicable
New Major Source:	$10,000	Not Applicable
Major Modifications:	$5,000	Not Applicable

- Total application fee is **$2,000** [= $1,000 minimum fee + $1,000 additional charges]

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

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.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.