Ed
13-3070A
051-0015

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

January 9, 2015
(Via Federal Express)

RECEIVED
JAN 13 2015
WV DEPT OF DIV OF AIR QUALITY

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

Subject: **Application for 45CSR13 NSR Modification Permit**
(Current Permit: R13-3070, issued 07/12/13)
Williams Ohio Valley Midstream LLC
OAK GROVE GAS PLANT
Marshall County, West Virginia

Dear Ms. McKeone,

Williams Ohio Valley Midstream LLC (OVM) is submitting an Application for 45CSR13 New Source Review (NSR) Modification Permit for the existing Oak Grove Gas Plant, located at 5258 Fork Ridge Rd, ~3.7 Miles Southeast of Moundsville, North of Fork Ridge Rd, Moundsville, Marshall County, WV 26041.

The OVM Oak Grove Gas Plant is an existing operation (w/ ongoing, construction and production). This application is prepared and submitted to:

- Update Each Heater Max Design Heat Input (MDHI) Value — H-01 (1E) thru H-07 (7E)
- Remove Each Heater Operating Hour Restriction — H-01 (1E) thru H-07 (7E)
- Update Process Flare Maximum and Average Flow Rates — FL-1 (8E)
- Update Process Flare Maximum and Average Heat Input Values — FL-1 (8E)
- Increase Slop-Oil/Condensate Thru-Put — TK-1 (10E) thru TK-4 (13E), TL-1 (14E)
- Update Fugitive Emission Estimates (Gas/Light Liquid) — FUG-G (15E), FUG-L (15E)
- Add VOC Emissions to the Amine Process Vent — V-01 (16E)
- Add Rod Packing and Dry Gas Seal Emissions — RPC (17E), DGS (18E)

It is anticipated that the facility modifications will be implemented immediately upon issuance of the modification permit.

These modifications will result in an increase in facility-wide emissions, as summarized below:

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

• 45CSR13 NSR – Modification Permit

EMISSIONS SUMMARY SHEET

Facility-Wide Emissions Summary [Tons per Year]			
Criteria Pollutants	**Potential Emissions (Including Fugitives)**		
	Current Permit	**Change*,****	**New Permit**
Nitrogen Oxides (NOX)	41.64	79.62	121.26
Carbon Monoxide (CO)	73.59	119.07	192.66
Volatile Organic Compounds (VOC)	71.04	40.96	112.00
Sulfur Dioxide (SO2)	1.45	(0.69)	0.76
Particulate Matter (PM10/2.5)	5.58	5.10	10.68
Hazardous Air Pollutants (HAP)	**Potential Emissions (Including Fugitives)**		
	Current Permit	**Change**	**New Permit**
Benzene	2.09	(0.23)	1.86
Ethylbenzene	---	2.04	2.04
Formaldehyde (HCHO)	0.10	0.02	0.12
n-Hexane	---	3.70	3.70
Toluene	---	1.96	1.96
2,2,4-Trimethylpentane	---	2.10	2.10
Xylenes	---	2.05	2.05
Other HAP (Methanol (MeOH), etc.)	---	0.01	0.01
Total HAP	15.65	(1.82)	13.83
Greenhouse Gases (GHG)	**Potential Emissions (Including Fugitives)**		
	Current Permit	**Change****	**New Permit**
Carbon Dioxide (CO_2)	86,119	132,211	218,331
Methane (CH_4)	148	227	374
Nitrous Oxide (N_2O)	27.1	42	69
CO_2 Equivalent (CO_2e)	97,873	150,255	248,128

* The increases in VOC is largely due to the proposed increase in Slop Oil (Condensate) thru-put (TK-01 (10E) thru TK-04 (13E) and TL-1 (14E)) and due to a significant increase in waste gas volume sent to the Process Flare (FL-1 (8E).

** The increases in NOx, CO, and CO2e emissions result primarily from a significant increase in waste gas volume burned in the Process Flare (FL-1 (8E)) and to a lesser extent from proposed increases in fuel combustion in Heaters (H-01 (1E) thru H-07 (7E)).

If you have any questions concerning this submittal or need additional information, please contact me at (412) 787-4259 or Danell.Zawaski@williams.com.

Sincerely,

R. Danell Zawaski, P.E.
Environmental Specialist

Enclosures:

- Application for NSR Construction Permit
- Attachments A through S
- Check for Application Fee

APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
MODIFICATION PERMIT

For the:

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

Marshall County, West Virginia

Submitted to:

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

Submitted by:

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

Prepared by:

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

January 2015

APPLICATION FOR
45CSR13 NEW SOURCE REVIEW
MODIFICATION PERMIT

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

Marshall County, West Virginia

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APPLICATION FEE

APPLICATION FOR
45CSR13 NSR
MODIFICATION PERMIT

GENERAL INSTRUCTIONS - Application forms are to be completed for any facility which emits the following regulated pollutants: Carbon Monoxide (CO), Lead, Nitrogen Oxides (NOx), Particulate Matter (PM), Particulate Matter less than 10 microns (PM10), Sulfur Dioxide (SO2), and Volatile Organic Compounds (VOCs) not listed as Hazardous Air Pollutants (HAPs) or Toxic Air Pollutants (TAPs) in accordance with Section '112 of the Clean Air Act or Rule 45CSR27.

- **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)***:
27-0856707

3. Name of facility *(if different from above)*:
OAK GROVE NATURAL GAS PROCESSING FACILITY

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

5A. Applicant's mailing address:
100 TELETECH DRIVE, SUITE 2
MOUNDSVILLE, WV 26041

5B. Facility's present physical address:
5258 FORK RIDGE ROAD
MOUNDSVILLE, WV 26041

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

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

8. Does the applicant own, lease, have an option to buy, or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**
– If **YES,** please explain: **APPLICANT OWNS THE PROPERTY**
– 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 FACILITY (AKA: GAS PLANT)

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

11A. DAQ Plant ID No. (existing facilities):
051-00157

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities):
R13-3070 - ISSUED 07/12/13

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 LAFAYETTE AVE IN MOUNDSVILLE:
A. HEAD EAST ONTO 12TH ST ~1.1 MI;
B. CONTINUE ONTO FORK RIDGE RD ~5.4 MI;
C. ENTRANCE TO SITEIS ON THE LEFT

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

12.B. New site address (if applicable): **NA**	12C. Nearest city or town: **MOUNDSVILLE**	12D. County: **MARSHALL**
12.E. UTM Northing (KM): **4,414.1 km N Northing**	12F. UTM Easting (KM): **525.9 km Easting**	12G. UTM Zone: **17S**

13. Briefly describe the proposed change(s) at the facility:
THIS APPLICATION IS PREPARED AND SUBMITTED TO:

- **UPDATE EACH HEATER MAXIMUM DESIGN HEAT INPUT (MDHI) VALUES** — **H-01 (1E) THRU H-07 (7E)**
- **REMOVE EACH HEATER OPERATING HOUR RESTRICTIONS** — **H-01 (1E) THRU H-07 (7E)**
- **UPDATE PROCESS FLARE AVERAGE AND MAXIMUM FLOW RATES** — **FL-1 (8E)**
- **UPDATE PROCESS FLARE MAXIMUM AND AVERAGE HEAT INPUTVALUES** — **FL-1 (8E)**
- **INCREASE SLOP OIL/CONDENSATE THRUPUT** — **TK-1 (10E) THRU TK-4 (13E) AND TL-1 (14E)**
- **UPDATE FUGITIVE EMISSION ESTIMATES** — **FUG-G (15E) AND FUG-L (15E)**
- **ADD VOC EMISSIONS TO THE AMINE PROCESS VENT** — **V-01 (16E)**
- **ADD ROD PACKING AND DRY GAS SEAL EMISSIONS** — **RPC (17E) AND DGS (18E)**
- **REMOVE CO2, CH4, AND CO2E EMISSION LIMITS** — **H-01 (1E) THRU H-07 (7E), FL-1 (8E), AND V-01 (16E)**

14A. Provide the date of anticipated installation or change: – 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).

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

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

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

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

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

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

☒ **Bulk Liquid Transfer Operations (TL-1)**
☐ Chemical Processes
☐ Concrete Batch Plant
☐ Grey Iron and Steel Foundry
☐ Haul Road Emissions
☐ Hot Mix Asphalt Plant
☐ Incinerator
☐ Indirect Heat Exchanger
☐ Quarry
☐ Solid Materials Sizing, Handling and Storage Facilities
☒ **Storage Tanks**
☒ **General Emission Unit, specify:**

- **NATURAL GAS FIRED HEATER (H-01 (1E) THRU TK-07 (7E))**
- **STANDBY GENERATOR (GEN-1 (9E))**

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
☐ Adsorption Systems
☐ Afterburner
☐ Other Collectors, specify: **NA**
☐ Baghouse
☐ Condenser
☐ Electrostatic Precipitator
☒ **Flare (FL-1)**
☐ Mechanical Collector
☐ Wet Collecting System

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: **NA**

☐ Authority of Corporation or Other Business Entity
☐ Authority of Governmental Agency
☐ Authority of Partnership
☐ 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 (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: Don Wicburg *(Please use blue ink)* DATE: 1/6/2014 *(Please use blue ink)*

35B. Printed name of signee: **DON WICBURG**	35C. Title: **VICE PRESIDENT AND GENERAL MANAGER**	
35D. E-mail: **DON.WICBURG@WILLIAMS.COM**	36E. Phone: **(304) 843-3158**	36F. FAX: **(304) 843-3131**
36A. Printed name of contact person: **R. DANELL ZAWASKI, P.E.**	36B. Title: **ENVIRONMENTAL SPECIALIST**	
36C. E-mail: **DANELL.ZAWASKI@WILLIAMS.COM**	36D. Phone: **(412) 787-4259**	36E. FAX: **(412) 787-6002**

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

Location/Topographic Map

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

- **Address:**
  5258 Fork Ridge Rd
  ~3.7 Miles Southeast of Moundsville
  North side of Fork Ridge Rd
  Moundsville, Marshall County, WV 26041

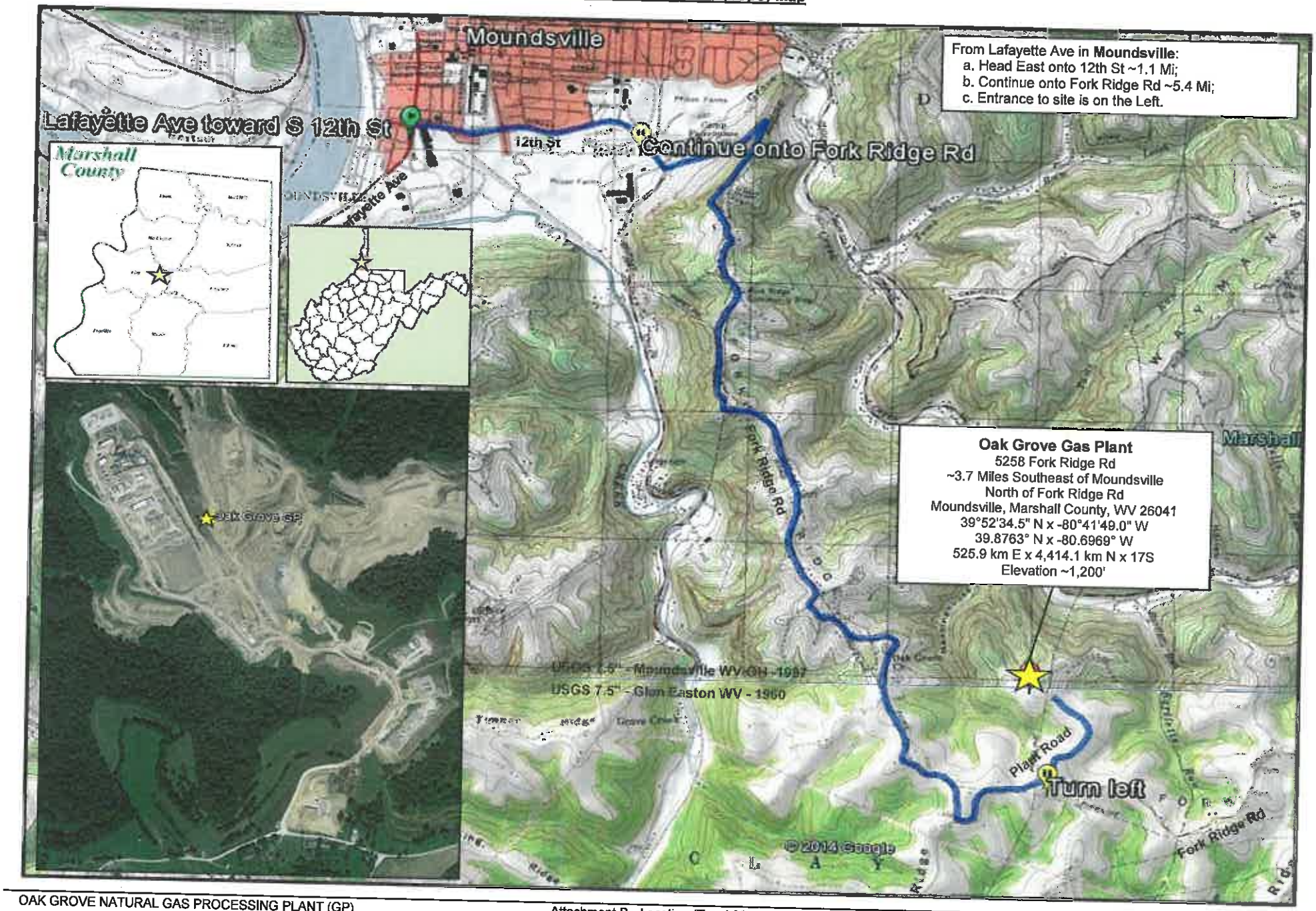
- **Latitude and Longitude:**
  39°52'37.0" North x -80°41'56.5" West
  (39.8769° North x -80.6990° West)

- **UTM:**
  525.74 km Easting x 4,414.14 km Northing x Zone 17S

- **Directions:**
  From Lafayette Ave/WV-2 in Moundsville:
  a. Head east onto 12th St ~1.1 Mile;
  b. Continue onto Fork Ridge Rd ~5.4 Mile;
  c. Entrance to site is on the left.

- **USGS:**
  7.5" Topographic - Moundsville WV-OH – 1997
  7.5" Topographic – Glen Easton WV – 1960

Attachment B - Location (Topo) 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 Oak Grove Gas Plant is an existing operation (w/ ongoing, permitted, construction and production). This application is prepared and submitted to:

- Update Each Heater Max Design Heat Input (MDHI) Value — H-01 (1E) thru H-07 (7E)
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- Add VOC Emissions to the Amine Process Vent — V-01 (16E)
- Add Rod Packing and Dry Gas Seal Emissions — RPC (17E), DGS (18E)

It is anticipated that the facility modifications will be implemented immediately upon issuance of the 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

OAK GROVE NATURAL GAS PROCESSING FACILITY

45CSR13 – Modification Permit

Attachment D

REGULATORY DISCUSSION

A. Applicability of New Source Review (NSR) Regulations

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

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

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

- NOx: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- VOC: PSD 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

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

This rule does not apply. The facility location is designated as either "Maintenance" or "Attainment/Unclassified" for all criteria pollutants.

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

This rule does not apply. The facility qualifies as a "HAP Area Source" for each regulated pollutant, as follows:

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

4. **Title V Operating Permit (TVOP)** [Applicable]

This rule does apply. The facility qualifies as a "Major Source" as follows:

- NOx: TVOP Major Source with Controlled PTE > 100 tpy
- CO: TVOP Major Source with Controlled PTE > 100 tpy
- VOC: TVOP Major Source with Controlled PTE > 100 tpy
- SO2: TVOP Natural Minor Source with Pre-Controlled PTE < 100 tpy
- PM10/2.5: TVOP Natural Minor Source with Pre-Controlled PTE < 100 tpy
- Each HAP: TVOP Synthetic Area Source with Controlled PTE < 10 tpy
- Total HAPs: TVOP Synthetic Area Source with Controlled PTE < 25 tpy

(Note: WVDEP requires that fugitive emissions be included in major source determinations at gas plants.)

B. Applicability of Federal Regulations

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

1. **NSPS A, General Provisions**
   40CFR§60.1-§60.19

   [Applicable]

   This rule does apply to all sources subject to an NSPS (unless a specific provision is excluded within the source NSPS). Requirements may include:

   a. Notification (§60.7)
   b. Recordkeeping and Reporting (§60.7)
   c. Source Testing (§60.8, §60.11)
   d. Control Device Requirements (§60.18)

2. **NSPS Dc, Steam Generating Units**
   40CFR§60.40c-§60.48c

   [Applicable]

   This rule does apply to the TXP1 Heat Medium Heater (H-01 (1E)), TXP2 & TXP3 Regen Gas Heaters (H-03 (3E) and H-04 (4E)), De-Ethanizer Hot Oil Heaters (H-05 (5E) and H-06 (6E)), and Amine Process Regen Gas Heater (H-07 (7E) because each has a maximum design heat input (MDHI) capacity ≥ 10 MMBtu/hr and ≤ 100 MMBtu/hr (§60.40c(a)).

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

   This rule does not apply to the TXP1 Regen Gas Heater (H-02 (2E)) because it has a MDHI capacity < 10 MMBtu/hr (§60.40c(a)).

3. **NSPS Kb, Volatile Organic Liquid Storage Vessels**
   40CFR§60.110b-§60.117b

   [Not Applicable]

   This rule does not apply because there is no tank with capacity ≥ 75 m3 (471.7 bbl or 19,813 gal) that is used to store volatile organic liquids (VOL) at the facility (§60.110b(a)).

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

   [Not Applicable]

   This rule does not apply because plant construction commenced after 08/23/11 (§60.630). (However, see Section 10. - NSPS OOOO, below.)

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 apply to the Standby Generator Engine (GEN-1 (8E)) because it was constructed (ordered), modified, or reconstructed after 06/12/06, is an emergency engine manufactured on or after 01/01/09, and has a maximum engine power > 19 KW (25 HP (§60.4230(a)(4)(iii)).

The Standby Emergency Generator Engine is EPA Certified and will be operated and maintained according to the manufacturer's emission related written instructions. As such, no emission testing is required (§60.4243(a)(1)).

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 because the facility is a natural gas processing plant constructed, reconstructed, or modified after August 23, 2011.

Affected facilities include reciprocating compressors and equipment leaks.

Requirements include replacement of the reciprocating compressor rod packing before the compressor has operated 26,000 hours or prior to 36 months from the date of the most recent rod packing replacement. Additional requirements include monitoring and expeditious repair of valves, flanges, connectors, pumps, pressure relief devices and open-ended valves or lines. The equipment leak standards are specified in §60.5400. Also notification, recordkeeping, and reporting as specified in §60.5420

11. **NESHAP A, General Provisions**
40CFR§63.1§63.16

[Not Applicable]

This rule does not apply because the facility is not subject to any Subpart under 40CFR§63 National Emission Standards for Hazardous Air Pollutant for Source Categories.

(Note: The Standby Emergency Generator Engine (GEN-1 (8E)) complies with NESHAP ZZZZ by compliance with NSPS JJJJ (§63.6590(a)(2)(iii)), no other requirements apply.)

12. **NESHAP HH, Oil and Natural Gas Production Facilities**
40CFR§63.760-§63.779

[Not Applicable]

This rule does not apply because the facility is an area source of HAPs and does not operate a triethylene glycol dehydration unit (§63.760(b)(2)).

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 gas turbine at the facility (§63.6080).

15. **NESHAP ZZZZ, Stationary Reciprocating Internal Combustion Engines (RICE)**
40CFR§63.6580-§63.6675

[Applicable]

This rule does apply to the Standby Generator Engine (GEN-1 (9E)). However, because the engine is "new" or "reconstructed"; i.e., commenced construction or reconstruction on or after 06/12/06, the only requirement is compliance with 40CFR§60.4230-§60.4248 (NSPS JJJJ) for Spark Ignition Internal Combustion Engines (§63.6590(a)(2)(iii)).

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 because the facility is NOT a major source of HAP (§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)). Specifically, "boiler" is defined as an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water.

18. **Chemical Accident Prevention Provisions (RMP)**
40CFR§68.1-§68.220

[Applicable]

This rule does apply because the facility stores more than a threshold quantity of 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. The facility is not subject to a listed source category; however, the aggregate maximum heat input capacity of the stationary fuel combustion units is ≥ 30 MMBtu/hr and the facility has the potential to emit ≥ 25,000 metric ton/yr (27,558 tpy) of CO2e/yr from all stationary fuel combustion sources combined (§98.2(a)).

Records must be kept of actual CO2, CH4 and N2O emissions to determine the actual CO2e emissions. If such emissions exceed the 25,000 metric ton/yr threshold then an annual report must be submitted no later than March 31st of each calendar year thereafter.

C. Applicability of Source Aggregation

For New Source Review (NSR) and Title V permitting, the three-part regulatory analysis used 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 major industrial grouping; and
ii) Are located on one or more contiguous or adjacent properties; and
iii) Are 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 and additionally any other Williams facility in West Virginia.

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, according to the courts, should meet the common sense meaning of the terms "contiguous" and "adjacent." It is important to focus on this criteria 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" according to the preamble of the Clean Air Act and recent court decisions.

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

The closest Williams-owned facility to the Oak Grove Processing Plant is the Taylor Compression Station, which is over ½ mile away as the crow flies. Taylor Compressor Station does not meet the common sense definition for being "contiguous" with or "adjacent" to the Oak Grove Processing Plant.

The Oak Grove 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 pre-existing upstream production wellpad operated by Chevron (the "Francis Wellpad") and is located less than half a mile from that wellpad. Other upstream production wells from which gas is processed at the Oak Grove 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. The subject facility does not need to be located in the immediate vicinity of the Francis Wellpad in order to operate properly nor does it need to be located by Taylor. Indeed, the Chevron Wellpad has not produced any of the gas processed at the Oak Grove 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 Francis 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 Oak Grove Processing Plant 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 Taylor compressor station, which is located approximately 1.5 miles away. This facility is the closest to Oak Grove to have common ownership but it is not "contiguous" with or "adjacent" to the Oak Grove facility.

The production wells, including the Chevron Wellpad, that can send natural gas to the subject facility are owned and operated by other companies, which are unaffiliated with Williams. Williams has no ownership stake in the Chevron wellpad or in any other production well or company in West Virginia. It is Williams' understanding that the well produced before the Oak Grove Plant was built but has not produced during or after the plant was built and that decision of Chevron's to produce Francis or not was unrelated to Williams' building of the plant. It is the current understanding of Williams that the production of Francis will not require Oak Grove to operate but this is better understood by Chevron.

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 plant 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. Williams will not have ownership or control of any future wellhead facilities. The producers are, and will be responsible for, any decisions to produce or shut-in wellhead facilities and have no control over the equipment installed, owned, and operated by Williams. Similarly, Williams cannot control the installation or operation of any equipment located at a well site that may be considered an air contamination source.
For the reasons above it is clear that Williams does not have common control of any production wells including Francis.

Summary

The subject facility, Taylor, 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 and is not "contiguous" or "adjacent" to Taylor. 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 gas plants. Applicability to the facility has been determined as follows:

1. **Particulate Air Pollution from Combustion of Fuel**
   45CSR2

   [Applicable]

   This rule does apply to the natural gas fired heaters (H-01 thru H-07); limiting opacity to 10% based on a six minute block average.

   Because the heat input ≥ 10 MMBtu/hr, these units (except H-02) are also subject to Sections 4 (emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions.

2. **Prevent and Control of Objectionable Odors**
   45CSR4

   [Applicable]

   This rule does apply and states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable. No odors have been deemed objectionable.

3. **Control of Air Pollution from Combustion of Refuse**
   45CSR6

   [Applicable]

   This rule does apply to the Process Flare (FL-1 (8E)). The flare is required to be smokeless except for periods not to exceed a total of 5 minutes during any 2 consecutive hours. The 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 waste 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 – Sulfur Oxides**
   45CSR10

   [Applicable]

   This rule does apply to the gas-fueled heaters w/ a Maximum Design Heat Input (MDHI) rating > 10 MMBtu/hr (H-01, and H-03 thru H-07) (§45-10-10.1). Requirements are specified in 45CSR10 Sections 3 (emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting).

5. **Permits for Construction, Modification, Relocation and Operation**
   45CSR13

   [Applicable]

   This rule does apply. Williams OVM has received a 45CSR13 Permit for the subject facility.

6. **Permits for Construction and Modification of Major Stationary Sources for the Prevention of Significant Deterioration**
45CSR14

[Not Applicable]

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

7. **Standards of Performance for New Stationary Sources (40 CFR Part 60)**
45CSR16

[Applicable]

This rule does apply to this source by reference of §40CFR60 Subparts Dc and OOOO. Williams is subject to the recordkeeping, monitoring, and testing required of these Subparts.

8. **Permits for Construction and Modification (Non-Attainment)**
45CSR19

[Not Applicable]

This rule does not apply because the facility is in an area designated as attainment for all regulated air pollutants.

9. **Regulation of Volatile Organic Compounds (VOC)**
45CSR21

[Not Applicable]

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

10. **Air Quality Management Fees Program**
45CSR22

[Applicable]

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

11. **Prevent and Control Emissions of Toxic Air Pollutants**
45CSR27

[Not Applicable]

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

12. **Air Pollution Emissions Banking and Trading**
45CSR28

[Not Applicable]

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

13. Emission Statements for VOC and NOX
45CSR29

[Not Applicable]

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

14. Requirements for Operating Permits
45CSR30

[Applicable]

This rule does apply. The facility qualifies as a "Major Source" as follows:

- NOx: TVOP Major Source with Controlled PTE > 100 tpy
- CO: TVOP Major Source with Controlled PTE > 100 tpy
- VOC: TVOP Major Source with Controlled PTE > 100 tpy
- SO2: TVOP Natural Minor Source with Pre-Controlled PTE < 100 tpy
- PM10/2.5: TVOP Natural Minor Source with Pre-Controlled PTE < 100 tpy
- Each HAP: TVOP Synthetic Area Source with Controlled PTE < 10 tpy
- Total HAPs: TVOP Synthetic Area Source with Controlled PTE < 25 tpy

(Note: WVDEP requires that fugitive emissions be included in major source determinations at gas plants.)

15. Emission Standards for Hazardous Air Pollutants (HAP)
45CSR34

[Not Applicable]

This rule does not apply because the facility is not subject to any Subpart under 40CFR§61 (MACT) or 40CFR§63 (NESHAP)

(Note: The Standby Emergency Generator Engine (GEN-1 (8E)) complies with NESHAP ZZZZ by compliance with NSPS JJJJ (§63.6590(a)(2)(iii)), no other requirements apply.)

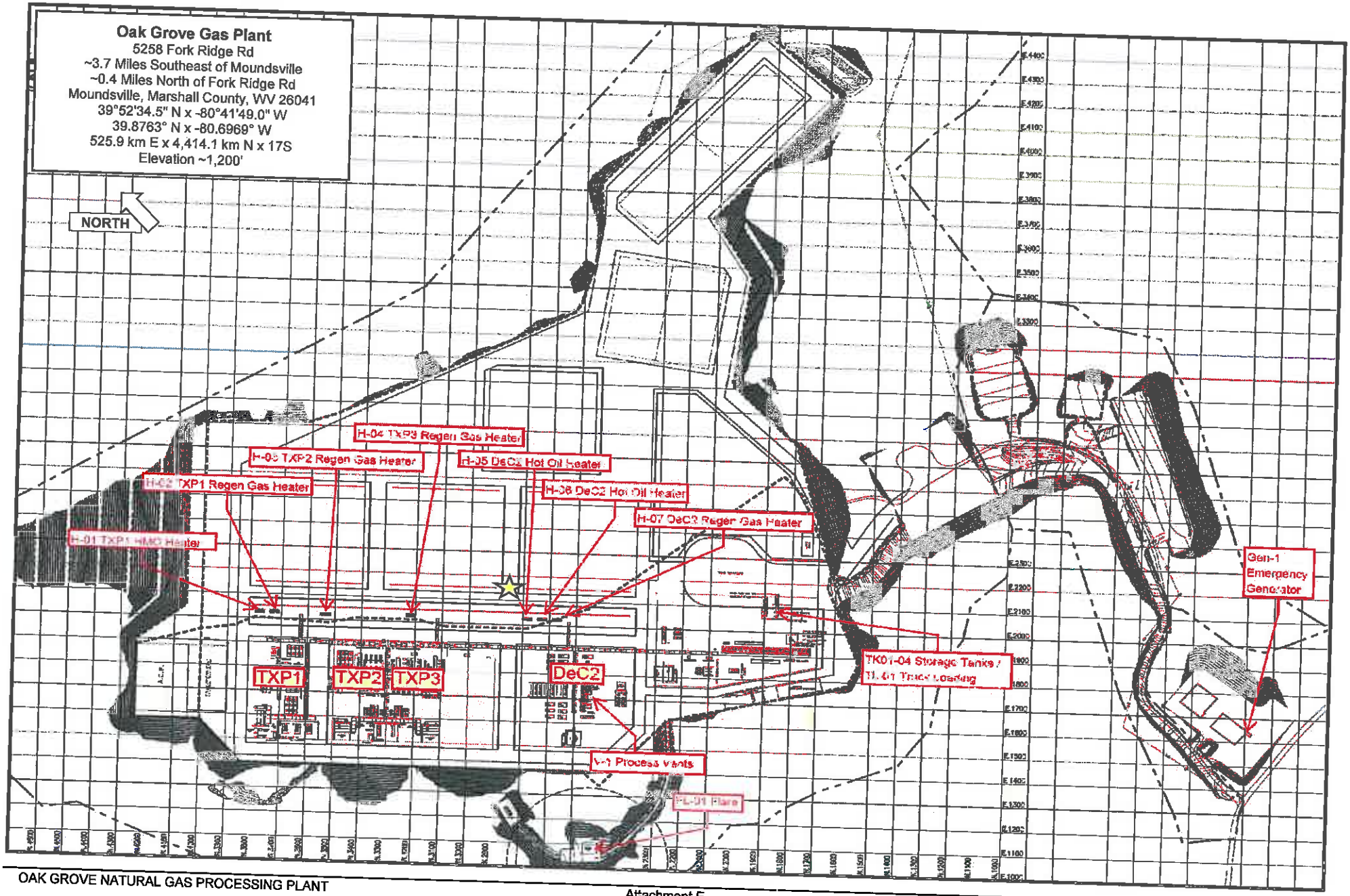
ATTACHMENT E

Plot Plan

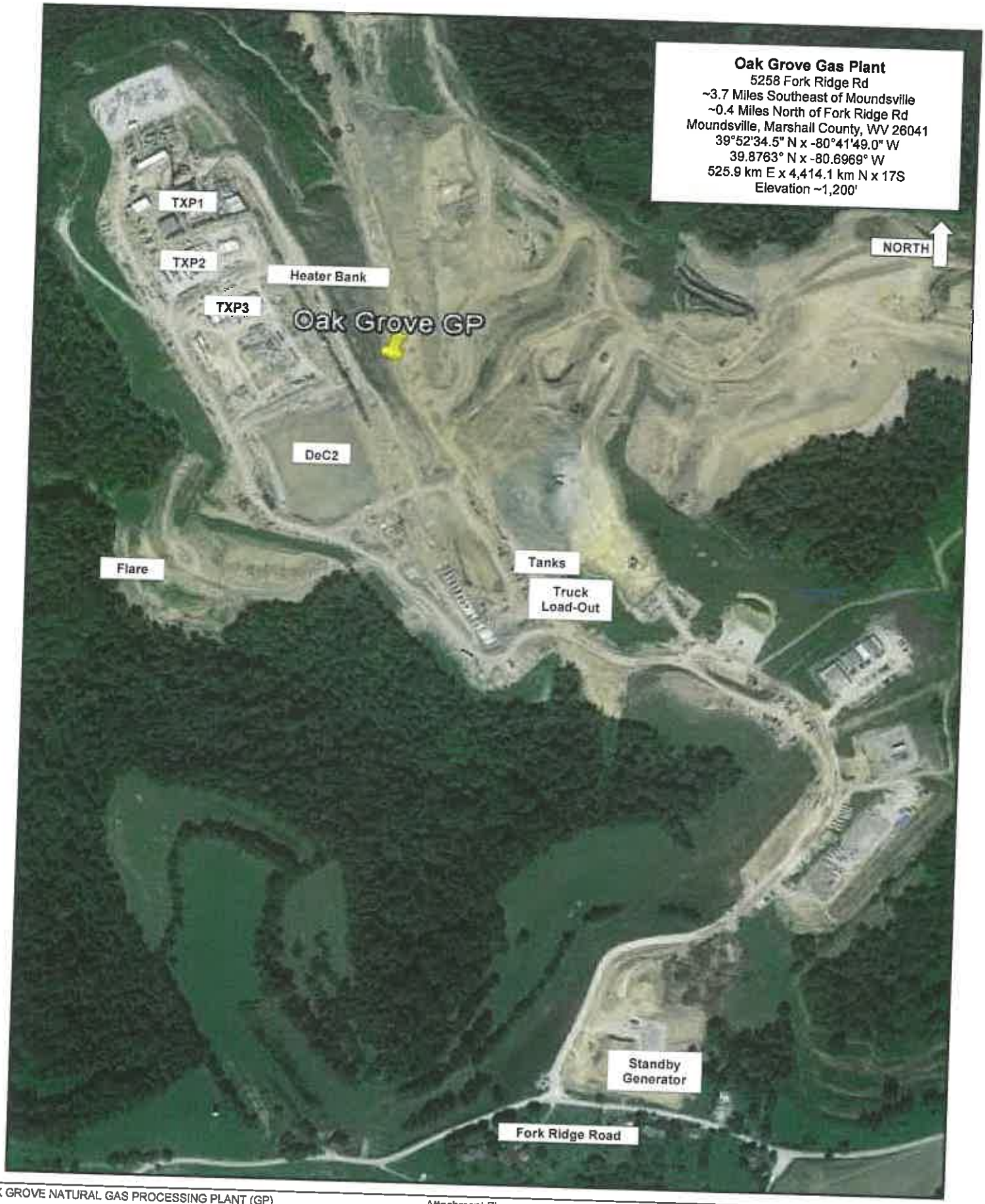
"21. Provide a **Plot Plan**, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E."

- **Plot Plan – Williams OVM Oak Grove Gas Plant**
- **Aerial View – Williams OVM Oak Grove Gas Plant**

PLOT PLAN


Oak Grove Gas Plant
5258 Fork Ridge Rd
~3.7 Miles Southeast of Moundsville
~0.4 Miles North of Fork Ridge Rd
Moundsville, Marshall County, WV 26041
39°52'34.5" N x -80°41'49.0" W
39.8763° N x -80.6969° W
525.9 km E x 4,414.1 km N x 17S
Elevation ~1,200'
NORTH
H-04 TXP3 Regen Gas Heater
H-03 TXP2 Regen Gas Heater
H-02 TXP1 Regen Gas Heater
H-01 TXP1 HMO Heater
H-05 DeC2 Hot Oil Heater
H-06 DeC2 Hot Oil Heater
H-07 DeC2 Regen Gas Heater
TXP1
TXP2
TXP3
DeC2
TK01-04 Storage Tanks /
TL-01 Truck Loading
Gen-1
Emergency
Generator
V-1 Process Vents
FL-01 Flare

AERIAL VIEW


Oak Grove Gas Plant
5258 Fork Ridge Rd
~3.7 Miles Southeast of Moundsville
~0.4 Miles North of Fork Ridge Rd
Moundsville, Marshall County, WV 26041
39°52'34.5" N x -80°41'49.0" W
39.8763° N x -80.6969° W
525.9 km E x 4,414.1 km N x 17S
Elevation ~1,200'
NORTH
TXP1
TXP2
TXP3
Heater Bank
Oak Grove GP
DeC2
Flare
Tanks
Truck Load-Out
Standby Generator
Fork Ridge Road

ATTACHMENT F

Detailed Process Flow Diagram

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

- **Process Flow Diagram (PFD) – Williams OVM Oak Grove Gas Plant**

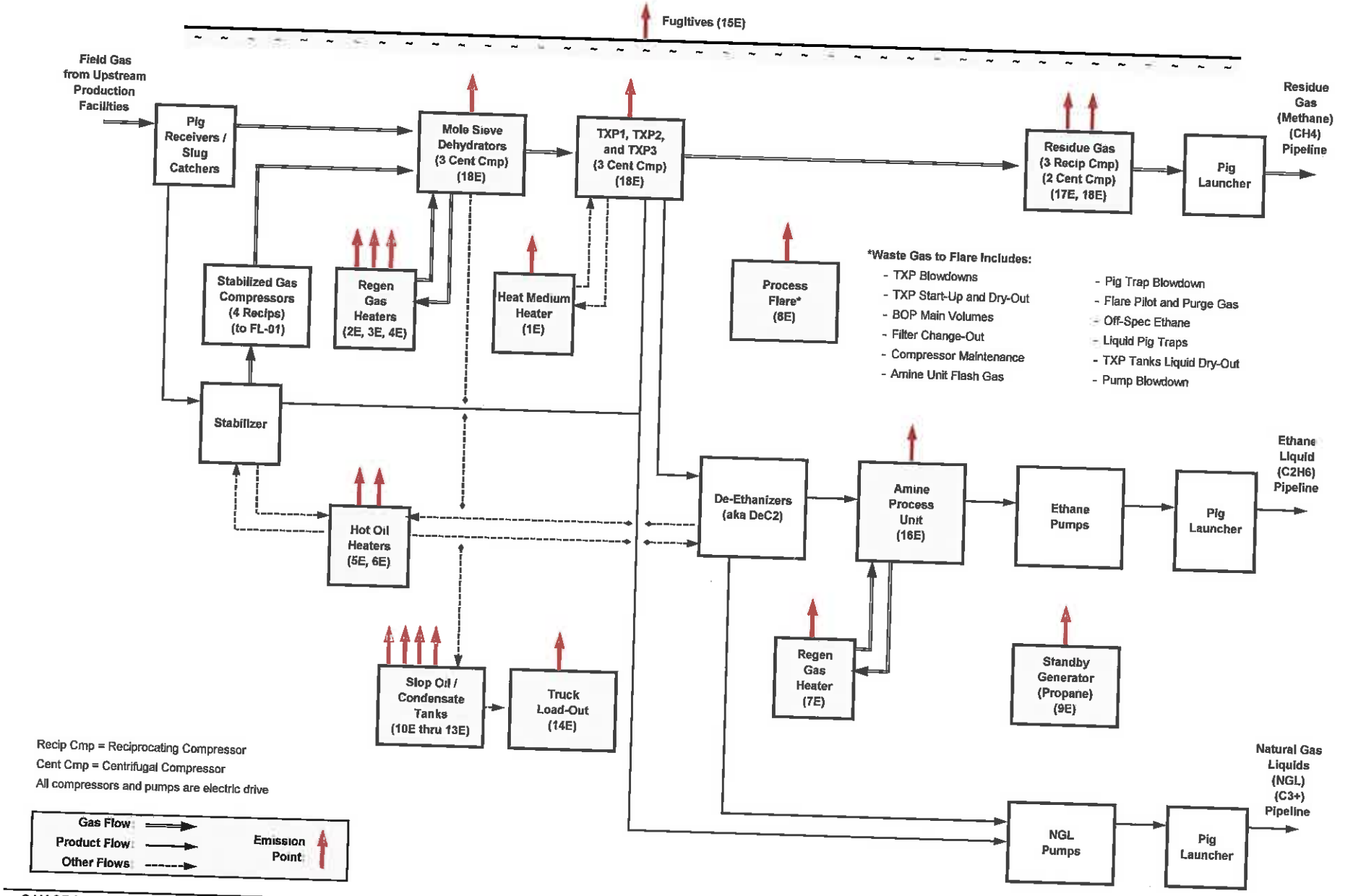
Williams Ohio Valley Midstream LLC (OVM)

OAK GROVE NATURAL GAS PROCESSING PLANT (GP)

45CSR13 NSR Modification Permit

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. Stabilizer
  - C. Molecular Sieve Dehydration Unit
  - D. Cryogenic Turboexpansion (TXP) Process
  - E. Heaters
  - F. Process Flare
  - G. Standby Generator Engine
  - H. Storage Tanks
  - I. Truck Load-Out
  - J. Amine Treatment Unit
  - K. Compressor Rod Packing and Dry Gas Seal Leaks

Attachment G
PROCESS DESCRIPTION

A. Project Overview

Williams Ohio Valley Midstream LLC owns and operates the Oak Grave Gas Plant in Marshall County (See Appendix B – Site Location Map). The facility is designed to process 600 MMscfd of natural gas received via pipeline. Three product streams are generated:

1. Residue Gas (i. e., dry, "clean", methane (CH_4)) is compressed for off-site shipment via natural gas transmission pipeline.
2. Ethane (C_2H_6) Liquid (amine treated to remove CO_2) is pumped for off-site shipment via liquid pipeline.
3. Natural Gas Liquids (NGL (C3+), including stabilized condensate) are also pumped for off-site shipment via liquid pipeline.

B. Stabilizer

The facility operations commence with a slug catcher to remove free liquids from the inlet natural gas. The raw condensate stream enters the stabilizer unit where it is heated to remove the lighter end hydrocarbons (methane, ethane and propane). These lighter end hydrocarbons are compressed and commingled with raw inlet gas for further processing. The stabilized condensate liquids are commingled with other natural gas liquid (NGL) product for off-site shipment.

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

C. Molecular Sieve Dehydration Unit

Mole sieves are used to remove water from the inlet gas stream as requisite for the following cryogenic processes. The operation starts with the wet gas entering the adsorption tower at the top which contains the molecular sieve desiccant. The gas exits the bottom of the vessel dry. While one tower is adsorbing, the other tower is regenerating. For regeneration, gas is heated up to 550 °F and is sent to the tower in regeneration to extract the water from the molecular sieves. As the saturated gas leaves the top of the vessel, it is cooled in a condenser and then the condensed water is separated. The two towers switch between adsorbing and regenerating on a fixed cycle.

The mole sieves are totally enclosed systems, so the only emissions are fugitives from piping and equipment. These emissions are controlled by implementation of a leak detection and repair (LDAR) program.

D. Cryogenic Turboexpansion (TXP) Process

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 (C_2H_6) and most of the other hydrocarbons (primarily propane (C_3H_8) and butane (C_4H_{10}), with de-minimis hexane, benzene, toluene, ethyl-benzene, xylene, etc. (together C5+)), while maintaining methane (CH_4) in gaseous form.

The TXPs are totally enclosed systems, so the only emissions are fugitives from piping and equipment. These emissions are controlled by implementation of a leak detection and repair (LDAR) program.

E. Heaters

Natural gas-fueled heaters are used at the facility in the various gas processing segments. Emissions are generated by combustion of natural gas.

F. Process Flare

The process flare is used to safely combust waste gas streams generated during routine operations, general maintenance activities, and in the event of an upset. The amount of gas routed to the flare during a given event will vary widely. Emissions are of two types:

1) Combustion byproducts estimated as per EPA AP-42 emission factors, plus
2) Incomplete combustion of waste gas estimated at 99% control efficiency.

G. Standby Generator Engine

A standby generator is used to provide electrical power for various activities at the site in the event of loss of purchase power.

H. Storage Tanks

There are numerous tanks at the facility used to store various materials such as slop oil/condensate, produced water, lube oil, heat medium (oil), amine, diesel fuel, and motor gasoline. The slop oil/condensate tanks are the only tanks with significant emissions to the atmosphere. All other storage tanks at the site have de-minimis emissions.

I. Truck Load-Out

There are emissions from loading of slop oil/condensate into tanker trucks.

J. Amine Process Unit

The ethane product stream is further processed in an amine treatment unit to remove carbon dioxide (CO_2) prior to off-site shipment via pipeline.

K. Compressor Rod Packing and Dry Gas Seal Leaks

Emissions result from reciprocating and centrifugal compressors that are utilized throughout the plant. The compressors generate emissions from the wear of mechanical joints, seals, and rotating surfaces over time.

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."

- **INLET GAS ANALYSIS SUMMARY**
- **INLET GAS CERTIFICATE OF ANALYSIS**
- **MATERIAL SAFETY DATA SHEETS (MSDS):**
  - Inlet Natural Gas
  - Residue Natural Gas
  - Ethane
  - Natural Gas Liquids

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

45CSR13 NSR – Modification Permit

ATTACHMENT H - Inlet Gas Composition - Design Basis

Legacy Measurement Solutions Gooc

Shreveport, LA

318-226-7237

Customer	: 2259 - WILLIAMS	**Date Sampled**	: 11/01/2013
Station ID	: 5001	**Date Analyzed**	: 11/11/2013
Cylinder ID	: 5203	**Effective Date**	: 12/01/2013
Producer	:	**Cyl Pressure**	: 900
Lease	: FORT BEELER 12 INCH	**Temp**	: 60
Area	: 500 - OHIO VALLEY MID	**Cylinder Type**	: Spot
State	: WV	**Sample By**	: JM

COMPONENT	MOL%	GPM@14.73(PSIA)
Oxygen	0.0030	0.000
Nitrogen	0.4955	0.000
Methane	73.4443	0.000
Carbon-Dioxide	0.1887	0.000
Ethane	17.2512	4.630
Propane	6.0946	1.685
Iso-Butane	0.5849	0.192
Normal-Butane	1.3036	0.412
Iso-Pentane	0.2148	0.079
Normal-Pentane	0.2357	0.086
2,2-Dimethylbutane	0.0045	0.002
2,3-Dimethylbutane/CycloC5	0.0087	0.003
2-methylpentane	0.0393	0.016
3-methylpentane	0.0225	0.009
Normal-Hexane	0.0518	0.021
2,2-Dimethylpentane	0.0004	0.000
Methylcyclopentane	0.0062	0.002
BENZENE	0.0008	0.000
3,3-Dimethylpentane	0.0006	0.000
CYCLOHEXANE	0.0050	0.002
2-Methylhexane	0.0075	0.003
2,3-Dimethylpentane	0.0019	0.001
3-Methylhexane	0.0075	0.003
1,t2-DMCYC5 / 2,2,4-TMC5	0.0001	0.000
1,t3-Dimethylcyclopentane	0.0002	0.000
N-Heptane	0.0108	0.005
METHYLCYCLOHEXANE	0.0059	0.003
2,5-Dimethylhexane	0.0005	0.000
2,3-Dimethylhexane	0.0007	0.000
TOLUENE	0.0013	0.000
2-Methylheptane	0.0017	0.001
4-Methylheptane	0.0007	0.000
3-Methylheptane	0.0014	0.001
1,t4-Dimethylcyclohexane	0.0007	0.000
N-OCTANE / 1,T2-DMCYC6	0.0022	0.001
1,t3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0000	0.000
2,4,4 TMC6	0.0000	0.000

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

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ATTACHMENT H - Inlet Gas Summary

Inlet Gas - Design Basis - (Ft Beeler Gas Plant)

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	0.4955	0.004955	0.1586	0.738	417.83
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.1887	0.001887	0.0830	0.386	218.85
Methane*	75-82-8	CH4	16.04	73.4443	0.734461	11.7826	54.834	31,049.05
Ethane*	74-84-0	C2H6	30.07	17.2512	0.172516	5.1874	24.141	13,669.67
Propane**	74-98-6	C3H8	44.10	6.0946	0.060947	2.6875	12.507	7,082.06
i-Butane**	75-28-5	C4H10	58.12	0.5849	0.005849	0.3400	1.582	895.87
n-Butane**	106-97-8	C4H10	58.12	1.3036	0.013036	0.7577	3.526	1,996.67
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	0.2148	0.002148	0.1550	0.721	408.40
n-Pentane**	109-66-0	C5H12	72.15	0.2357	0.002357	0.1701	0.791	448.13
Cyclohexane**	110-82-7	C6H12	84.16	0.0112	0.000112	0.0094	0.044	24.84
Other Hexanes**	varies	C6H14	86.18	0.0750	0.000750	0.0646	0.301	170.32
Methylcyclohexane**	varies	C7H14	98.19	0.0062	0.000062	0.0061	0.028	16.04
Heptanes**	varies	C7H16	100.20	0.0287	0.000287	0.0288	0.134	75.73
C8+ Heavies**	varies	C8H18	114.5 est	0.0087	0.000087	0.0100	0.046	26.25
Benzene***	71-43-2	C6H6	78.11	0.0008	0.000008	0.0006	0.003	1.65
Ethylbenzene***	100-41-4	C8H10	106.17	0.0001	0.000001	0.0001	0.000	0.14
n-Hexane***	110-54-3	C6H14	86.18	0.0518	0.000518	0.0446	0.208	117.63
Toluene***	108-88-3	C7H8	92.14	0.0013	0.000013	0.0012	0.006	3.16
2,2,4-TMP***	540-84-1	C8H18	114.23	0.0001	0.000001	0.0001	0.000	0.15
Xylenes***	1330-20-7	C8H10	106.17	0.0005	0.000005	0.0005	0.002	1.40
Totals:				**100.00**	**1.00**	**21.49**	**100.00**	**56,624**
Total THC:				**99.31**	**0.99**	**21.25**	**98.88**	**55,987**
Total VOC:				**8.62**	**0.09**	**4.28**	**19.90**	**11,268**
Total HAP:				**0.05**	**0.001**	**0.05**	**0.22**	**124**

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

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

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

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.189	0.386	219	0.259	0.530	300
Methane	75-82-8	CH4	73.444	54.834	31,049	88.230	65.873	37,300
Ethane	74-84-0	C2H6	17.251	24.141	13,670	20.823	29.140	16,500
VOC	Various	C3+	8.618	19.901	11,268	10.401	24.018	13,600
Benzene	71-43-2	C6H6	0.001	0.003	2	0.005	0.018	10
Ethylbenzene	110-54-3	C8H10	0.000	0.000	0	0.004	0.018	10
n-Hexane	100-41-4	C6H14	0.052	0.208	118	0.066	0.265	150
Toluene	108-88-3	C7H8	0.001	0.006	3	0.004	0.018	10
2,2,4-TMP	540-84-1	C8H18	0.000	0.000	0	0.003	0.018	10
Xylenes	1330-20-7	C8H10	0.001	0.002	1	0.004	0.018	10
Total HAP	Various	C6+	0.055	0.219	124	0.088	0.353	200

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

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ATTACHMENT H - Residue Gas Summary

Residue Gas Composition

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	---	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	---	---	---	---	---
Methane*	75-82-8	CH4	16.04	95.38600	0.953822	15.3016	91.571	40,322.46
Ethane*	74-84-0	C2H6	30.07	4.47600	0.044758	1.3458	8.054	3,546.51
Propane**	74-98-6	C3H8	44.10	0.14200	0.001420	0.0626	0.375	165.00
i-Butane**	75-28-5	C4H10	58.12	---	---	---	---	---
n-Butane**	106-97-8	C4H10	58.12	---	---	---	---	---
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	---	---	---	---	---
n-Pentane**	109-66-0	C5H12	72.15	---	---	---	---	---
Cyclohexane**	110-82-7	C6H12	84.16	---	---	---	---	---
Other Hexanes**	varies	C6H14	86.18	---	---	---	---	---
Methylcyclohexane**	varies	C7H14	98.19	---	---	---	---	---
Heptanes**	varies	C7H16	100.20	---	---	---	---	---
C8+ Heavies**	varies	C8H18	114.5 est	---	---	---	---	---
Benzene***	71-43-2	C6H6	78.11	---	---	---	---	---
Ethylbenzene***	100-41-4	C8H10	106.17	---	---	---	---	---
n-Hexane***	110-54-3	C6H14	86.18	---	---	---	---	---
Toluene***	108-88-3	C7H8	92.14	---	---	---	---	---
2,2,4-TMP***	540-84-1	C8H18	114.23	---	---	---	---	---
Xylenes***	1330-20-7	C8H10	106.17	---	---	---	---	---
Totals:				**100.00**	**1.00**	**16.71**	**100.00**	**44,034**
Total THC:				**100.00**	**1.00**	**16.71**	**100.00**	**44,034**
Total VOC:				**0.14**	**0.00**	**0.06**	**0.37**	**165**
Total HAP:				**0.00**	**0.000**	**0.00**	**0.00**	**0**

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

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

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

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	---	---	---	--	--	---
Methane	75-82-8	CH4	95.386	91.571	40,322	100.005	96.005	42,275
Ethane	74-84-0	C2H6	4.476	8.054	3,547	5.427	9.765	4,300
VOC	Various	C3+	0.142	0.375	165	0.172	0.454	200
Benzene	71-43-2	C6H6	---	---	---	--	--	---
Ethylbenzene	110-54-3	C8H10	---	---	---	--	--	---
n-Hexane	100-41-4	C6H14	---	---	---	--	--	---
Toluene	108-88-3	C7H8	---	---	---	--	--	---
2,2,4-TMP	540-84-1	C8H18	---	---	---	--	--	---
Xylenes	1330-20-7	C8H10	---	---	---	--	--	---
Total HAP	Various	C6+	---	---	---	--	--	---

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

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ATTACHMENT H - Ethane Product Summary

Ethane Product

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	---	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.06970	0.000697	0.0307	0.100	80.84
Methane*	75-82-8	CH4	16.04	3.00000	0.030001	0.4813	1.565	1,268.28
Ethane*	74-84-0	C2H6	30.07	93.32740	0.933301	28.0635	91.228	73,952.04
Propane**	74-98-6	C3H8	44.10	1.00000	0.010000	0.4410	1.433	1,162.03
i-Butane**	75-28-5	C4H10	58.12	1.00000	0.010000	0.5812	1.889	1,531.66
n-Butane**	106-97-8	C4H10	58.12	1.00000	0.010000	0.5812	1.889	1,531.66
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	---	---	---	---	---
n-Pentane**	109-66-0	C5H12	72.15	---	---	---	---	---
Cyclohexane**	110-82-7	C6H12	84.16	---	---	---	---	---
Other Hexanes**	varies	C6H14	86.18	---	---	---	---	---
Methylcyclohexane**	varies	C7H14	98.19	---	---	---	---	---
Heptanes**	varies	C7H16	100.20	---	---	---	---	---
C8+ Heavies**	varies	C8H18	114.5 est	---	---	---	---	---
Benzene***	71-43-2	C6H6	78.11	0.10000	0.001000	0.0781	0.254	205.84
Ethylbenzene***	100-41-4	C8H10	106.17	0.10000	0.001000	0.1062	0.345	279.77
n-Hexane***	110-54-3	C6H14	86.18	0.10000	0.001000	0.0862	0.280	227.09
Toluene***	108-88-3	C7H8	92.14	0.10000	0.001000	0.0921	0.300	242.81
2,2,4-TMP***	540-84-1	C8H18	114.23	0.10000	0.001000	0.1142	0.371	301.02
Xylenes***	1330-20-7	C8H10	106.17	0.10000	0.001000	0.1062	0.345	279.77
Totals:				**100.00**	**1.00**	**30.76**	**100.00**	**81,063**
Total THC:				**99.93**	**1.00**	**30.73**	**99.90**	**80,982**
Total VOC:				**3.60**	**0.04**	**2.19**	**7.11**	**5,762**
Total HAP:				**0.60**	**0.006**	**0.58**	**1.90**	**1,536**

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

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

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

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.070	0.100	81	0.086	0.123	100
Methane	75-82-8	CH4	3.000	1.565	1,268	3.785	1.974	1,600
Ethane	74-84-0	C2H6	93.327	91.228	73,952	100.001	97.751	79,240
VOC	Various	C3+	---	---	---	–	–	—
Benzene	71-43-2	C6H6	0.100	0.254	206	0.121	0.308	250
Ethylbenzene	110-54-3	C8H10	0.100	0.345	280	0.122	0.419	340
n-Hexane	100-41-4	C6H14	0.100	0.280	227	0.123	0.345	280
Toluene	108-88-3	C7H8	0.100	0.300	243	0.124	0.370	300
2,2,4-TMP	540-84-1	C8H18	0.100	0.371	301	0.123	0.456	370
Xylenes	1330-20-7	C8H10	0.100	0.345	280	0.122	0.419	340
Total HAP	Various	C6+	0.600	1.895	1536	0.734	2.319	1,880

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ATTACHMENT H - Natural Gas Liquids (NGL) Summary

Natural Gas Liquids (NGL) Composition (Inlet Gas w/CH4 and C2H6 Removed)

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	---	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	---	---	---	---	---
Methane*	75-82-8	CH4	16.04	---	---	---	---	---
Ethane*	74-84-0	C2H6	30.07	--	---	---	---	---
Propane**	74-98-6	C3H8	44.10	70.72025	0.707202	31.1845	62.848	82,176.57
i-Butane**	75-28-5	C4H10	58.12	6.78704	0.067870	3.9448	7.950	10,395.16
n-Butane**	106-97-8	C4H10	58.12	15.12665	0.151267	8.7919	17.719	23,168.28
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	2.49249	0.024925	1.7983	3.624	4,738.82
n-Pentane**	109-66-0	C5H12	72.15	2.73501	0.027350	1.9733	3.977	5,199.91
Cyclohexane**	110-82-7	C6H12	84.16	0.12996	0.001300	0.1094	0.220	288.22
Other Hexanes**	varies	C6H14	86.18	0.87028	0.008703	0.7500	1.511	1,976.29
Methylcyclohexane**	varies	C7H14	98.19	0.07194	0.000719	0.0706	0.142	186.14
Heptanes**	varies	C7H16	100.20	0.33303	0.003330	0.3337	0.673	879.38
C8+ Heavies**	varies	C8H18	114.5 est	0.10095	0.001010	0.1156	0.233	304.60
Benzene***	71-43-2	C6H6	78.11	0.00928	0.000093	0.0073	0.015	19.11
Ethylbenzene***	100-41-4	C8H10	106.17	0.00058	0.000006	0.0006	0.001	1.62
n-Hexane***	110-54-3	C6H14	86.18	0.60107	0.006011	0.5180	1.044	1,364.96
Toluene***	108-88-3	C7H8	92.14	0.01508	0.000151	0.0139	0.028	36.63
2,2,4-TMP***	540-84-1	C8H18	114.23	0.00058	0.000006	0.0007	0.001	1.75
Xylenes***	1330-20-7	C8H10	106.17	0.00580	0.000058	0.0062	0.012	16.23
Totals:				**100.00**	**1.00**	**49.62**	**100.00**	**130,754**
Total THC:				**100.00**	**1.00**	**49.62**	**100.00**	**130,754**
Total VOC:				**100.00**	**1.00**	**49.62**	**100.00**	**130,754**
Total HAP:				**0.63**	**0.006**	**0.55**	**1.10**	**1,440**

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

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

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

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	---	---	---	--	--	---
Methane	75-82-8	CH4	---	---	---	--	--	---
Ethane	74-84-0	C2H6	--	---	---	--	--	---
VOC	Various	C3+	100.000	100.000	130,754	100.000	100.000	130,800
Benzene	71-43-2	C6H6	0.009	0.015	19	0.015	0.023	30
Ethylbenzene	110-54-3	C8H10	0.001	0.001	2	0.004	0.008	10
n-Hexane	100-41-4	C6H14	0.601	1.044	1,365	0.722	1.254	1,640
Toluene	108-88-3	C7H8	0.015	0.028	37	0.021	0.038	50
2,2,4-TMP	540-84-1	C8H18	0.001	0.001	2	0.003	0.008	10
Xylenes	1330-20-7	C8H10	0.006	0.012	16	0.007	0.015	20
Total HAP	Various	C6+	0.632	1.102	1,440	0.773	1.346	1,760

Williams Ohio Valley Midstream LLC

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ATTACHMENT H - Waste Gas Summary

Waste Gas (Blended Streams to Flare (FL-1 (8E))

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	0.07238	0.000724	0.0232	0.081	61.04
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.08287	0.000829	0.0365	0.127	96.10
Methane*	75-82-8	CH4	16.04	18.71099	0.187114	3.0018	10.490	7,910.19
Ethane*	74-84-0	C2H6	30.07	76.82945	0.768313	23.1024	80.734	60,878.87
Propane**	74-98-6	C3H8	44.10	1.81821	0.018183	0.8018	2.802	2,112.80
i-Butane**	75-28-5	C4H10	58.12	0.89096	0.008910	0.5179	1.810	1,364.64
n-Butane**	106-97-8	C4H10	58.12	1.01082	0.010108	0.5875	2.053	1,548.23
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	0.03582	0.000358	0.0258	0.090	68.11
n-Pentane**	109-66-0	C5H12	72.15	0.03931	0.000393	0.0284	0.099	74.74
Cyclohexane**	110-82-7	C6H12	84.16	0.00187	0.000019	0.0016	0.005	4.14
Other Hexanes**	varies	C6H14	86.18	0.01251	0.000125	0.0108	0.038	28.41
Methylcyclohexane**	varies	C7H14	98.19	0.00103	0.000010	0.0010	0.004	2.68
Heptanes**	varies	C7H16	100.20	0.00479	0.000048	0.0048	0.017	12.64
C8+ Heavies**	varies	C8H18	114.5 est	0.00145	0.000015	0.0017	0.006	4.38
Benzene***	71-43-2	C6H6	78.11	0.07947	0.000795	0.0621	0.217	163.59
Ethylbenzene***	100-41-4	C8H10	106.17	0.07935	0.000794	0.0842	0.294	221.99
n-Hexane***	110-54-3	C6H14	86.18	0.08798	0.000880	0.0758	0.265	199.80
Toluene***	108-88-3	C7H8	92.14	0.07956	0.000796	0.0733	0.256	193.17
2,2,4-TMP***	540-84-1	C8H18	114.23	0.07935	0.000794	0.0906	0.317	238.86
Xylenes***	1330-20-7	C8H10	106.17	0.07942	0.000794	0.0843	0.295	222.20
Totals:				**100.00**	**1.00**	**28.62**	**100.00**	**75,407**
Total THC:				**99.84**	**1.00**	**28.56**	**99.79**	**75,249**
Total VOC:				**4.30**	**0.04**	**2.45**	**8.57**	**6,460**
Total HAP:				**0.49**	**0.005**	**0.47**	**1.64**	**1,240**

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

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

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

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.083	0.127	96	0.129	0.199	150
Methane	75-82-8	CH4	18.711	10.490	7,910	22.472	12.598	9,500
Ethane	74-84-0	C2H6	76.829	80.734	60,879	92.253	96.941	73,100
VOC	Various	C3+	4.302	8.567	6,460	5.194	10.344	7,800
Benzene	71-43-2	C6H6	0.079	0.217	164	0.097	0.265	200
Ethylbenzene	110-54-3	C8H10	0.079	0.294	222	0.097	0.358	270
n-Hexane	100-41-4	C6H14	0.088	0.265	200	0.106	0.318	240
Toluene	108-88-3	C7H8	0.080	0.256	193	0.099	0.318	240
2,2,4-TMP	540-84-1	C8H18	0.079	0.317	239	0.096	0.385	290
Xylenes	1330-20-7	C8H10	0.079	0.295	222	0.097	0.358	270
Total HAP	Various	C6+	0.485	1.644	1,240	0.591	2.002	1,510

ATTACHMENT H - Waste Gas Btu Analysis

Based on Streams Disposed in Flare (FL-1 (8E))

Component	Formula	Molecular Weight (MW)	Component Btu/scf		Inlet Gas		Residue Gas		Ethane Product		NGLs		Waste Gas	
					Flow: 92.1 MMscf/yr		Flow: 37.0 MMscf/yr		Flow: 500.0 MMscf/yr		Flow: 1.1 MMscf/yr		Flow: 630.2 MMscf/yr	
					Flow: 10,509 scf/hr		Flow: 4,225 scf/hr		Flow: 57,078 scf/hr		Flow: 128 scf/hr		Flow: 71,940 scf/hr	
					14.6%		5.9%		79.3%		0.2%		100.0%	
			LHV	HHV	Mole %	Btu/scf	Mole %	Btu/scf	Mole %	Btu/scf	Mole %	Btu/scf	Mole %	Btu/scf
Nitrogen	N2	28.013	—	—	0.4955	—	—	—	—	—	—	—	0.072	—
Hydrogen Sulfide	H2S	34.086	586.8	637.1	—	—	—	—	—	—	—	—	—	—
Carbon Dioxide	CO2	44.010	—	—	0.1887	—	—	—	0.070	—	—	—	0.083	—
Methane*	CH4	16.042	909.4	1,010.0	73.4443	667.902	95.3860	867.4	3.000	27.3	—	—	18.711	170.2
Ethane*	C2H6	30.069	1,618.7	1,769.7	17.2512	279.245	4.4760	72.5	93.327	1510.7	—	—	76.829	1243.6
Propane**	C3H8	44.096	2,314.9	2,516.2	6.0946	141.084	0.1420	3.3	1.000	23.1	70.720	1637.1	1.818	42.1
i-Butane**	C4H10	58.122	3,000.4	3,252.0	0.5849	17.549	—	—	1.000	30.0	6.787	203.6	0.891	26.7
n-Butane**	C4H10	58.122	3,010.8	3,262.4	1.3036	39.249	—	—	1.000	30.1	15.127	455.4	1.011	30.4
Cyclopentane**	C5H10	70.100	3,512.0	3,763.6	—	—	—	—	—	—	—	—	—	—
i-Pentane**	C5H12	72.149	3,699.0	4,000.9	0.2148	7.945	—	—	—	—	2.492	92.2	0.036	1.3
n-Pentane**	C5H12	72.149	3,706.9	4,008.7	0.2357	8.737	—	—	—	—	2.735	101.4	0.039	1.5
Cyclohexane**	C6H12	84.159	4,179.7	4,481.6	0.0112	0.468	—	—	—	—	0.130	5.4	0.002	0.1
Other Hexanes**	C6H14	86.175	4,394.8	4,746.9	0.0750	3.296	—	—	—	—	0.870	38.2	0.013	0.5
Methylcyclohexane**	C7H14	98.186	4,863.7	5,215.9	0.0062	0.302	—	—	—	—	0.072	3.5	0.001	0.1
Heptanes**	C7H16	100.202	5,100.0	5,502.5	0.0287	1.464	—	—	—	—	0.333	17.0	0.005	0.2
C8+ Heavies**	C8+	114.5 est	5,815 est	6,255 est	0.0087	0.506	—	—	—	—	0.101	5.9	0.001	0.1
Benzene***	C6H6	78.112	3,590.9	3,741.9	0.0008	0.029	—	—	0.100	3.6	0.009	0.3	0.079	2.85
Ethylbenzene***	C8H10	106.165	4,970.4	5,222.0	0.0001	0.002	—	—	0.100	5.0	0.001	0.0	0.079	3.9
n-Hexane***	C6H14	86.175	4,403.8	4,756.0	0.0518	2.281	—	—	0.100	4.4	0.601	26.5	0.088	3.9
Toluene***	C7H8	92.138	4,273.7	4,474.9	0.0013	0.056	—	—	0.100	4.3	0.015	0.6	0.080	3.40
2,2,4-TMP***	C8H18	114.229	5,778.8	6,231.6	0.0001	0.003	—	—	0.100	5.8	0.001	0.0	0.079	4.6
Xylenes***	C8H10	106.165	4,957.2	5,208.9	0.0005	0.025	—	—	0.100	5.0	0.006	0.3	0.079	3.9
					100.00		100.00		100.00		100.00		100.00	
Btu/scf (LHV):					1,170		943		1,649		2,588		1,539	
LHV/HHV:					91.0%		90.1%		91.5%		90.7%		91.4%	
Btu/scf (HHV):					1,286		1,047		1,802		2,852		1,685	
MMBtu/hr (LHV):					12.30		3.98		94.13		0.33		110.75	
MMBtu/hr (HHV):					13.52		4.42		102.84		0.37		121.22	

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

			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

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.

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

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

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

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

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

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 %

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

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

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

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

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

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

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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 (H_2S) 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.

Ethane (purity)

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations

Revision Date: 11/05/2014

Version: 1.0

SECTION 1: IDENTIFICATION

Product Identifier

Product Form: Mixture

Product Name: Ethane (purity)

Synonyms: Ethyl hydride

Intended Use of the Product

Use of the Substance/Mixture: Industrial use.

Name, Address, and Telephone of the Responsible Party

Company

Williams, Inc.

One Williams Center

Tulsa, OK 74172, US

T 800-688-7507

employeesafetycoe@williams.com

Emergency Telephone Number

Emergency Number : 888-677-2370

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) :

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

Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. Asphyxiant gas, can be fatal. May cause damage to the blood, central nervous system, and cardiovascular system. High concentrations of gas can cause unconciousness and death. Being under the influence of alcohol may enhance the effects of this product.

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product Identifier	% (v/v)	Classification (GHS-US)
Ethane	(CAS No) 74-84-0	95 - 100	Simple Asphy Flam. Gas 1, H220 Liquefied gas, H280
Propane	(CAS No) 74-98-6	< 3	Simple Asphy

			Flam. Gas 1, H220 Liquefied gas, H280
Methane	(CAS No) 74-82-8	< 3	Simple Asphy Flam. Gas 1, H220 Compressed gas, H280

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. This product 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: Not available

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Leaking gas fire, do not fight fire unless leak can be stopped safely. 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.

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), hydrocarbons, sulfur oxides.

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 (gas, vapor, mist, spray). 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. Isolate area.

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.

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.

Conditions for Safe Storage, Including Any Incompatibilities

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

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, halogens.

Specific End Use(s)

Industrial use.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government

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
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
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

Exposure Controls

Appropriate Engineering Controls: Gas detectors should be used when flammable gases/vapors 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
Appearance	:	Clear,colorless gas, liquefied compressed gas
Odor	:	Odorless
Odor Threshold	:	Not available
pH	:	Not available
Evaporation Rate	:	Not available
Melting Point	:	Not available
Freezing Point	:	Not available
Boiling Point	:	-89 °C (-128.20 °F)
Flash Point	:	-135 °C (-211.00 °F)
Auto-ignition Temperature	:	> 472 °C (881.60 °F)
Decomposition Temperature	:	Not available
Flammability (solid, gas)	:	Extremely flammable gas
Lower Flammable Limit	:	2.9 %
Upper Flammable Limit	:	13 %
Vapor Pressure	:	29000 mm Hg 21°C (70°F)
Relative Vapor Density at 20 °C	:	1.05 (Air = 1)
Relative Density	:	0.45
Specific Gravity	:	Not available
Solubility	:	Slightly soluble in water.
Partition Coefficient: N-octanol/water	:	1.81
Viscosity	:	Not available
Explosion Data – Sensitivity to Mechanical Impact	:	Not expected to present an explosion hazard due to mechanical impact.
Explosion Data – Sensitivity to Static Discharge	:	Static discharge could act as an ignition source.

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions.

Chemical Stability: Extremely flammable gas. Stable under recommended handling and storage conditions (see section 7).

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, halogens, chlorine.

Hazardous Decomposition Products: Carbon oxides (CO, CO2), hydrocarbons, sulfur oxides.

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:

Propane (74-98-6)	
LC50 Inhalation Rat	658 mg/l/4h
Ethane (74-84-0)	
LC50 Inhalation Rat	658 mg/l/4h

SECTION 12: ECOLOGICAL INFORMATION

Toxicity No additional information available

Persistence and Degradability

Ethane (purity)	
Persistence and Degradability	Product is biodegradable.

Bioaccumulative Potential

Ethane (purity)	
Bioaccumulative Potential	Not expected to bioaccumulate.
Propane (74-98-6)	
Log Pow	2.3
Ethane (74-84-0)	
Log Pow	<= 2.8

Mobility in Soil Not available

Other Adverse Effects

Other Adverse Effects: Can cause frost damage to vegetation.

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 DOT

Proper Shipping Name : ETHANE
Hazard Class : 2.1
Identification Number : UN1035
Label Codes : 2.1
ERG Number : 115

In Accordance with IMDG

Proper Shipping Name : ETHANE
Hazard Class : 2
Identification Number : UN1035
Label Codes : 2.1
EmS-No. (Fire) : F-D
EmS-No. (Spillage) : S-U

In Accordance with IATA

Proper Shipping Name	: ETHANE
Identification Number	: UN1035
Hazard Class	: 2
Label Codes	: 2.1
ERG Code (IATA)	: 10L

In Accordance with TDG

Proper Shipping Name	: ETHANE
Hazard Class	: 2.1
Identification Number	: 1035
Label Codes	: 2.1

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Ethane (purity)	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard

Propane (74-98-6)
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

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

US State Regulations

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
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
RTK - 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
RTK - 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
RTK - 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

Ethane (74-84-0)

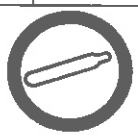
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware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

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
RTK - 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
RTK - 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

RTK - 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

Ethane (purity)	
WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas
	

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

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

Methane (74-82-8)	
Listed on the Canadian DSL (Domestic Substances List)	
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 SDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date : 11/06/2014

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. 4 (Oral)	Acute toxicity (oral) Category 4
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment - Chronic Hazard Category 1
Compressed gas	Gases under pressure Compressed gas
Flam. Gas 1	Flammable gases Category 1
Flam. Liq. 1	Flammable liquids Category 1
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
H220	Extremely flammable gas
H224	Extremely flammable liquid and vapor
H280	Contains gas under pressure; may explode if heated
H302	Harmful if swallowed
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects

Party Responsible for the Preparation of This Document

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

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.

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

OAK GROVE GAS PLANT

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[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
Point Sources						
H-01	1E	TXP1 Heat Medium Heater	tbd	26.26 MMBtu/hr	Modified	na
H-02	2E	TXP1 Regeneration Gas Heater	tbd	9.40 MMBtu/hr	Modified	na
H-03	3E	TXP2 Regeneration Gas Heater	tbd	20.30 MMBtu/hr	Modified	na
H-04	4E	TXP3 Regeneration Gas Heater	tbd	20.30 MMBtu/hr	Modified	na
H-05	5E	DeC2 Hot Oil Heater	tbd	68.33 MMBtu/hr	Modified	na
H-06	6E	DeC2 Hot Oil Heater	tbd	68.33 MMBtu/hr	Modified	na
H-07	7E	DeC2 Regeneration Gas Heater	tbd	10.44 MMBtu/hr	Modified	na
FL-1	8E	Process Flare	tbd	630.19 MMscf/yr	Modified	na
GEN-1	9E	Standby Generator	tbd	224 bhp	Modified	na
TK-1	10E	Slop Oil/Condensate Tank	tbd	400 bbl	Modified	na
TK-2	11E	Slop Oil/Condensate Tank	tbd	400 bbl	Modified	na
TK-3	12E	Slop Oil/Condensate Tank	tbd	400 bbl	Modified	na
TK-4	13E	Slop Oil/Condensate Tank	tbd	400 bbl	Modified	na
TL-1	14E	Truck Load-Out - Slop Oil/Condensate	tbd	4,000,000 gal/yr	Modified	na
V-01	16E	Amine Process Unit Vent	tbd	44,000 bbl/day	Modified	FL-1
RPC	17E	Rod Packing - Reciprocating Compressors	tbd	3 Recips	Modified	na
DGS	18E	Dry Gas Seals - Centrifugal Compressors	tbd	8 Centrifugal	Modified	na
Fugitive Sources						
FUG-G	15E	Piping and Equipment Fugitives - Gas	tbd	---	Modified	LDAR
FUG-L	15E	Piping and Equipment Fugitives - Light Liquid	tbd	---	Modified	LDAR

[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.

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

45CSR13 NSR – Modification Permit

Attachment I

EMISSION UNITS TABLE - Continued

(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[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
Insignificant Sources (Miscellaneous Tanks)						
---	---	00-V-823 Common Closed Drain Vessel	2014	2,200 gal	Existing	na
---	---	00-V-817 Flare Knockout Vessel	2014	25,000 gal	Existing	na
---	---	21-ST-810 Lube Oil Day Tank	2014	300 gal	Existing	na
---	---	21-V-809 Closed Drain Vessel	2014	4,500 gal	Existing	na
---	---	21-V-701 Hot Oil Surge Tank	2014	2,300 gal	Existing	na
---	---	21-V-828 De-Ethanizer Surge Tank	2014	70,000 gal	Existing	na
---	---	21-ST-801 De-Ionized Water Storage Tank	2014	16,800 gal	Existing	na
---	---	21-ST-802 Amine Storage Tank	2014	4,200 gal	Existing	na
---	---	21-ST-803 Raw Regen Water Storage Tank	2014	16,800 gal	Existing	na
---	---	21-ST-806 Used Amine Storage Tank	2014	25,000 gal	Existing	na
---	---	21-HTR-703 Hot Oil Heater	2014	2,662 gal	Existing	na
---	---	21-HTR-704 Hot Oil Heater	2014	2,662 gal	Existing	na
---	---	31-ST-980 Lube Oil Day Tank	2014	300 gal	Existing	na
---	---	32-ST-980 Lube Oil Day Tank	2014	300 gal	Existing	na
---	---	31-V-801 Feed Separator	2014	1,700 gal	Existing	na
---	---	32-V-801 Feed Separator	2014	1,700 gal	Existing	na
---	---	01-ST-863 Residue Compressor Lube Oil	2014	335 gal	Existing	na
---	---	01-ST-884 Turbo Expander Bullet Tank	2014	60 gal	Existing	na
---	---	01-V-868 Closed Drain Vessel	2014	370 gal	Existing	na
---	---	01-V-403 Cold Drain Tank	2014	3,500 gal	Existing	na
---	---	01-V-860 Inlet Gas Separator	2014	380 gal	Existing	na
---	---	01-V-402 Cold Separator	2014	7,500 gal	Existing	na
---	---	Diesel tank	2014	500 gal	Existing	na
---	---	Gasoline tank	2014	500 gal	Existing	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**
  - TXP1 Heat Medium Heater (H-01 (1E))
  - TXP1 Regeneration Gas Heater (H-02 (2E))
  - TXP2 Regeneration Gas Heater (H-03 (3E))
  - TXP3 Regeneration Gas Heater (H-04 (4E))
  - De-Ethanizer Hot Oil Heater (H-05 (5E))
  - De-Ethanizer Hot Oil Heater (H-06 (6E))
  - Amine Process Regeneration Gas Heater (H-07 (7E))
  - Process Flare (FL-1 (8E))
  - Standby Generator Engine (Gen-1 (9E))
  - Slop Oil/Condensate Storage Tanks (T-01 (10E) thru T-04 (13E))
  - Truck Load-Out (TL-1 (14E))
  - Amine Process Vent (V-01 (16E))
  - Rod Packing/Crankcase Leaks (RPC (17E))
  - Dry Gas Seal Leaks (DGS (18E))
  - Total Plant-Wide (Including Fugitives)
- **Table 2 – Release Parameter Data**

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
H-01 (1E)	**TXP1 Heat Medium Heater (H-01 (1E))**														
	Upward Vertical Stack	H-01 (1E)	H-01 (1E)	na	na	C	8,760	NOX	2.57	11.28	2.57	11.28	Gas	AP-42	
								CO	2.16	9.47	2.16	9.47	Gas	AP-42	
								VOC	0.15	0.64	0.15	0.64	Gas	AP-42	
								SO2	0.02	0.07	0.02	0.07	Gas	AP-42	
								PM10/2.5	0.20	0.86	0.20	0.86	Solid/Gas	AP-42	
								Benzene	5.4E-05	2.4E-04	5.4E-05	2.4E-04	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	1.9E-03	0.01	1.9E-03	0.01	Gas	AP-42	
								n-Hexane	0.05	0.20	0.05	0.20	Gas	AP-42	
								Toluene	8.8E-05	3.8E-04	8.8E-05	3.8E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	4.9E-05	2.1E-04	4.9E-05	2.1E-04	Gas	AP-42	
								Total HAP	0.05	0.21	0.05	0.21	Gas	AP-42	
								CO2e	3,225	14,125	3,225	14,125	Gas	EPA	
H-02 (2E)	**TXP1 Regen Gas Heater (H-02 (2E))**														
	Upward Vertical Stack	H-02 (2E)	H-02 (2E)	na	na	C	8,760	NOX	0.92	4.04	0.92	4.04	Gas	AP-42	
								CO	0.77	3.39	0.77	3.39	Gas	AP-42	
								VOC	0.05	0.23	0.05	0.23	Gas	AP-42	
								SO2	0.01	0.02	0.01	0.02	Gas	AP-42	
								PM10/2.5	0.07	0.31	0.07	0.31	Solid/Gas	AP-42	
								Benzene	1.9E-05	8.5E-05	1.9E-05	8.5E-05	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	6.9E-04	0.00	6.9E-04	0.00	Gas	AP-42	
								n-Hexane	0.02	0.07	0.02	0.07	Gas	AP-42	
								Toluene	3.1E-05	1.4E-04	3.1E-05	1.4E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	1.7E-05	7.7E-05	1.7E-05	7.7E-05	Gas	AP-42	
								Total HAP	0.02	0.08	0.02	0.08	Gas	AP-42	
								CO2e	1,154	5,056	1,154	5,056	Gas	EPA	

Williams Ohio Valley Midstream LLC
Williams Ohio Valley Midstream LLC

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
H-03 (3E)	**TXP2 Regen Gas Heater (H-03 (3E))**														
	Upward Vertical Stack	H-03 (3E)	H-03 (3E)	na	na	C	8,760	NOX	0.73	3.20	0.73	3.20	Gas	Vendor	30
								CO	0.81	3.56	0.81	3.56	Gas	Vendor	50
								VOC	0.39	1.69	0.39	1.69	Gas	Vendor	15
								SO2	0.01	0.05	0.01	0.05	Gas	AP-42	
								PM10/2.5	0.26	1.16	0.26	1.16	Solid/Gas	Vendor	15
								Benzene	4.2E-05	1.8E-04	4.2E-05	1.8E-04	Gas	AP-42	
								Ethylbenzene	—	—	—	—	Gas	AP-42	
								HCHO	1.5E-03	0.01	1.5E-03	0.01	Gas	AP-42	
								n-Hexane	0.04	0.16	0.04	0.16	Gas	AP-42	
								Toluene	6.8E-05	3.0E-04	6.8E-05	3.0E-04	Gas	AP-42	
								2,2,4-TMP	—	—	—	—	Gas	AP-42	
								Xylenes	—	—	—	—	Gas	AP-42	
								Other HAP	3.8E-05	1.7E-04	3.8E-05	1.7E-04	Gas	AP-42	
								Total HAP	0.04	0.16	0.04	0.16	Gas	AP-42	
								CO2e	2,380	10,422	2,380	10,422	Gas	EPA	
H-04 (4E)	**TXP3 Regen Gas Heater (H-04 (4E))**														
	Upward Vertical Stack	H-04 (4E)	H-04 (4E)	na	na	C	8,760	NOX	0.73	3.20	0.73	3.20	Gas	Vendor	30
								CO	0.81	3.56	0.81	3.56	Gas	Vendor	50
								VOC	0.39	1.69	0.39	1.69	Gas	Vendor	15
								SO2	0.01	0.05	0.01	0.05	Gas	AP-42	
								PM10/2.5	0.26	1.16	0.26	1.16	Solid/Gas	Vendor	15
								Benzene	4.2E-05	1.8E-04	4.2E-05	1.8E-04	Gas	AP-42	
								Ethylbenzene	—	—	—	—	Gas	AP-42	
								HCHO	1.5E-03	0.01	1.5E-03	0.01	Gas	AP-42	
								n-Hexane	0.04	0.16	0.04	0.16	Gas	AP-42	
								Toluene	6.8E-05	3.0E-04	6.8E-05	3.0E-04	Gas	AP-42	
								2,2,4-TMP	—	—	—	—	Gas	AP-42	
								Xylenes	—	—	—	—	Gas	AP-42	
								Other HAP	3.8E-05	1.7E-04	3.8E-05	1.7E-04	Gas	AP-42	
								Total HAP	0.04	0.16	0.04	0.16	Gas	AP-42	
								CO2e	2,380	10,422	2,380	10,422	Gas	EPA	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
H-05 (5E)	**De-Ethanizer Hot Oil Heater (H-05 (5E))**														
	Upward Vertical Stack	H-05 (5E)	H-05 (5E)	na	na	C	8,760	NOX	2.46	10.77	2.46	10.77	Gas	Vendor	30
								CO	2.53	11.07	2.53	11.07	Gas	Vendor	50
								VOC	0.38	1.67	0.38	1.67	Gas	AP-42	
								SO2	0.04	0.18	0.04	0.18	Gas	AP-42	
								PM10/2.5	0.51	2.23	0.51	2.23	Solid/Gas	AP-42	
								Benzene	1.4E-04	6.2E-04	1.4E-04	6.2E-04	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	5.0E-03	0.02	5.0E-03	0.02	Gas	AP-42	
								n-Hexane	0.12	0.53	0.12	0.53	Gas	AP-42	
								Toluene	2.3E-04	1.0E-03	2.3E-04	1.0E-03	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	1.3E-04	5.6E-04	1.3E-04	5.6E-04	Gas	AP-42	
								Total HAP	0.13	0.55	0.13	0.55	Gas	AP-42	
								CO2e	8,390	36,749	8,390	36,749	Gas	EPA	
H-06 (6E)	**De-Ethanizer Hot Oil Heater (H-06 (6E))**														
	Upward Vertical Stack	H-06 (6E)	H-06 (6E)	na	na	C	8,760	NOX	2.46	10.77	2.46	10.77	Gas	Vendor	30
								CO	2.53	11.07	2.53	11.07	Gas	Vendor	50
								VOC	0.38	1.67	0.38	1.67	Gas	AP-42	
								SO2	0.04	0.18	0.04	0.18	Gas	AP-42	
								PM10/2.5	0.51	2.23	0.51	2.23	Solid/Gas	AP-42	
								Benzene	1.4E-04	6.2E-04	1.4E-04	6.2E-04	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	5.0E-03	0.02	5.0E-03	0.02	Gas	AP-42	
								n-Hexane	0.12	0.53	0.12	0.53	Gas	AP-42	
								Toluene	2.3E-04	1.0E-03	2.3E-04	1.0E-03	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	1.3E-04	5.6E-04	1.3E-04	5.6E-04	Gas	AP-42	
								Total HAP	0.13	0.55	0.13	0.55	Gas	AP-42	
								CO2e	8,390	36,749	8,390	36,749	Gas	EPA	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
H-07 (7E)	Amine Process Regen Gas Heater (H-07 (7E))														
	Upward Vertical Stack	H-07 (7E)	H-07 (7E)	na	na	C	8,760	NOX	1.02	4.48	1.02	4.48	Gas	AP-42	
								CO	0.86	3.77	0.86	3.77	Gas	AP-42	
								VOC	0.06	0.25	0.06	0.25	Gas	AP-42	
								SO2	0.01	0.03	0.01	0.03	Gas	AP-42	
								PM10/2.5	0.08	0.34	0.08	0.34	Solid/Gas	AP-42	
								Benzene	2.1E-05	9.4E-05	2.1E-05	9.4E-05	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	AP-42	
								HCHO	7.7E-04	0.00	7.7E-04	3.4E-03	Gas	AP-42	
								n-Hexane	0.02	0.08	0.02	0.08	Gas	AP-42	
								Toluene	3.5E-05	1.5E-04	3.5E-05	1.5E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	---	---	---	---	Gas	AP-42	
								Other HAP	1.9E-05	8.5E-05	1.9E-05	8.5E-05	Gas	AP-42	
								Total HAP	0.02	0.08	0.02	0.08	Gas	AP-42	
								CO2e	1,282	5,616	1,282	5,616	Gas	EPA	
FL-1 (8E)	Process Flare (FL-1 (8E))														
	Upward Vertical Stack	FL-1 (8E)	FL-1 (8E)	na	na	C	8,760	NOX	---	---	641.06	73.27	Gas	AP-42	
								CO	---	---	1,279.80	146.27	Gas	AP-42	
								VOC	17,811	2,035.65	178.11	20.36	Gas	AP-42	
								SO2	---	---	1.57	0.19	Gas	AP-42	
								PM10/2.5	---	---	19.95	2.39	Solid/Gas	AP-42	
								Benzene	451	52	4.5E+00	5.2E-01	Gas	AP-42	
								Ethylbenzene	612.01	69.95	6.12	0.70	Gas	AP-42	
								HCHO	---	---	3.4E-01	0.04	Gas	AP-42	
								n-Hexane	550.81	62.95	5.51	0.63	Gas	AP-42	
								Toluene	533	61	5.3E+00	6.1E-01	Gas	AP-42	
								2,2,4-TMP	658.50	75.26	6.58	0.75	Gas	AP-42	
								Xylenes	612.59	70.02	6.13	0.70	Gas	AP-42	
								Other HAP	---	---	8.6E-03	9.9E-04	Gas	AP-42	
								Total HAP	3,417.47	390.60	34.52	3.95	Gas	AP-42	
								CO2e	545,188	62,312	910,502	104,065	Gas	EPA	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
Gen-1 (9E)	**Standby Generator Engine (Gen-1 (9E))**							NOX	0.99	4.33	0.99	0.25	Gas	AP-42	
								CO	1.98	8.65	1.98	0.49	Gas	AP-42	
								VOC	0.54	2.36	0.54	0.13	Gas	AP-42	
								SO2	1.3E-03	0.01	1.3E-03	3.2E-04	Gas	AP-42	
								PM10/2.5	0.04	0.19	0.04	0.01	Solid/Gas	AP-42	
								Benzene	3.5E-03	0.02	3.5E-03	8.7E-04	Gas	AP-42	
								Ethylbenzene	5.4E-05	2.4E-04	5.4E-05	1.4E-05	Gas	AP-42	
								HCHO	0.04	0.20	0.04	0.01	Gas	AP-42	
								n-Hexane	---	---	---	---	Gas	AP-42	
	Upward Vertical Stack	Gen-1 (9E)	Gen-1 (9E)	na	na	Intermit-tent Venting (As Needed)	500	Toluene	1.2E-03	0.01	1.2E-03	3.1E-04	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	AP-42	
								Xylenes	4.3E-04	1.9E-03	4.3E-04	1.1E-04	Gas	AP-42	
								Other HAP	0.02	0.09	0.02	0.01	Gas	AP-42	
								Total HAP	0.07	0.31	0.07	0.02	Gas	AP-42	
								CO2e	317	1,388	317	79	Gas	EPA	
T-01 (10E) thru T-04 (13E)	**Slop Oil/Condensate Storage Tanks (T-01 (10E) thru T-04 (13E))**							NOX	---	---	---	---	---	---	
								CO	---	---	---	---	---	---	
								VOC	4.33	18.96	4.33	18.96	Gas	AP-42	
								SO2	---	---	---	---	---	---	
								PM10/2.5	---	---	---	---	---	---	
								Benzene	0.14	0.63	0.14	0.63	Gas	AP-42	
								Ethylbenzene	0.14	0.63	0.14	0.63	Gas	AP-42	
								HCHO	---	---	---	---	---	---	
								n-Hexane	0.14	0.63	0.14	0.63	Gas	AP-42	
	Upward Vertical Stack	T-01 (10E) thru T-04 (13E)	T-01 (10E) thru T-04 (13E)	na	na	C	8,760	Toluene	0.14	0.63	0.14	0.63	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	---	---	
								Xylenes	0.14	0.63	0.14	0.63	Gas	AP-42	
								Other HAP	---	---	---	---	---	---	
								Total HAP	0.87	3.79	0.87	3.79	Gas	AP-42	
								CO2e	---	---	---	---	---	---	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
TL-1 (14E)	**Truck Load-Out (TL-1 (14E))**							NOX	—	—	—	—	—	—	
								CO	—	—	—	—	—	—	
								VOC	—	18.09	—	18.09	Gas	AP-42	
								SO2	—	—	—	—	—	—	
								PM10/2.5	—	—	—	—	—	—	
								Benzene	—	0.60	—	0.60	Gas	AP-42	
								Ethylbenzene	—	0.60	—	0.60	Gas	AP-42	
								HCHO	—	—	—	—	—	—	
								n-Hexane	—	0.60	—	0.60	Gas	AP-42	
	Upward Vertical Stack	TL-1 (14E)	TL-1 (14E)	na	na	Intermit-tent Venting (As Needed)	—	Toluene	—	0.60	—	0.60	Gas	AP-42	
								2,2,4-TMP	—	—	—	—	—	—	
								Xylenes	—	0.60	—	0.60	Gas	AP-42	
								Other HAP	—	—	—	—	—	—	
								Total HAP	—	3.62	—	3.62	Gas	AP-42	
								CO2e	—	—	—	—	—	—	
V-01 (16E)	**Amine Process Vent (V-01 (16E))**							NOX	—	—	—	—	—	—	
								CO	—	—	—	—	—	—	
								VOC	0.11	0.49	0.11	0.49	Gas	EE	
								SO2	—	—	—	—	—	—	
								PM10/2.5	—	—	—	—	—	—	
								Benzene	—	—	—	—	—	—	
								Ethylbenzene	—	—	—	—	—	—	
								HCHO	—	—	—	—	—	—	
								n-Hexane	—	—	—	—	—	—	
	Upward Vertical Stack	V-01 (16E)	V-01 (16E)	na	na	C	8,760	Toluene	—	—	—	—	—	—	
								2,2,4-TMP	—	—	—	—	—	—	
								Xylenes	—	—	—	—	—	—	
								Other HAP	—	—	—	—	—	—	
								Total HAP	—	—	—	—	—	—	
								CO2e	4,738	20,751	4,738	20,751	Gas	EPA	

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Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
RPC (17E)	Rod Packing/Crankcase Leaks (RPC (17E))														
	na	RPC (17E)	Compressors and Engines	na	na	C	8,760	NOX	—	—	—	—	—	—	
								CO	—	—	—	—	—	—	
								VOC	0.17	0.30	0.17	0.30	Gas	EE	
								SO2	—	—	—	—	—	—	
								PM10/2.5	—	—	—	—	—	—	
								Benzene	2.4E-03	6.1E-04	2.4E-03	6.1E-04	Gas	EE	
								Ethylbenzene	2.4E-03	6.1E-04	2.4E-03	6.1E-04	Gas	EE	
								HCHO	—	—	—	—	—	—	
								n-Hexane	2.4E-03	6.1E-04	2.4E-03	6.1E-04	Gas	EE	
								Toluene	2.4E-03	6.1E-04	2.4E-03	6.1E-04	Gas	EE	
								2,2,4-TMP	2.4E-03	6.1E-04	2.4E-03	6.1E-04	—	—	
								Xylenes	2.4E-03	6.1E-04	2.4E-03	6.1E-04	Gas	EE	
								Other HAP	—	—	—	—	—	—	
								Total HAP	0.01	3.7E-03	1.5E-02	3.7E-03	Gas	EE	
								CO2e	394	1,454	394	1,454	Gas	EE	
DGS (18E)	Dry Gas Seal Leaks (DGS (18E))														
	na	DGS (18E)	Centrifugal Compressors	na	na	C	8,760	NOX	—	—	—	—	—	—	
								CO	—	—	—	—	—	—	
								VOC	0.76	3.33	0.76	3.33	Gas	EE	
								SO2	—	—	—	—	—	—	
								PM10/2.5	—	—	—	—	—	—	
								Benzene	1.9E-03	0.01	1.9E-03	0.01	Gas	EE	
								Ethylbenzene	1.9E-03	0.01	1.9E-03	0.01	Gas	EE	
								HCHO	—	—	—	—	—	—	
								n-Hexane	1.9E-03	0.01	1.9E-03	0.01	Gas	EE	
								Toluene	1.9E-03	0.01	1.9E-03	0.01	Gas	EE	
								2,2,4-TMP	1.9E-03	0.01	1.9E-03	0.01	Gas	—	
								Xylenes	1.9E-03	0.01	1.9E-03	0.01	Gas	EE	
								Other HAP	—	—	—	—	—	—	
								Total HAP	0.24	1.05	1.1E-02	0.05	Gas	EE	
								CO2e	347	1,522	347	1,522	Gas	EE	

Attachment J
EMISSION POINTS DATA SUMMARY SHEET - Continued

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 Concen-tration[7] *(ppmv or mg/m³)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
Varies							Varies	NOX	11.89	52.07	650.01	121.26	Gas	Varies	
	Total Plant-Wide (Including Fugitives)							CO	12.45	54.54	1,286.38	192.66	Gas	Varies	
								VOC	17,766	2,212.34	198.43	112.00	Gas	Varies	
								SO2	0.13	0.58	1.67	0.76	Gas	Varies	
								PM10/2.5	1.93	8.46	21.43	10.68	Solid/Gas	Varies	
								Benzene	449.15	53.10	4.66	1.86	Gas	Varies	
								Ethylbenzene	609.42	71.49	6.26	2.04	Gas	Varies	
								HCHO	0.06	0.27	0.40	0.12	Gas	Varies	
								n-Hexane	549	66	6.05	3.70	Gas	Varies	
								Toluene	530.32	62.42	5.47	1.96	Gas	Varies	
								2,2,4-TMP	655.54	75.57	6.58	0.86	Gas	Varies	
								Xylenes	611.40	71.72	6.28	2.05	Gas	Varies	
								Other HAP	0.02	0.09	0.03	0.01	Gas	Varies	
								Total HAP	3,405	403	35.89	13.84	Gas	Varies	
								CO2e	576,449	209,944	939,572	248,128	Gas	Varies	

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

OAK GROVE GAS PLANT

45CSR13 NSR – Modification Permit

Attachment J

EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 2: Release Parameter Data

Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (oF)	Volumetric Flow[1] (acfm) *(At operating conditions)*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height[2] *(Release height of emissions above ground level)*	Northing	Easting
1E	3.5	750	14,098	24.4	~ 1,150	19	4,414.07	525.79
2E	2.5	830	5,737	19.5	~ 1,150	16.5	4,414.07	525.79
3E	2.5	520	7,208	24.5	~ 1,150	26.3	4,414.07	525.79
4E	2.5	520	7,208	24.5	~ 1,150	26.3	4,414.07	525.79
5E	4.0	476	22,893	31.0	~ 1,150	24.8	4,414.07	525.79
6E	4.0	476	22,893	31.0	~ 1,150	24.8	4,414.07	525.79
7E	2.5	714	3,916	13.3	~ 1,150	16.5	4,414.07	525.79
8E	2.0	1,000	70	1	~ 1,150	170	4,414.07	525.79
9E	0.5	1,550	1,507 (scfm)	na	~ 1,150	10	4,414.07	525.79
10E	---	---	---	---	~ 1,150	---	4,414.07	525.79
11E	---	---	---	---	~ 1,150	---	4,414.07	525.79
12E	---	---	---	---	~ 1,150	---	4,414.07	525.79
13E	---	---	---	---	~ 1,150	---	4,414.07	525.79
14E	---	---	---	---	~ 1,150	---	4,414.07	525.79
16E	---	---	---	---	~ 1,150	---	4,414.07	525.79
17E	---	---	---	---	~ 1,150	---	4,414.07	525.79
18E	---	---	---	---	~ 1,150	---	4,414.07	525.79

[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**

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

45CSR13 NSR – Modification Permit

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not 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 ((Note: Truck Load-Out (TL-1 (14E)) is included in the Point Source Emissions)) ☑ If Yes, then complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☑ **Yes** ☐ No ☑ **If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS DATA SHEET.**
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form. If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

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	**((Note: Truck Load-Out (TL-1 (14E)) is included in the Point Source Emissions))**					
Wastewater Treatment	na	---	---	---	---	---
Process and Piping Fugitives (FUG-G (15E) and FUG-L (15E) (Total Combined)	**VOC**	**28.58**	**125.17**	**13.43**	**42.50**	**O - AP-42**
	Benzene	**0.07**	**0.29**	**0.02**	**0.10**	**O - AP-42**
	E-Benzene	**0.07**	**0.29**	**0.02**	**0.10**	**O - AP-42**
	n-Hexane	**0.07**	**0.29**	**0.02**	**0.10**	**O - AP-42**
	Toluene	**0.07**	**0.29**	**0.02**	**0.10**	**O - AP-42**
	2,2,4-TMP	**0.07**	**0.29**	**0.02**	**0.10**	**O - AP-42**
	Xylenes	**0.07**	**0.29**	**0.02**	**0.10**	**O - AP-42**
	Other HAP	**---**	**---**	**---**	**---**	**---**
	Total HAP	**0.40**	**1.75**	**0.14**	**0.59**	**O - AP-42**
	CO2e	**772**	**3,380**	**255**	**1118**	**O - GWP**
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).

FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued

LEAK SOURCE DATA SHEET					
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]	140	140/0/0/0/0/0 na	≤ 5	10,857
	Heavy Liquid VOC[8]	---	---	---	---
	Non-VOC[9]	---	---	---	---
Valves[10]	Gas VOC	3,550	3,550/0/0/0/0/0 na	≤ 5	9,633
	Light Liquid VOC	1,775	1,775/0/0/0/0/0 na	≤ 5	13,712
	Heavy Liquid VOC	---	---	---	---
	Non-VOC	---	---	---	---
Safety Relief Valves[11]	Gas VOC	See "Other"	---	---	---
	Light Liquid VOC	See "Other"	---	---	---
	Non-VOC	---	---	---	---
Open Ended Lines[12]	Gas VOC	166	166/0/0/0/0/0 na	≤ 5	1,540
	Light Liquid VOC	83	83/0/0/0/0/0 na	≤ 5	2,244
	Non-VOC	---	---	---	---
Sampling Connections[13]	Gas VOC	See "Open Ended Lines"	---	---	---
	Light Liquid VOC	See "Open Ended Lines"	---	---	---
	Non-VOC	---	---	---	---
Compressors	Gas VOC	See "Other"	---	---	---
	Non-VOC	---	---	---	---
Flanges	Gas VOC	6,372	6,372/0/0/0/0/0 na	≤ 5	11,527
	Light Liquid VOC	3,186	3,186/0/0/0/0/0 na	≤ 5	6,768
	Non-VOC	---	---	---	---
Other (Connectors)	Gas VOC	5,010	5,010/0/0/0/0/0 na	≤ 5	9,907
	Light Liquid VOC	2,505	2,505/0/0/0/0/0 na	≤ 5	18,816
	Non-VOC	---	---	---	---
				TOTAL (lb/yr)	**85,005**
				TOTAL (tpy)	**42.50**

Attachment K
FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued

Notes for Leak Source Data Sheet

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

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

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

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

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

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

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

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

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

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

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

11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or ifthe 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."

- **HEATER DATA SHEET**
  - TXP1 Heat Medium Heater (H-01 (1E))
  - TXP1 Regeneration Gas Heater (H-02 (2E))
  - TXP2 and TXP3 Regeneration Gas Heaters (H-03 (3E) and H-04 (4E))
  - De-Ethanizer Hot Oil Heaters (H-05 (5E) and H-06 (6E))
  - Amine Process Regeneration Gas Heater (H-07 (7E))
- **EMERGENCY GENERATOR ENGINE DATA SHEET (GEN-1 (9E))**
- **STORAGE TANK DATA SHEET**
- **BULK LIQUID TRANSFER OPERATIONS (TL-1)**

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): **H-01 (1E)**

1. Name or type and model of proposed affected source: **TXP1 HEAT MEDIUM HEATER (H-01 (1E))**
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: **26.26 MMBTU/HR NATURAL GAS-FIRED HEAT MEDIUM HEATER**
4. Name(s) and maximum amount of proposed material(s) produced per hour: **26.26 MMBTU/HR NATURAL GAS-FIRED HEAT MEDIUM HEATER**
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: **NA**

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

6. Combustion Data (if applicable):

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

26.26 MMBTU/HR NATURAL GAS-FIRED HEAT MEDIUM HEATER

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

COMMERCIAL NATURAL GAS W/ NEGLIGIBLE SULFUR AND ASH

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

@ °F and psia.

(d) Percent excess air: **5%**

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

26.26 MMBTU/HR NATURAL GAS-FIRED HEAT MEDIUM HEATER

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

NA

(g) Proposed maximum design heat input: **26.26** $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

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

a.	NO_X	2.57	lb/hr	--- grains/ACF
b.	SO_2	0.02	lb/hr	--- grains/ACF
c.	CO	2.16	lb/hr	--- grains/ACF
d.	PM_{10}	0.20	lb/hr	--- grains/ACF
e.	Hydrocarbons	0.25	lb/hr	--- grains/ACF
f.	VOCs	0.15	lb/hr	--- grains/ACF
g.	Pb	NA	lb/hr	--- grains/ACF
h.	Specify other(s)			
	N-HEXANE	0.05	lb/hr	--- grains/ACF
	TOTAL HAP	0.05	lb/hr	--- grains/ACF
	CO2E	3,225	lb/hr	--- grains/ACF
			lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
FUEL CONSUMPTION	**FUEL CONSUMPTION**
REPORTING	TESTING
NA	**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 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 L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): **H-02 (2E)**

1. Name or type and model of proposed affected source: **TXP1 REGENERATION GAS HEATER (H-02 (2E))**
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: **9.40 MMBTU/HR NATURAL GAS-FIRED REGENERATION GAS HEATER**
4. Name(s) and maximum amount of proposed material(s) produced per hour: **9.40 MMBTU/HR NATURAL GAS-FIRED REGENERATION GAS HEATER**
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: **NA**

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

6. Combustion Data (if applicable):

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

9.40 MMBTU/HR NATURAL GAS-FIRED REGENERATION GAS HEATER

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

COMMERCIAL NATURAL GAS W/ NEGLIGIBLE SULFUR AND ASH

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

@ °F and psia.

(d) Percent excess air: **5%**

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

9.40 MMBTU/HR NATURAL GAS-FIRED REGENERATION GAS HEATER

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

NA

(g) Proposed maximum design heat input: **9.40** $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

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

a.	NO_X	0.92	lb/hr	---	grains/ACF
b.	SO_2	0.01	lb/hr	---	grains/ACF
c.	CO	0.77	lb/hr	---	grains/ACF
d.	PM_{10}	0.07	lb/hr	---	grains/ACF
e.	Hydrocarbons	0.08	lb/hr	---	grains/ACF
f.	VOCs	0.05	lb/hr	---	grains/ACF
g.	Pb	NA	lb/hr	---	grains/ACF
h.	Specify other(s)				
	N-HEXANE	0.02	lb/hr	---	grains/ACF
	TOTAL HAP	0.02	lb/hr	---	grains/ACF
	CO2E	1,154	lb/hr	---	grains/ACF
			lb/hr		grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
FUEL CONSUMPTION	**FUEL CONSUMPTION**
REPORTING	TESTING
NA	**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 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 L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): **H-03 (3E) AND H-04 (4E)**

1. Name or type and model of proposed affected source: **TXP2 AND TXP3 REGEN GAS HEATER (H-03 (3E) AND H-04 (4E))**
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: **20.30 MMBTU/HR NATURAL GAS-FIRED REGEN GAS HEATERS (EACH)**
4. Name(s) and maximum amount of proposed material(s) produced per hour: **20.30 MMBTU/HR NATURAL GAS-FIRED REGEN GAS HEATER (EACH)**
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: **NA**

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

6. Combustion Data (if applicable):

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

20.30 MMBTU/HR NATURAL GAS-FIRED REGEN GAS HEATER (EACH)

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

COMMERCIAL NATURAL GAS W/ NEGLIGIBLE SULFUR AND ASH

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

@ °F and psia.

(d) Percent excess air: **5%**

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

20.30 MMBTU/HR NATURAL GAS-FIRED REGEN GAS HEATER (EACH)

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

NA

(g) Proposed maximum design heat input: **20.30** $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

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

a. NO_X	0.73	lb/hr	---	grains/ACF
b. SO_2	0.01	lb/hr	---	grains/ACF
c. CO	0.81	lb/hr	---	grains/ACF
d. PM_{10}	0.26	lb/hr	---	grains/ACF
e. Hydrocarbons	0.50	lb/hr	---	grains/ACF
f. VOCs	0.39	lb/hr	---	grains/ACF
g. Pb	NA	lb/hr	---	grains/ACF
h. Specify other(s)				
N-HEXANE	0.04	lb/hr	---	grains/ACF
TOTAL HAP	0.04	lb/hr	---	grains/ACF
CO2E	2,380	lb/hr	---	grains/ACF
		lb/hr		grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
FUEL CONSUMPTION	**FUEL CONSUMPTION**
REPORTING	TESTING
NA	**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 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 L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): **H-05 (5E) AND H-06 (6E)**

1. Name or type and model of proposed affected source: **DE-ETHANIZER HOT OIL HEATERS (H-05 (5E) AND H-06 (6E))**
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: **68.33 MMBTU/HR NATURAL GAS-FIRED HOT OIL HEATERS (EACH)**
4. Name(s) and maximum amount of proposed material(s) produced per hour: **68.33 MMBTU/HR NATURAL GAS-FIRED HOT OIL HEATERS (EACH)**
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: **NA**

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

6. Combustion Data (if applicable):

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

68.33 MMBTU/HR NATURAL GAS-FIRED HOT OIL HEATERS (EACH)

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

COMMERCIAL NATURAL GAS W/ NEGLIGIBLE SULFUR AND ASH

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

@ °F and psia.

(d) Percent excess air: **5%**

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

68.33 MMBTU/HR NATURAL GAS-FIRED HOT OIL HEATERS (EACH)

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

NA

(g) Proposed maximum design heat input: **68.33** $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

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

a.	NO_X	2.46	lb/hr	---	grains/ACF
b.	SO_2	0.04	lb/hr	---	grains/ACF
c.	CO	2.53	lb/hr	---	grains/ACF
d.	PM_{10}	0.51	lb/hr	---	grains/ACF
e.	Hydrocarbons	0.50	lb/hr	---	grains/ACF
f.	VOCs	0.38	lb/hr	---	grains/ACF
g.	Pb	NA	lb/hr	---	grains/ACF
h.	Specify other(s)				
	N-HEXANE	0.12	lb/hr	---	grains/ACF
	TOTAL HAP	0.13	lb/hr	---	grains/ACF
	CO2E	8,390	lb/hr	---	grains/ACF
			lb/hr		grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
FUEL CONSUMPTION	**FUEL CONSUMPTION**
REPORTING	TESTING
NA	**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 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 L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): **H-07 (7E)**

1. Name or type and model of proposed affected source:

   AMINE PROCESS REGENERATION GAS HEATER

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   10.44 MMBTU/HR NATURAL GAS-FIRED REGERATION GAS HEATER

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   10.44 MMBTU/HR NATURAL GAS-FIRED REGERATION GAS HEATER

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   NA

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

6. Combustion Data (if applicable):

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

10.44 MMBTU/HR NATURAL GAS-FIRED REGERATION GAS HEATER

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

COMMERCIAL NATURAL GAS W/ NEGLIGIBLE SULFUR AND ASH

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

@ °F and psia.

(d) Percent excess air: **5%**

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

10.44 MMBTU/HR NATURAL GAS-FIRED REGERATION GAS HEATER

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

NA

(g) Proposed maximum design heat input: **10.44** $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

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

a.	NO_X	1.02	lb/hr	---	grains/ACF
b.	SO_2	0.03	lb/hr	---	grains/ACF
c.	CO	0.86	lb/hr	---	grains/ACF
d.	PM_{10}	0.08	lb/hr	---	grains/ACF
e.	Hydrocarbons	0.10	lb/hr	---	grains/ACF
f.	VOCs	0.06	lb/hr	---	grains/ACF
g.	Pb	NA	lb/hr	---	grains/ACF
h.	Specify other(s)				
	N-HEXANE	0.02	lb/hr	---	grains/ACF
	TOTAL HAP	0.02	lb/hr	---	grains/ACF
	CO2E	1,282	lb/hr	---	grains/ACF
			lb/hr		grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
FUEL CONSUMPTION	**FUEL CONSUMPTION**
REPORTING	TESTING
NA	**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 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

Williams Ohio Valley Midstream LLC

OAK GROVE GAS PLANT

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Attachment L

EMERGENCY GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		GEN-1 (9E)					
Engine Manufacturer and Model		Olympian G150LG2					
Manufacturer's Rated bhp/rpm		224 / 1,800					
Source Status[2]		ES					
Date Installed/Modified/Removed[3]		tbd					
Manufactured/Reconstruction Date[4]		> 07/01/10					
Certified Engine? (40CFR60 NSPS IIII)[5]		na					
Certified Engine? (40CFR60 NSPS JJJJ)[6]		Yes					
Engine, Fuel and Combustion Data	Engine Type[7]	RB4S					
	APCD Type[8]	---					
	Fuel Type[9]	Propane					
	H_2S (gr/100 scf)	≤ 0.25					
	Operating bhp/rpm	224 / 1,800					
	BSFC (Btu/bhp-hr)	9,794					
	Fuel (ft^3/hr)	878					
	Fuel ($MMft^3$/yr)	0.44					
	Operation (hrs/yr)	500					
Reference[10]	PTE[11]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
NSPS	NOX	0.99	0.25				
NSPS	CO	1.98	0.49				
AP	VOC	0.54	0.13				
AP	SO2	1.3E-03	3.2E-04				
AP	PM10/2.5	0.04	0.01				
AP	Benzene	3.5E-03	8.7E-04				
AP	Ethylbenzene	5.4E-05	1.4E-05				
AP	Formaldehyde	0.04	0.01				
AP	n-Hexane	---	---				
AP	Toluene	1.2E-03	3.1E-04				
AP	2,2,4-TMP	---	---				
AP	Xylenes	4.3E-04	1.1E-04				
AP	Other HAPs	0.02	0.01				
AP	Tot HAP	0.07	0.02				
AP/40CFR98	CO2e	317	79				

EMERGENCY GENERATOR ENGINE DATA SHEET

Notes to ATTACHMENT L - EMERGENCY 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)
   MS = Modification of Existing Source
   ES = 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 compression ignition internal combustion engine according to 40CFR60 Subpart IIII. 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§60.4210 as appropriate.

6. 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.

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

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

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

10. 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
   GR = GRI-HAPCalcTM
   AP = AP-42
   OT = Other (please list) _____

11. 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.

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ATTACHMENT L - STORAGE TANK DATA SHEET

Source ID	Status	Contents	Volume (gal)	Diam (ft)	Thru-Put (gal/yr)	Orientation	Ave Liq Hght (ft)
TK-1	Exist	Slop Oil (Condensate)	16,800	12.0	1,000,000	Vert	8.0
TK-2	Exist	Slop Oil (Condensate)	16,800	12.0	1,000,000	Vert	8.0
TK-3	Exist	Slop Oil (Condensate)	16,800	12.0	1,000,000	Vert	8.0
TK-4	Exist	Slop Oil (Condensate)	16,800	12.0	1,000,000	Vert	8.0
Also the following insignificant Storage Tanks:							
---	Exist	Produced Water/Oil	2,200	---	26,400	---	---
---	Exist	Produced Water/Oil	25,000	---	300,000	---	---
---	Exist	Lube Oil	300	---	3,600	---	---
---	Exist	Produced Water/Oil	4,500	---	54,000	---	---
---	Exist	Heat Medium (Oil)	2,300	---	27,600	---	---
---	Exist	21-V-828 De-Ethanizer Surge Tank	70,000	---	840,000	---	---
---	Exist	De-Ionized Water	16,800	---	201,600	---	---
---	Exist	Amine	4,200	---	50,400	---	---
---	Exist	Raw Regen Water	16,800	---	403,200	---	---
---	Exist	Used Amine	25,000	---	300,000	---	---
---	Exist	Hot Oil	2,662	---	31,944	---	---
---	Exist	Hot Oil	2,662	---	31,944	---	---
---	Exist	Lube Oil	300	---	3,600	---	---
---	Exist	Lube Oil	300	---	3,600	---	---
---	Exist	31-V-801 Feed Separator	1,700	---	20,400	---	---
---	Exist	32-V-801 Feed Separator	1,700	---	20,400	---	---
---	Exist	Lube Oil	335	---	4,020	---	---
---	Exist	01-ST-884 Turbo Expander Bullet	60	---	720	---	---
---	Exist	Produced Water/Oil	370	---	4,440	---	---
---	Exist	01-V-403 Cold Drain Tank	3,500	---	42,000	---	---
---	Exist	01-V-860 Inlet Gas Separator	380	---	4,560	---	---
---	Exist	01-V-402 Cold Separator	7,500	---	90,000	---	---
---	Exist	Diesel	500	---	6,000	---	---
---	Exist	Gasoline	500	---	6,000	---	---

Notes to STORAGE TANK DATA SHEET

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

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*): **TL-1**

1. Loading Area Name: **OAK GROVE GAS PLANT**

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		Slop Oil/Cond.					
Max. daily throughput (1000 gal/day)		10.96					
Max. annual throughput (1000 gal/yr)		40,000					
Loading Method [1]		SP					
Max. Fill Rate (gal/min)		200					
Average Fill Time (min/loading)		60					
Max. Bulk Liquid Temperature (°F)		60					
True Vapor Pressure [2]		5.0					
Cargo Vessel Condition [3]		U					
Control Equipment or Method [4]		None					
Minimum control efficiency (%)		---					
Maximum Emission Rate (VOC)	Loading (lb/hr)	27.13					
	Annual (lb/yr)	36,180					
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 Monitor volume of liquids loaded	RECORDKEEPING Maintain records of volume of liquids loaded
REPORTING na	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 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."

- **PROCESS FLARE DATA SHEET (FL-1 (8E))**

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): **PROCESS FLARE (FL-1 (8E))**

Equipment Information

1. Manufacturer: **ZEECO** Model No.	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: **208,000 LB/HR** **4,645 MMBTU/HR**	6. Dimensions of stack: Diameter **2.0 FT** Height **170 FT**
7. Estimated combustion efficiency: (Waste gas destruction efficiency) **Estimated:** **99%** **Minimum guaranteed:** **99%**	8. Fuel used in burners: ☒ **Natural Gas** ☐ Fuel Oil, Number ☐ Other, Specify:
9. Number of burners: **1** Rating: **4,645 MMBTU/HR**	11. Describe method of controlling flame: **FLAME SENSING SYSTEM (THERMOCOUPLES) WILL MONITOR THE PILOT FLAME AND AUTOMATICALLY INITIATE A RE-LIGHT PROCEDURE IN THE EVENT OF A PILOT FLAME OUTAGE**
10. Will preheat be used? ☐ Yes ☒ No	
12. Flare height: **170 FT**	14. Natural gas flow rate to flare pilot flame per pilot: **1.25 SCF/MIN** **75.00 SCF/HR**
13. Flare tip inside diameter: **2.0 FT**	
15. Number of pilot lights: **3** Total **0.24 MMBTU/HR**	16. Will automatic re-ignition be used? ☒ Yes ☐ No
17. If automatic re-ignition will be used, describe the method: **PRESENCE OF FLAME MONITORED BY THERMOCOUPLE. IN THE EVENT OF A FLAME FAILURE, THE PILOT WILL AUTOMATICALLY BE RE-LIT.**	
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: **8,760**	

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	NEGLIGIBLE	10,509 SCFH - AVE	BLOWDOWN
ETHANE	NEGLIGIBLE	57,078 SCFH - AVE	ETHANE
NGL	NEGLIGIBLE	128 SCFH - AVE	BLOWDOWN
RESIDUE GAS	NEGLIGIBLE	4,225 SCFH - AVE	PURGE/PILOT
TOTAL	NEGLIGIBLE	71,940 SCFH - AVE	

30. Estimate total combustible to flare: 5,425 LB/HR (AVE)
(Maximum mass flow rate of waste gas) 208,000 LB/HR (MAX)

31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:
71,940 SCF/HR (AVE) 2,624,950 SCF/HR (MAX) 630.19 MMSCF/YR

32. Give composition of carrier gases:
NA

33. Temperature of emission stream: °F Heating value of emission stream: 1,685 BTU/SCF (AVE) Mean molecular weight of emission stream: MW = ~28.6 LB/LB-MOLE	34. Identify and describe all auxiliary fuels to be burned. NA BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: VARIES °F	36. Flare gas flow rate: 1,199 SCFM (AVE)
37. Flare gas heat content: 1,685 BTU/SCF (AVE)	38. Flare gas exit velocity: 0.60 FT/SEC

39. Maximum rate during emergency for one major piece of equipment or process unit: 2,624,950 SCFH

40. Maximum rate during emergency for one major piece of equipment or process unit: 4,645 MMBTU/HR

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

42. Describe the collection material disposal system:
NA

43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet? YES

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

MONITORING:	RECORDKEEPING:
MONITOR PRESENCE OF A PILOT FLAME	**MAINTAIN RECORDS OF DATE AND DURATION OF PILOT FLAME OUTAGES**
REPORTING:	TESTING:
NA	**OPERATE FLARE IN ACCORDANCE WITH REQUIREMENTS OF 40CFR 60.18 (GENERAL CONTROL DEVICE REQUIREMENTS)**

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 – ASSUME 100%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
99% VOC AND HAP

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

ATTACHMENT N

Supporting Emissions Calculations

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

- **Emission Summary Spreadsheets**
  - Potential to Emit (PTE) – CRITERIA – CONTROLLED
  - Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS – CONTROLLED
  - Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – CONTROLLED
  - Potential to Emit (PTE) – PRE-CONTROLLED
- **Unit-Specific Emission Spreadsheets**
  - TXP1 Heat Medium Heater (H-01 (1E))
  - TXP1 Regeneration Gas Heater (H-02 (2E))
  - TXP2 & TXP3 Regeneration Gas Heaters (H-03 and -04 (3E and 4E))
  - De-Ethanizer Hot Oil Heaters (H-05 and -06 (5E and 6E))
  - De-Ethanizer Regeneration Gas Heaters (H-07 (7E))
  - Process Flare (FL-1 (8E))
  - Standby Generator Engine (500 hr/yr) (GEN-1 (9E))
  - Slop Oil/Condensate Storage Tanks (TK-01 thru -04 (10E thru 13E))
  - Slop Oil/Condensate Truck Load-Out (TL-1 (14E))
  - Amine Process Unit Vent (V-01 (16E))
  - Rod Packing Leaks – Reciprocating Compressors (RPC (17E))
  - Dry Gas Seal Leaks – Centrifugal Compressors (DGS (18E))
  - Piping and Equipment Fugitives (Gas & Light Liquid) (FUG-G and FUG-L (15E))
- **AP-42 and GHG Emission Factors**

Potential to Emit (PTE) – CRITERIA – CONTROLLED

Unit ID	Point ID	Description	Site Rating	NOX		CO		VOC		SO2		PM10/2.5	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
H-01	01E	TXP1 Heat Medium Heater	26.26 MMBtu/hr	2.57	11.28	2.16	9.47	0.15	0.64	0.02	0.07	0.20	0.86
H-02	02E	TXP1 Regeneration Gas Heater	9.40 MMBtu/hr	0.92	4.04	0.77	3.39	0.05	0.23	0.01	0.02	0.07	0.31
H-03	03E	TXP2 Regeneration Gas Heater	20.30 MMBtu/hr	0.73	3.20	0.81	3.56	0.39	1.69	0.01	0.05	0.26	1.16
H-04	04E	TXP3 Regeneration Gas Heater	20.30 MMBtu/hr	0.73	3.20	0.81	3.56	0.39	1.69	0.01	0.05	0.26	1.16
H-05	05E	DeC2 Hot Oil Heater	68.33 MMBtu/hr	2.46	10.77	2.53	11.07	0.38	1.67	0.04	0.18	0.51	2.23
H-06	06E	DeC2 Hot Oil Heater	68.33 MMBtu/hr	2.46	10.77	2.53	11.07	0.38	1.67	0.04	0.18	0.51	2.23
H-07	07E	DeC2 Regeneration Gas Heater	10.44 MMBtu/hr	1.02	4.48	0.86	3.77	0.06	0.25	0.01	0.03	0.08	0.34
FL-1	08E	Process Flare	630.19 MMscf/yr	638.12	73.27	1,273.93	146.28	177.30	20.36	1.54	0.19	19.50	2.39
GEN-1	09E	Standby Generator	224 bhp	0.99	0.25	1.98	0.49	0.54	0.13	1.3E-03	3.2E-04	0.04	0.01
TK-1	10E	Slop Oil/Condensate Tank	400 bbl	—	—	—	—	1.08	4.74	—	—	—	—
TK-2	11E	Slop Oil/Condensate Tank	400 bbl	—	—	—	—	1.08	4.74	—	—	—	—
TK-3	12E	Slop Oil/Condensate Tank	400 bbl	—	—	—	—	1.08	4.74	—	—	—	—
TK-4	13E	Slop Oil/Condensate Tank	400 bbl	—	—	—	—	1.08	4.74	—	—	—	—
TL-1	14E	Truck Load-Out - Slop Oil/Condensate	4,000,000 gal/yr	—	—	—	—	27.13	18.09	—	—	—	—
V-01	16E	Amine Process Unit Vent	44,000 bbl/day	—	—	—	—	0.11	0.49	—	—	—	—
RPC-1	17E	Rod Packing - Reciprocating Compressors	3 Recips	—	—	—	—	0.17	0.30	—	—	—	—
DGS	18E	Dry Gas Seals - Centrifugal Compressors	8 Centrifugal	—	—	—	—	0.76	3.33	—	—	—	—
		TOTAL POINT SOURCE EMISSIONS:		**650.01**	**121.26**	**1,286.38**	**192.66**	**212.13**	**69.50**	**1.67**	**0.76**	**21.43**	**10.68**
FUG-G-1	15E	Piping and Equipment Fugitives - Gas	—	—	—	—	—	3.72	16.30	—	—	—	—
FUG-L-1	15E	Piping and Equipment Fugitives - Light Liquid	—	—	—	—	—	9.70	26.20	—	—	—	—
		TOTAL FUGITIVE EMISSIONS:		—	—	—	—	**13.43**	**42.50**	—	—	—	—
		TOTAL FACILITY-WIDE EMISSIONS:		**650.01**	**121.26**	**1286.38**	**192.66**	**225.56**	**112.00**	**1.67**	**0.76**	**21.43**	**10.68**
		WV NSR THRESHOLD:		6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy	
		TVOP THRESHOLD:			100 tpy		100 tpy		100 tpy		100 tpy		100 tpy

Notes:
1 - Emissions are based on operation at 100% of rated load for 8,760 hr/yr.
2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
4 - HCHO is formaldehyde; Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP (i-octane), acetaldehyde, acrolein, and methanol.

Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS – CONTROLLED

Unit ID	Point ID	Benzene CAS: 71-43-2 MW: 78.11 lb/lb-mol		Ethylbenzene CAS: 121-69-16 MW: 106.17 lb/lb-mol		Formaldehyde CAS: 121-69-26 MW: 30.03 lb/lb-mol		n-Hexane CAS: 121-69-34 MW: 86.18 lb/lb-mol		Toluene CAS: 121-69-87 MW: 92.14 lb/lb-mol		2,2,4-TMP CAS: 121-69-94 MW: 114.23 lb/lb-mol		Xylenes CAS: 121-69-99 MW: 106.17 lb/lb-mol		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
H-01	01E	5.4E-05	2.4E-04	—	—	1.9E-03	0.01	0.05	0.20	8.8E-05	3.8E-04	—	—	—	—	4.9E-05	2.1E-04	0.05	0.21
H-02	02E	1.9E-05	8.5E-05	—	—	6.9E-04	3.0E-03	0.02	0.07	3.1E-05	1.4E-04	—	—	—	—	1.7E-05	7.7E-05	0.02	0.08
H-03	03E	4.2E-05	1.8E-04	—	—	1.5E-03	0.01	0.04	0.16	6.8E-05	3.0E-04	—	—	—	—	3.8E-05	1.7E-04	0.04	0.16
H-04	04E	4.2E-05	1.8E-04	—	—	1.5E-03	0.01	0.04	0.16	6.8E-05	3.0E-04	—	—	—	—	3.8E-05	1.7E-04	0.04	0.16
H-05	05E	1.4E-04	6.2E-04	—	—	0.01	0.02	0.12	0.53	2.3E-04	1.0E-03	—	—	—	—	1.3E-04	5.6E-04	0.13	0.55
H-06	06E	1.4E-04	6.2E-04	—	—	0.01	0.02	0.12	0.53	2.3E-04	1.0E-03	—	—	—	—	1.3E-04	5.6E-04	0.13	0.55
H-07	07E	2.1E-05	9.4E-05	—	—	7.7E-04	3.4E-03	0.02	0.08	3.5E-05	1.5E-04	—	—	—	—	1.9E-05	8.5E-05	0.02	0.08
FL-1	08E	4.49	0.52	6.09	0.70	0.34	3.9E-02	5.48	0.63	5.30	0.61	6.6E+00	7.5E-01	6.11	0.70	8.6E-03	9.9E-04	34.38	3.95
GEN-1	09E	3.5E-03	8.7E-04	5.4E-05	1.4E-05	0.04	0.01	—	—	1.2E-03	3.1E-04	—	—	4.3E-04	1.1E-04	0.02	0.01	0.07	0.02
TK-1	10E	0.04	0.16	0.04	0.16	—	—	0.04	0.16	0.04	0.16	0.04	0.16	0.04	0.16	—	—	0.22	0.95
TK-2	11E	0.04	0.16	0.04	0.16	—	—	0.04	0.16	0.04	0.16	0.04	0.16	0.04	0.16	—	—	0.22	0.95
TK-3	12E	0.04	0.16	0.04	0.16	—	—	0.04	0.16	0.04	0.16	0.04	0.16	0.04	0.16	—	—	0.22	0.95
TK-4	13E	0.04	0.16	0.04	0.16	—	—	0.04	0.16	0.04	0.16	0.04	0.16	0.04	0.16	—	—	0.22	0.95
TL-1	14E	0.90	0.60	0.90	0.60	—	—	0.90	0.60	0.90	0.60	0.90	0.60	0.90	0.60	—	—	5.43	3.62
V-01	16E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
RPC-1	17E	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DGS	18E	1.9E-03	0.01	1.9E-03	0.01	—	—	1.9E-03	0.01	1.9E-03	0.01	1.9E-03	0.01	1.9E-03	0.01	—	—	0.01	0.05
TOTAL POINT		**5.54**	**1.76**	**7.14**	**1.94**	**0.40**	**0.12**	**6.93**	**3.60**	**6.35**	**1.86**	**7.61**	**2.00**	**7.16**	**1.95**	**0.03**	**0.01**	**41.17**	**13.23**
FUG-G-1	15E	0.01	0.04	0.01	0.04	—	—	0.01	0.04	0.01	0.04	0.01	0.04	0.01	0.04	—	—	0.05	0.24
FUG-L-1	15E	0.01	0.06	0.01	0.06	—	—	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	—	—	0.08	0.36
TOTAL FUGITIVES		**0.02**	**0.10**	**0.02**	**0.10**	**0.00**	**0.00**	**0.02**	**0.10**	**0.02**	**0.10**	**0.02**	**0.10**	**0.02**	**0.10**	**0.00**	**0.00**	**0.14**	**0.60**
TOTAL FACILITY		**5.57**	**1.86**	**7.17**	**2.04**	**0.40**	**0.12**	**6.95**	**3.70**	**6.38**	**1.96**	**7.63**	**2.10**	**7.19**	**2.05**	**0.03**	**0.01**	**41.30**	**13.83**
NSR THRESHOLD:		2 lb/hr *OR* 0.5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 0.5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy	
TVOP THRESHOLD:			10 tpy		10 tpy		10 tpy		10 tpy		10 tpy		10 tpy		10 tpy		10 tpy		25 tpy

Notes:
1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
4 - HCHO is formaldehyde; Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP (i-octane), acetaldehyde, acrolein, and methanol.

Attachment N

Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – CONTROLLED

Unit ID	Point ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr	kg/MMBtu GWP: CO2 tpy	53.06 1 CO2e tpy	kg/MMBtu GWP: CH4 tpy	1.00E-03 25 CO2e tpy	kg/MMBtu GWP N2O tpy	1.00E-04 298 CO2e tpy	TOTAL CO2e tpy
H-01	01E	TXP1 Heat Medium Heater	26.26	8,760	13,456	13,456	26	661	0.03	8	14,125
H-02	02E	TXP1 Regeneration Gas Heater	9.40	8,760	4,816	4,816	9	237	0.01	3	5,056
H-03	03E	TXP2 Regeneration Gas Heater	20.30	8,760	10,401	10,401	1	16	0.02	6	10,422
H-04	04E	TXP3 Regeneration Gas Heater	20.30	8,760	10,401	10,401	1	16	0.02	6	10,422
H-05	05E	DeC2 Hot Oil Heater	68.33	8,760	35,008	35,008	69	1,721	0.07	20	36,749
H-06	06E	DeC2 Hot Oil Heater	68.33	8,760	35,008	35,008	69	1,721	0.07	20	36,749
H-07	07E	DeC2 Regeneration Gas Heater	10.44	8,760	5,350	5,350	11	263	0.01	3	5,616
FL-1	08E	Process Flare	121.22	8,760	83,066	83,066	25	623	68.38	20,376	104,066
GEN-1	09E	Standby Generator	2.19	500	76	76	0.13	3.15	1.2E-04	0.04	79
TK-1	10E	Slop Oil/Condensate Tank	—	8,760	—	—	—	—	—	—	—
TK-2	11E	Slop Oil/Condensate Tank	—	8,760	—	—	—	—	—	—	—
TK-3	12E	Slop Oil/Condensate Tank	—	8,760	—	—	—	—	—	—	—
TK-4	13E	Slop Oil/Condensate Tank	—	8,760	—	—	—	—	—	—	—
TL-1	14E	Truck Load-Out - Slop Oil/Condensate	—	—	—	—	—	—	—	—	—
V-01	16E	Amine Process Unit Vent	—	8,760	20,732	20,732	0.7	19	—	—	20,751
RPC-1	17E	Rod Packing - Reciprocating Compressors	—	8,760	16	16	58	1,438	—	—	1,454
DGS	18E	Dry Gas Seals - Centrifugal Compressors	—	8,760	0.1	0.1	61	1,522	—	—	1,522
		TOTAL POINT SOURCE EMISSIONS			218,331	218,331	330	8,239	68.8	20,441	247,010
FUG-G-1	15E	Piping and Equipment Fugitives - Gas	—	8,760	0.36	0.4	45	1,118	—	—	1,118
FUG-L-1	15E	Piping and Equipment Fugitives - Light Liquid	—	8,760	—	—	—	—	—	—	—
		TOTAL FUGITIVE EMISSIONS			—	—	45	1,118	—	—	1,118

TOTAL FACILITY-WIDE PTE (w/o FUG):	218,331		374		68.6		248,128
PSD Threshold: (	na	- OR -	na	- OR -	na	) - AND -	na
Title V Major Source Threshold:							na

Notes:

1 - Emissions are based on operation at 100% of rated load.

2 - Engine CO2 and CH4 emissions are based on vendor specifications.

3 - Fugitive CH4 emissions are based on EPA Fugitive Emission Factors for Oil and Gas Production Operations.

4 - All other GHG emissions are based on default values in 40CFR98, Subpart C, Table C-1.

5 - High Heat Value (HHV) = Low Heat Value (LHV) / 0.90.

6 - PSD Thresholds and Title V Major Source Thresholds are only applicable if other regulated air pollutants exceed the corresponding Thresholds.

Potential to Emit (PTE) – PRE-CONTROLLED

Unit ID	Point ID	Description	NOX		CO		VOC		n-Hexane		TOTAL HAP		CO2E	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
H-01	01E	TXP1 Heat Medium Heater	2.57	11.28	2.16	9.47	0.15	0.64	2.57	11.28	0.05	0.21	3,225	14,125
H-02	02E	TXP1 Regeneration Gas Heater	0.92	4.04	0.77	0.77	0.05	0.23	0.92	4.04	0.02	0.08	1,154	5,056
H-03	03E	TXP2 Regeneration Gas Heater	0.73	3.20	0.81	3.56	0.39	1.69	0.73	3.20	0.04	0.16	2,380	10,422
H-04	04E	TXP3 Regeneration Gas Heater	0.73	3.20	0.81	3.56	0.39	1.69	0.73	3.20	0.04	0.16	2,380	10,422
H-05	05E	DeC2 Hot Oil Heater	2.46	10.77	2.53	11.07	0.38	1.67	2.46	10.77	0.13	0.55	8,390	36,749
H-06	06E	DeC2 Hot Oil Heater	2.46	10.77	2.53	11.07	0.38	1.67	2.46	10.77	0.13	0.55	8,390	36,749
H-07	07E	DeC2 Regeneration Gas Heater	1.02	4.48	0.86	3.77	0.06	0.25	1.02	4.48	0.02	0.08	1,282	5,616
FL-1	08E	Process Flare	638.12	73.27	1,273.93	146.28	17,729.97	2,035.80	638.12	73.27	3,403.17	390.76	542,681	62,312
GEN-1	09E	Standby Generator	0.99	4.33	1.98	8.65	0.54	2.36	—	—	0.07	0.31	317	1,388
TK-1	10E	Slop Oil/Condensate Tank	—	—	—	—	1.08	4.74	0.04	0.16	0.22	0.95	—	—
TK-2	11E	Slop Oil/Condensate Tank	—	—	—	—	1.08	4.74	0.04	0.16	0.22	0.95	—	—
TK-3	12E	Slop Oil/Condensate Tank	—	—	—	—	1.08	4.74	0.04	0.16	0.22	0.95	—	—
TK-4	13E	Slop Oil/Condensate Tank	—	—	—	—	1.08	4.74	0.04	0.16	0.22	0.95	—	—
TL-1	14E	Truck Load-Out - Slop Oil/Condensate	—	—	—	—	—	18.09	—	0.60	—	3.62	—	—
V-01	16E	Amine Process Unit Vent	—	—	—	—	0.11	0.49	—	—	—	—	4,738	20,751
RPC-1	17E	Rod Packing - Reciprocating Compressors	—	—	—	—	0.17	0.30	2.4E-03	6.1E-04	0.01	3.7E-03	394	1,454
DGS	18E	Dry Gas Seals - Centrifugal Compressors	—	—	—	—	0.76	3.33	1.9E-03	0.01	0.01	0.05	347	1,522
TOTAL PRE-CONTROLLED POINT SOURCE EMISSIONS			650.01	125.34	1,286.38	198.20	17,737.68	2,087.16	649.17	122.26	3,404.54	400.34	575,677	206,565
FUG-G-1	15E	Piping and Equipment Fugitives - Gas	—	—	—	—	11.25	49.28	0.03	0.12	0.17	0.72	772	3,380
FUG-L-1	15E	Piping and Equipment Fugitives - Light Liquid	—	—	—	—	17.33	75.90	0.04	0.18	0.24	1.05	—	—
TOTAL PRE-CONTROLLED FUGITIVE EMISSIONS			—	—	—	—	28.58	125.17	0.07	0.30	0.41	1.78	772	3,380
TOTAL PRE-CONTROLLED EMISSIONS			650.01	125.34	1286.38	198.20	17,766.26	2,212.34	649.24	122.56	3404.95	402.11	576,449	209,944
WV NSR THRESHOLD:			6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		—	
TVOP THRESHOLD:				100 tpy		100 tpy		100 tpy		10 tpy		25 tpy		—

Notes:
1 - Emissions are based on operation at 100% of rated load for 8,760 hr/yr.
2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
4 - HCHO is formaldehyde; Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP (i-octane), acetaldehyde, acrolein, and methanol.

Attachment N - TXP1 Heat Medium Heater Emissions

Unit 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 (1E)	TXP1 Heat Medium Heater	EPA AP-42 Table 1.4-1	NOX	100.00	0.10	2.57	11.28	—	2.57	11.28
		EPA AP-42 Table 1.4-1	CO	84.00	0.08	2.16	9.47	—	2.16	9.47
	23.69 MMBtu/hr (LHV)	EPA AP-42 Table 1.4-2	VOC	5.68	5.6E-03	0.15	0.64	—	0.15	0.64
	26.26 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	0.02	0.07	—	0.02	0.07
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.20	0.86	—	0.20	0.86
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	5.4E-05	2.4E-04	—	5.4E-05	2.4E-04
		EPA AP-42 Table 1.4-3	Ethylbenzene	—	—	—	—	—	—	—
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	1.9E-03	0.01	—	1.9E-03	0.01
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	0.05	0.20	—	0.05	0.20
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	8.8E-05	3.8E-04	—	8.8E-05	3.8E-04
		EPA AP-42 Table 1.4-3	2,2,4-TMP	—	—	—	—	—	—	—
	207,509 MMBtu/yr (LHV)	EPA AP-42 Table 1.4-3	Xylenes	—	—	—	—	—	—	—
	230,064 MMBtu/yr (HHV)	EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	4.9E-05	2.1E-04	—	4.9E-05	2.1E-04
		SUM	Tot HAP	1.88	1.8E-03	0.05	0.21	—	0.05	0.21
	25,748 scf/hr	40CFR98 - Table C-1	CO2	119,317	116.98	3,072	13,456	—	3,072	13,456
	225.55 MMscf/yr	40CFR98 - Table C-2	CH4	234.60	0.23	6.04	26.46	—	6.04	26.46
		40CFR98 - Table C-2	N2O	0.22	2.2E-04	5.8E-03	0.03	—	5.8E-03	0.03
		40CFR98 - Table A-1	CO2e	125,249	122.79	3,225	14,125	—	3,225	14,125

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.

3 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylenes), 2,2,4-TMP (iso-octane), acetaldehyde, acrolein, and methanol (MeOH).

4 - Emission factors in AP-42 are NOT EPA-recommended emission limits. Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

Attachment N - TXP1 Regen Gas Heater Emissions

Unit 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 (2E)	TXP1 Regen Gas Heater	EPA AP-42 Table 1.4-1	NOX	100.00	0.10	0.92	4.04	—	0.92	4.04
		EPA AP-42 Table 1.4-1	CO	84.00	0.08	0.77	3.39	—	0.77	3.39
		EPA AP-42 Table 1.4-2	VOC	5.68	5.6E-03	0.05	0.23	—	0.05	0.23
		EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	0.01	0.02	—	0.01	0.02
	8.48 MMBtu/hr (LHV)	EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.07	0.31	—	0.07	0.31
	9.40 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	1.9E-05	8.5E-05	—	1.9E-05	8.5E-05
		EPA AP-42 Table 1.4-3	Ethylbenzene	—	—	—	—	—	---	---
	8,760 hr/yr	EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	6.9E-04	0.00	—	6.9E-04	0.00
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	0.02	0.07	—	0.02	0.07
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	3.1E-05	1.4E-04	—	3.1E-05	1.4E-04
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	2,2,4-TMP	—	—	—	—	—	---	---
		EPA AP-42 Table 1.4-3	Xylenes	—	—	—	—	—	---	---
	74,271 MMBtu/yr (LHV)	EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	1.7E-05	7.7E-05	---	1.7E-05	7.7E-05
	82,344 MMBtu/yr (HHV)	SUM	Tot HAP	1.88	1.8E-03	0.02	0.08	—	0.02	0.08
		40CFR98 - Table C-1	CO2	119,317	116.98	1,100	4,816	—	1,100	4,816
	9,216 scf/hr	40CFR98 - Table C-2	CH4	234.60	0.23	2.16	9.47	—	2.16	9.47
	80.73 MMscf/yr	40CFR98 - Table C-2	N2O	0.22	2.2E-04	2.1E-03	0.01	—	2.1E-03	0.01
		40CFR98 - Table A-1	CO2e	125,249	122.79	1,154	5,056	—	1,154	5,056

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.

3 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylenes), 2,2,4-TMP (iso-octane), acetaldehyde, acrolein, and methanol (MeOH).

4 - Emission factors in AP-42 are NOT EPA-recommended emission limits. Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

Attachment N - TXP2 & TXP3 Regen Gas Heater Emissions

Unit 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 (3E) and H-04 (4E) (each)	TXP2 & TXP3 Regen Gas Heaters (each)	Vendor Data	NOX	36.72	0.04	0.73	3.20	—	0.73	3.20
		Vendor Data	CO	40.80	0.04	0.81	3.56	—	0.81	3.56
		Vendor Data	VOC	19.38	1.9E-02	0.39	1.69	—	0.39	1.69
		EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	0.01	0.05	—	0.01	0.05
	18.31 MMBtu/hr (LHV)	Vendor Data	PM10/2.5	13.26	0.01	0.26	1.16	—	0.26	1.16
	20.30 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	4.2E-05	1.8E-04	—	4.2E-05	1.8E-04
		EPA AP-42 Table 1.4-3	Ethylbenzene	—	—	—	—	—	—	—
	8,760 hr/yr	EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	1.5E-03	0.01	—	1.5E-03	0.01
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	0.04	0.16	—	0.04	0.16
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	6.8E-05	3.0E-04	—	6.8E-05	3.0E-04
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	2,2,4-TMP	—	—	—	—	—	—	—
		EPA AP-42 Table 1.4-3	Xylenes	—	—	—	—	—	—	—
	160,394 MMBtu/yr (LHV)	EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	3.8E-05	1.7E-04	—	3.8E-05	1.7E-04
	177,828 MMBtu/yr (HHV)	SUM	Tot HAP	1.88	1.8E-03	0.04	0.16	—	0.04	0.16
		40CFR98 - Table C-1	CO2	119,317	116.98	2,375	10,401	—	2,375	10,401
	19,902 scf/hr	Vendor Data	CH4	7.14	0.01	0.14	0.62	—	0.14	0.62
	174.34 MMscf/yr	40CFR98 - Table C-2	N2O	0.22	2.2E-04	4.5E-03	0.02	—	4.5E-03	0.02
		40CFR98 - Table A-1	CO2e	119,562	117.22	2,380	10,422	—	2,380	10,422

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.

3 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylenes), 2,2,4-TMP (iso-octane), acetaldehyde, acrolein, and methanol (MeOH).

4 - Emission factors in AP-42 are NOT EPA-recommended emission limits. Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

ZEECO BURNER DATA SHEETS

BASIS OF EMISSIONS INFORMATION

				Rev.
Furnace Temperature (°F)	1,508			
Excess Combustion Air (%)	15% Gas			
Combustion Air Temperature (°F)	100			
Relative Humidity (%)	70%			
Heat Release for Guarantee (MM Btu/hr)	16.200	to	9.100 LHV	1

EMISSIONS INFORMATION

	PREDICTED (ppmv)	PREDICTED (#/MMBtu)	GUARANTEED (ppmv)	GUARANTEED (#/MMBtu)
NOx Design	9	0.011	30	0.036
NOx Rich Rjctn	9	0.011	30	0.036
CO - Gas	6	0.000	50	0.040
UHC - Gas	1	0.001	10	0.007
Particulate - Gas	2	0.002	15	0.013
VOC - Gas	0	0.000	15	0.019

Attachment N - De-Ethanizer Hot Oil Heater Emissions

Unit 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 (5E) and H-06 (6E) (each)	De-Ethanizer Hot Oil Heaters (each)	Vendor Data	NOX	36.72	0.04	2.46	10.77	—	2.46	10.77
		Vendor Data	CO	37.74	0.04	2.53	11.07	—	2.53	11.07
		EPA AP-42 Table 1.4-2	VOC	5.58	5.6E-03	0.38	1.67	—	0.38	1.67
	61.63 MMBtu/hr (LHV)	EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	0.04	0.18	—	0.04	0.18
	68.33 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.51	2.23	—	0.51	2.23
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	1.4E-04	6.2E-04	—	1.4E-04	6.2E-04
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Ethylbenzene	—	—	—	—	—	---	—
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	5.0E-03	0.02	—	5.0E-03	0.02
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	0.12	0.53	—	0.12	0.53
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	2.3E-04	1.0E-03	—	2.3E-04	1.0E-03
		EPA AP-42 Table 1.4-3	2,2,4-TMP	—	—	—	—	—	---	—
	539,864 MMBtu/yr (LHV)	EPA AP-42 Table 1.4-3	Xylenes	—	—	—	—	—	—	—
	598,545 MMBtu/yr (HHV)	EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	1.3E-04	5.6E-04	—	1.3E-04	5.6E-04
		SUM	Tot HAP	1.88	1.8E-03	0.13	0.55	—	0.13	0.55
	66,987 scf/hr	40CFR98 - Table C-1	CO2	119,317	116.98	7,993	35,008	—	7,993	35,008
	586.81 MMscf/yr	40CFR98 - Table C-2	CH4	234.60	0.23	15.72	68.83	—	15.72	68.83
		40CFR98 - Table C-2	N2O	0.22	2.2E-04	1.5E-02	0.07	—	1.5E-02	0.07
		40CFR98 - Table A-1	CO2e	125,249	122.79	8,390	36,749	—	8,390	36,749

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.
3 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylenes), 2,2,4-TMP (iso-octane), acetaldehyde, acrolein, and methanol (MeOH).
4 - Emission factors in AP-42 are NOT EPA-recommended emission limits. Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

To: Baldasar

FABER BURNER COMPANY
#13011
BURNER DATA
Page 3 of 4

F. **Gas Pilot Data:**
Natural Gas at 1000 BTU/SCF & 0.6 S.G., 630 SCFH required at 1 PSIG at the pilot.

G. **Turndown Data:**
10:1 on Natural Gas
4:1 on Natural Gas (with emissions guarantee)

H. **Excess Air Design Data:**
15% on Natural Gas @ MCR

I. **EMISSION GUARANTEES**

Not to Exceed:	Natural Gas	
	lbs/MMBTU	PPM
NOx	0.035	30
CO	0.037	30

Parts Per Million (PPM) @ 3% O2 Dry

DeC2 Regeneration Gas Heater Emissions

Unit ID	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
H-07 (7E)	DeC2 Regen Gas Heater	EPA AP-42 Table 1.4-1	NOX	100.00	0.10	1.02	4.48	—	1.02	4.48
		EPA AP-42 Table 1.4-1	CO	84.00	0.08	0.86	3.77	—	0.86	3.77
		EPA AP-42 Table 1.4-2	VOC	5.68	5.6E-03	0.06	0.25	—	0.06	0.25
	9.42 MMBtu/hr (LHV)	EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	0.01	0.03	—	0.01	0.03
	10.44 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.08	0.34	—	0.08	0.34
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	2.1E-05	9.4E-05	—	2.1E-05	9.4E-05
	8,760 hr/yr	EPA AP-42 Table 1.4-3	Ethylbenzene	—	—	—	—	—	—	—
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	7.7E-04	3.4E-03	—	7.7E-04	3.4E-03
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	0.02	0.08	—	0.02	0.08
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	3.5E-05	1.5E-04	—	3.5E-05	1.5E-04
		EPA AP-42 Table 1.4-3	2,2,4-TMP	—	—	—	—	—	—	—
	82,504 MMBtu/yr (LHV)	EPA AP-42 Table 1.4-3	Xylenes	—	—	—	—	—	—	—
	91,472 MMBtu/yr (HHV)	EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	1.9E-05	8.5E-05	—	1.9E-05	8.5E-05
		SUM	Tot HAP	1.88	1.8E-03	0.02	0.08	—	0.02	0.08
	10,237 scf/hr	40CFR98 - Table C-1	CO2	119,317	116.98	1,221	5,350	—	1,221	5,350
	89.68 MMscf/yr	40CFR98 - Table C-2	CH4	234.60	0.23	2.40	10.52	—	2.40	10.52
		40CFR98 - Table C-2	N2O	0.22	2.2E-04	2.3E-03	0.01	—	2.3E-03	0.01
		40CFR98 - Table A-1	CO2e	125,249	122.79	1,282	5,616	—	1,282	5,616

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.

3 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylenes), 2,2,4-TMP (iso-octane), acetaldehyde, acrolein, and methanol (MeOH).

4 - Emission factors in AP-42 are NOT EPA-recommended emission limits. Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

Attachment N - Process Flare Emissions

Unit ID	Description	Reference	Pollutant	Emission Factor lb/MMscf	Emission Factor lb/MMBtu	Pre-Controlled Emissions lb/hr	Pre-Controlled Emissions tpy	Control Efficiency %	Controlled Emissions lb/hr	Controlled Emissions tpy
FL-1 (8E)	Process Flare-01	TCEQ 2010 Flare Study	NOX	Varies	0.1380	—	—	—	638.12	73.27
	Peak (Hourly)	TCEQ 2010 Flare Study	CO	Varies	0.2755	—	—	—	1,273.93	146.28
	208,000 lb/hr (Peak)	Mass Balance	VOC	6,461	3.83	17,729.97	2,035.80	99%	177.30	20.36
	2,566,068 scf/hr (Peak)	EPA AP-42 Table 1.4-2	SO2	0.60	3.3E-04	—	—	—	1.54	0.19
	4,624 MMBtu/hr (HHV)	EPA AP-42 Table 1.4-2	PM10/2.5	7.60	4.2E-03	—	—	—	19.50	2.39
	1,802 Btu/scf (HHV)	Mass Balance	Benzene	163.59	0.10	448.93	51.55	99%	4.49	0.52
		Mass Balance	Ethylbenzene	221.99	0.13	609.20	69.95	99%	6.09	0.70
	8,760 hr/yr	EPA AP-42 Table 1.4-3	HCHO	0.12	7.4E-05	—	—	—	0.34	0.04
		Mass Balance	n-Hexane	199.79	0.12	548.28	62.95	99%	5.48	0.63
	Average (Annual)	Mass Balance	Toluene	193.17	0.11	530.10	60.87	99%	5.30	0.61
	71,940 scf/hr (Average)	Mass Balance	2,2,4-TMP	238.85	1.4E-01	655.47	75.26	99%	6.55	0.75
	121.22 MMBtu/hr (HHV)	Mass Balance	Xylenes	222.72	0.13	611.18	70.18	99%	6.11	0.70
	1,061,889 MMBtu/yr	EPA AP-42 Table 1.4-3	Other HAP	3.1E-03	1.9E-06	—	—	—	8.6E-03	9.9E-04
	630.19 MMscf/yr	Sum	Tot HAP	1,240.25	0.74	3,403.17	390.76	99%	34.38	3.95
	1,685 Btu/scf (HHV)	40CFR98 Table C-1	CO2	263,621	156.45	—	—	—	723,433	83,066
		Mass Balance	CH4	7,910	4.69	21,707	2,492.48	99%	217.07	25
		40CFR98 - Table C-2	N2O	217.00	0.13	—	—	—	596	68
		40CFR98 - Table A-1	CO2e	526,042	312.19	542,681	62,312	—	906,320	104,066

Notes:

1 - Flare design peak and short-term (lb/hr) emissions are based on an emergency ethane release
Flow rate = 208,000 lb/hr, MW = 30.76 lb/lb-mol, and heating value = 1,802 Btu/scf (HHV).

2 - Heat Input (See 'Att H - Waste Gas Summary' and 'Att H - Waste Gas Btu Analysis' spreadsheets):

Component	Waste Gas (to Flare) Mol% (Vol%)	MMscf/yr	scf/hr (ave)	Btu/scf (HHV)	lb/MMscf
Nitrogen	0.1%	0.46	52.07	—	61
CO2	0.1%	0.52	59.61	—	96
Methane	18.7%	117.92	13,460.69	189	7,910
Ethane	76.8%	484.17	55,271.11	1,244	60,879
VOC	4.3%	27.11	3,094.90	252	6,461
Benzene	0.08%	0.50	57.17	2.9	164
E-Benzene	0.08%	0.50	57.08	3.9	222
n-Hexane	0.09%	0.55	63.29	3.9	200
Toluene	0.08%	0.50	57.23	3.4	193
2,2,4-TMP	0.08%	0.50	57.08	4.6	239
Xylenes	0.08%	0.50	57.27	3.9	223
TOTAL	100.0%	630.19	71,938	1,685	75,407
		vs. 85.5		vs. 1,300	

3 - CO2e Emission Factor (See 'Att H - Waste Gas Summary'):

40CFR98	kg/MMBtu	lb/MMBtu	Wgt%	lb/MMBtu
Methane	53.06	116.98	12.6%	14.74
Ethane	59.60	131.40	96.9%	127.38
VOC	62.87	138.60	10.3%	14.34
Conservative Estimate			119.9%	156.45

4 - Waste Gas volumes to the flare are conservatively estimated as as follows:

Stream Description	Estimated Gas Volume to Process Flare (FL-1 (8E))	scf/hr (ave)	MMscf/yr
Inlet Gas	TXP Blowdowns	2,146	18.80
	TXP Start-Up and Dry-out	2,383	20.88
	Balance of Plant Volumes	197	1.73
	Filters Change-Out	43	0.38
	Compressor Maintenance	2,493	21.84
	Amine Unit Flash Gas	1,297	4.54
	Gas Pig Trap Blowdown	920	8.06
	Compressor Dry Gas Seals	56	0.49
	Other/Misc/Contingency (20%)	1,752	15.34
	SubTotal:	10,509	92.06
Ethane	Ethane	57,078	500.00
	SubTotal:	57,078	500.00
NGL	Liquid Pig Trap Blowdown	6	0.06
	TXP Tanks Liquid Dry-Out	100	0.88
	Pump Maintenance	22	0.19
	SubTotal:	128	1.12
Residue Gas	Purge Gas	4,000	35.04
	Pilot Gas	225	1.971
	SubTotal:	4,225	37.01
	Grand-Total:	71,940	630.19
		5,425 lb/hr	

Attachment N - Standby Generator Engine Emissions

Unit ID (Point ID)	Description	Reference	Pollutant	Pre-Controlled Emissions g/bhp-hr	Pre-Controlled Emissions lb/MMBtu	Pre-Controlled Emissions lb/hr	Pre-Controlled Emissions tpy	Control Efficiency	Controlled Emissions g/bhp-hr	Controlled Emissions lb/MMBtu	Controlled Emissions lb/hr	Controlled Emissions tpy
GEN-1 (9E)	Generator Engine (Propane) (EPA Certified)	NSPS JJJJ	NOx	2.00	0.45	0.99	4.33	na	2.00	0.45	0.99	0.25
	Olympian G150LG2	NSPS JJJJ	CO	4.00	0.90	1.98	8.65	na	4.00	0.90	1.98	0.49
	224 bhp	NMHC+CH4	THC	2.22	0.50	1.10	4.81	na	2.22	0.50	1.10	0.27
	150 ekW	NMNEHC*120%	NMHC	1.20	0.27	0.59	2.60	na	1.20	0.27	0.59	0.15
	Manufactured ≥ 07/01/10	NSPS JJJJ	NMNEHC	1.00	0.23	0.49	2.16	na	1.00	0.23	0.49	0.12
	NSPS JJJJ Affected	NMNEHC + HCHO	VOC	1.09	0.25	0.54	2.36	na	1.09	0.25	0.54	0.13
		AP-42 Table 3.2-3	SO2	2.6E-03	5.88E-04	1.3E-03	5.7E-03	na	2.6E-03	5.9E-04	1.3E-03	3.2E-04
	500 hr/yr	AP-42 Table 3.2-3	PM10/2.5	0.09	0.02	0.04	0.19	na	0.09	0.02	0.04	0.01
		AP-42 Table 3.2-3	Benzene	0.01	1.58E-03	3.5E-03	0.02	na	0.01	1.6E-03	3.5E-03	8.7E-04
		AP-42 Table 3.2-3	Ethylbenzene	1.1E-04	2.48E-05	5.4E-05	2.4E-04	na	1.1E-04	2.5E-05	5.4E-05	1.4E-05
	8,815 Btu/bhp-hr (LHV)	AP-42 Table 3.2-3	HCHO	0.09	0.02	0.04	0.20	na	0.09	0.02	0.04	0.01
	9,794 Btu/bhp-hr (HHV)	AP-42 Table 3.2-3	n-Hexane	—	—	—	—	na	—	—	—	—
		AP-42 Table 3.2-3	Toluene	2.5E-03	5.58E-04	1.2E-03	5.4E-03	na	2.5E-03	5.6E-04	1.2E-03	3.1E-04
	2.19 MMBtu/hr (HHV)	AP-42 Table 3.2-3	2,2,4-TMP	—	—	—	—	na	—	—	—	—
		AP-42 Table 3.2-3	Xylenes	8.7E-04	1.95E-04	4.3E-04	1.9E-03	na	8.7E-04	2.0E-04	4.3E-04	1.1E-04
	878 scf/hr	AP-42 Table 3.2-3	Other HAP	0.04	0.01	0.02	0.09	na	0.04	0.01	0.02	5.2E-03
	0.44 MMscf/yr	SUM	Total HAP	0.14	0.03	0.07	0.31	0.0%	0.14	0.03	0.07	0.02
		40CFR98 - Table C-1	CO2	616	138.60	304	1,332	na	616	138.60	304	76
		40CFR98 - Table C-1	CH4	1.02	0.23	0.50	2.21	na	1.02	0.23	0.50	0.13
	2,250 Btu/scf (LHV)	40CFR98 - Table C-2	N2O	9.8E-04	2.2E-04	4.8E-04	2.1E-03	na	9.8E-04	2.2E-04	4.8E-04	1.2E-04
	2,500 Btu/scf (HHV)	40CFR98 - Table A-1	CO2e	642	144	317	1,388	na	642	144	317	79

Notes:
1 - The emissions are based on operation at 100% of rated load.
2 - Pre-Controlled emissions assume 8,760 hr/hr and Controlled emissions are based on 500 hr/yr.

Table 1 to Subpart JJJJ of Part 60—NO_x, CO, and VOC Emission Standards for Stationary Non Emergency SI Engines ≥100 HP (Except Gasoline and Rich Burn LPG), Stationary SI Landfill/Digester Gas Engines, and Stationary Emergency Engines >25 HP

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards[a] g/HP-hr NO_x	g/HP-hr CO	g/HP-hr VOC[d]	ppmvd at 15% O_2 NO_x	ppmvd at 15% O_2 CO	ppmvd at 15% O_2 VOC[d]
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG[b]	100≤HP<500	7/1/2008	2.0	4.0	1.0	160	540	86
		1/1/2011	1.0	2.0	0.7	82	270	60
Non-Emergency SI Lean Burn Natural Gas and LPG	500≤HP<1,350	1/1/2008	2.0	4.0	1.0	160	540	86
		7/1/2010	1.0	2.0	0.7	82	270	60
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≤HP<1,350)	HP≥500	7/1/2007	2.0	4.0	1.0	160	540	86
Landfill/Digester Gas (except lean burn 500≤HP<1,350)	HP≥500	7/1/2010	1.0	2.0	0.7	82	270	60
	HP<500	7/1/2008	3.0	5.0	1.0	220	610	80
		1/1/2011	2.0	5.0	1.0	160	610	80
	HP≥500	7/1/2007	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	160	610	80
Landfill/Digester Gas Lean Burn	500≤HP<1,350	1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	160	610	80
Emergency	25<HP<130	1/1/2009	<10	387	N/A	N/A	N/A	N/A
	HP≥130		2.0	4.0	1.0	160	540	86

[a]Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O_2.

[b]Owners and operators of new or reconstructed non-emergency lean burn SI stationary engines with a site rating of greater than or equal to 250 brake HP located at a major source that are meeting the requirements of 40 CFR part 63, subpart ZZZZ, Table 2a do not have to comply with the CO emission standards of Table 1 of this subpart.

[c]The emission standards applicable to emergency engines between 25 HP and 130 HP are in terms of NO_x + HC.

[d]For purposes of this subpart, when calculating emissions of volatile organic compounds, emissions of formaldehyde should not be included.

[76 FR 37975, June 28, 2011]

Attachment N - Slop Oil/Condensate Storage Tank Emissions

Storage Tank PTE Calculations - Working, Breathing and Flashing Emissions

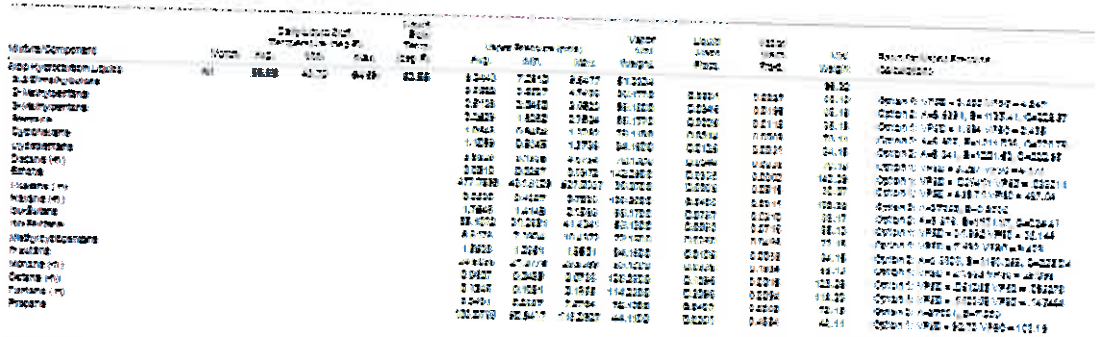
Unit ID	Tank ID	Material Stored	Capacity		Turnovers per Year	Throughput		Working Losses	Breathing Losses	Flashing Losses	Total Losses	VOC 100%		Hex, BTEX, TMP (Ea) 3.33%		Total HAP 20.00%	
			gal	bbl		gal/yr	bbl/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TK-1	10E	Slop Oil/Condensate	16,800	400	60	1,000,000	23,810	6,840	2,644	0	9,484	1.08	4.74	0.04	0.16	0.22	0.95
TK-2	11E	Slop Oil/Condensate	16,800	400	60	1,000,000	23,810	6,840	2,644	0	9,484	1.08	4.74	0.04	0.16	0.22	0.95
TK-3	12E	Slop Oil/Condensate	16,800	400	60	1,000,000	23,810	6,840	2,644	0	9,484	1.08	4.74	0.04	0.16	0.22	0.95
TK-4	13E	Slop Oil/Condensate	16,800	400	60	1,000,000	23,810	6,840	2,644	0	9,484	1.08	4.74	0.04	0.16	0.22	0.95
Total:			67,200	1,600	60	4,000,000	95,238					4.33	18.96	0.14	0.63	0.87	3.79

Notes:

1 - EPA TANKS 4.0.9d was used to determine the Slop Oil/Condensate Tank Working and Breathing (Standing) Losses.

2 - The ProMax process simulation software was used to estimate Flashing Losses from the slop oil/condensate storage tanks. The process simulation shows no flashing losses from the storage tanks.

Oak Grove TK-01 thru TK-04 - Vertical Fixed Roof Tank
Moundsville, West Virginia



Identification
User Identification: Oak Grove TK-01 thru TK-04
City: Moundsville
State: West Virginia
Company: Williams Ohio Valley Midstream
Type of Tank: Vertical Fixed Roof Tank
Description: 400 barrel slop liquids storage tank

Tank Dimensions
Shell Height (ft): 10.00
Diameter (ft): 10.00
Liquid Height (ft): 10.00
Avg. Liquid Height (ft): 10.00
Volume (gallons): 16,800.00
Turnovers: 60.00
Net Throughput(gal/yr): 1,000,000.00
Is Tank Heated (y/n): N

Paint Characteristics
Shell Color/Shade: Gray/Light
Shell Condition: Good
Roof Color/Shade: Gray/Light
Roof Condition: Good

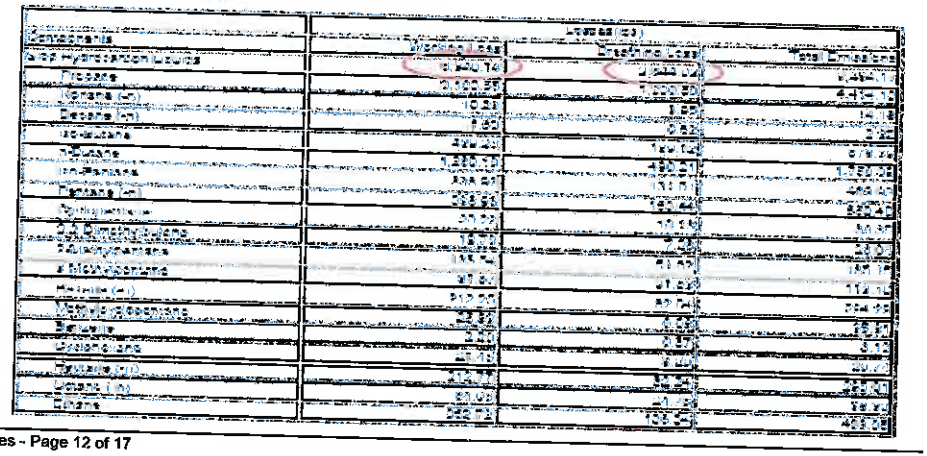
Roof Characteristics
Type: Dome
Height (ft): 0.00
Slope (ft/ft) (cone roof): 0.00

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

Meteorological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg atmospheric Pressure = 14.11 psia)

Emissions Report for: Annual

Oak Grove TK-01 thru TK-01 Vertical Fixed Roof Tank
Moundsville, West Virginia



Attachment N - Truck Load-Out

Unit ID	Description	S	P	MW	T	CE	L_L	T-Put	VOC AP-42 Sect 5.2		Hex, BTEX, TMP (ea) 3.33% of VOC		Total HAP 20.0% of VOC	
		sat. fac.	psia	lb/lb-mol	°R	%	lb/Mgal	Mgal/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TL-1 (14E)	Slop Oil/Condensate	1.45	5.00	51.33	512.55	--	9.05	4,000	27.13	18.09	0.90	0.60	5.43	3.62

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

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

where:
- L_L = Loading loss, lb/1000 gal of liquid loaded.
- S = Saturation factor, use 1.45 for "splash loading".
- P = True vapor pressure of liquid loaded, psia. Estimated as shown.
- MW = molecular weight of vapors, lb/lb-mol. Obtained from EPA TANKS 4.0.
- T = Temperature of bulk liquid loaded, °R = °F + 460. Obtained from EPA TANKS 4.0.
- CE = Overall emission reduction efficiency (collection efficiency x control efficiency).

5 - Estimated load-out at: 50 gpm; which results in: 1.334 hr/yr of operation.

6 - **Emission factors in AP-42 are NOT EPA-recommended emission limits.** Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

Attachment N - Amine Process Unit (V-01)

Unit ID	Description	Flow Rate				VOC (Propane) 0.456%		CO2 1.271%		CH4 1.204%		CO2e CH4 GWP: 25	
		MMscfd	lb/hr	Safety	lb/hr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
V-01 (16E)	Flash Gas	0.0124	40.65	2.50	101.63	NA - See Process Flare (FL-1 (8E))							
					Pre-Control:	NA - See Process Flare (FL-1 (8E))							
					Flash Gas Control:	99%		---		99%		---	
					Controlled:	NA - See Process Flare (FL-1 (8E))							

Unit ID	Description	Flow Rate				VOC (Propane) 0.002%		CO2 95.842%		CH4 0.003%		CO2e CH4 GWP: 25	
		MMscfd	lb/hr	Safety	lb/hr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
V-01 (16E)	Acid Gas	0.4305	1,973.44	2.50	4,933.59	0.11	0.49	4,733	20,732	0.17	0.74	4,738	20,751
					Total:	0.11	0.49	4,733	20,732	0.17	0.74	4,738	20,751

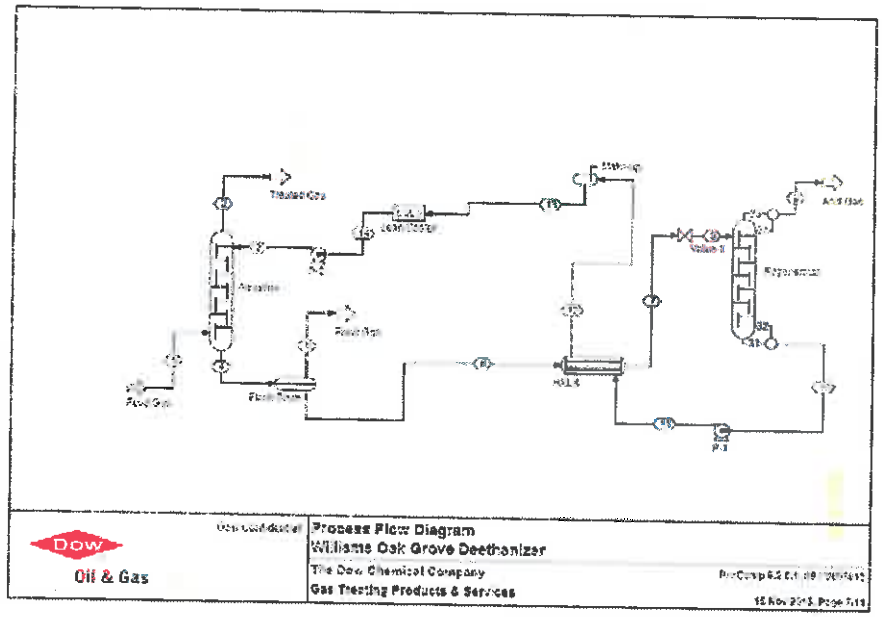
Notes: 1 - Amine unit emissions based on process simulation done by the Dow Chemical Company Gas Treating Technology Group.
2 - The amine unit flash gas will either be used as fuel gas or burned in the flare. Worst-case assumption is the flash gas is sent to the flare for destruction.

Dow
Oil & Gas

Simulation Summary
Williams Oak Grove Deethanizer

Outlet Streams

STREAM-ID		2	5	9
Stream Name		Treated Gas	Flash Gas	
Outlet Block		Treated Gas	Flash Gas	Acid Gas
Temperature	deg F	125.3454	116.0635	120.0000
Pressure	Psi (g)	642.4893	75.0000	6.4336
Vapor Fraction (mol/mol)	-	1.0000	1.0000	1.0000
Flowrate	lb/hr	2.1313E+05	40.6516	1973.4357
Volume Flow (Liquid)	USgal/min			
Volume Flow (Vapor)	MMSCFD @60F	65.2285	1.2448E-02	0.4305
Water	mass %	0.1622	0.8945	3.5978
Carbon Dioxide	mass %	1.8544E-03	1.2709	95.9423
Nitrogen	mass %	0.0000	0.0000	0.0000
Methane	mass %	1.2983	1.2035	3.4323E-03
Ethane	mass %	97.9399	96.1749	0.4541
Propane	mass %	0.5948	0.4559	2.2814E-03
TOTAL	mass %	100.0000	100.0000	100.0000



Attachment N - Reciprocating Compressors - Rod Packing Leaks (RPC)

Unit Description	No. of Recip Comp-ressors	Cyl per Recip Comp-ressor	scfh per Cylinder	Contin-gency	Total Leak Rate	VOC 200 lb/MMscf		HCHO — lb/MMscf		n-Hex, BTEX (Ea) — lb/MMscf		Total HAP — lb/MMscf		CO2 — lb/MMscf		CH4 42,275 lb/MMscf		CO2e CH4 GWP = 25 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 - Residue	3	6.0	15	15%	2.72	0.06	0.27	—	—	—	—	—	—	—	—	13.13	57.49	328	1,437

Crankcase Emissions (Combustion Gas)

Operating hr/yr: 500

Unit Description	GEN-1 Horsepower (bhp)	Leak Rate 0.50 scf/bhp-hr MMscf/yr	Safety Factor	VOC 22.68 lb/MMscf		HCHO 1.89 lb/MMscf		n-Hex, BTEX (Ea) 0.50 lb/MMscf		Total HAP 2.98 lb/MMscf		CO2 12,803 lb/MMscf		CH4 21 lb/MMscf		CO2e CH4 GWP = 25 lb/MMscf	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Crankcase - GEN-1	224	0.98	250%	0.11	0.03	0.01	2.3E-03	2.4E-03	6.1E-04	0.01	3.7E-03	63	16	0.10	0.03	65	16
Total Plant-Wide RPC Emissions:				**0.17**	**0.30**	**0.01**	**2.3E-03**	**2.4E-03**	**6.1E-04**	**0.01**	**3.7E-03**	**62.81**	**15.70**	**13.23**	**57.52**	**394**	**1,454**

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 - Rod packing leaks include three (3) TXP1 residue gas recipricating copressors. Note that the rod packing leaks from the stabilized gas recirocating compressors are routed to the Flare.

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

Pollutant	Representative Gas Analysis	Worst-Case Assumption
CO2	— lb/MMscf	— lb/MMscf
CH4	40,322 lb/MMscf	42,275 lb/MMscf
VOC	— lb/MMscf	200 lb/MMscf
Total HAP	— lb/MMscf	— lb/MMscf

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

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 , from standby generator (GEN-1), are estimated as follows:

(Data from Olympian G150LG2 Data Sheet and Emissions Calculation Spreadsheet.)

Tot Engine Exhaust (TEEx) (Vol) 1,507 acf/min 12 MMscf/yr TEEx*

Pollutant	GEN-1 PTE	Crankcase Emission Factor**
Crankcase THC emissions (Mass)	0.27 tpy THC	46.19 lb THC / MMscf TEEx
Crankcase VOC emissions (Mass)	0.13 tpy VOC	22.68 lb VOC / MMscf TEEx
Crankcase HCHO emissions (Mass)	0.01 tpy HCHO	1.89 lb HCHO / MMscf TEEx
Crankcase BTEX (ea) emissions (Mass)	0.00 tpy BTEX	0.22 lb BTEX / MMscf TEEx
Crankcase HAP (tot) emissions (Mass)	0.02 tpy HAP	2.98 lb HAP / MMscf TEEx
Crankcase CO2 emissions (Mass)	76 tpy CO2	12,803 lb CO2 / MMscf TEEx
Crankcase CH4 emissions (Mass)	0.13 tpy CH4	21 lb CH4 / MMscf TEEx
Crankcase CH4 emissions (Mass)	0.00 tpy N2O	0 lb CH4 / MMscf TEEx
Crankcase CO2e emissions (Mass)	79 tpy CO2e	13,340 lb CO2e /MMscf TEEx

* Conversion from acf/min to scf/yr based on 500 hr/yr, 1,550 oF exhaust temp, and 68 oF std temp.

** Crankcase EmFact = PTE (tpy) from a G150LG2 Engine ÷ Tot Engine Exhaust (TEEx) (MMsf/yr).

Attachment N - Centrifugal Compressor - Dry Gas Seal Leaks (DGS)

Unit Description	No. of Turbine Compressors	Leak Rate Per Centrifugal Compressor		Contin-gency	Total Leak Rate	VOC 13,600 lb/MMscf		HCHO na lb/MMscf		Hex,BTEX,TMP-Ea 33 lb/MMscf		Total HAP 200 lb/MMscf		CO2 300 lb/MMscf		CH4 37,300 lb/MMscf		CO2e CH4 GWP = 25 lb/MMscf	
		scf/hr	MMscf/yr		MMscf/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Compressors - Inlet	3	16.2	0.14	15%	0.49	0.76	3.33	—	—	1.9E-03	0.01	0.01	0.05	0.02	0.07	2	9	52	228

Unit Description	No. of Turbine Compressors	Leak Rate Per Centrifugal Compressor		Contin-gency	Total Leak Rate	VOC -- lb/MMscf		HCHO na lb/MMscf		Hex,BTEX,TMP-Ea -- lb/MMscf		Total HAP — lb/MMscf		CO2 --- lb/MMscf		CH4 42,275 lb/MMscf		CO2e CH4 GWP = 25 lb/MMscf	
		scf/hr	MMscf/yr		MMscf/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Compressors - Residue	5	48.6	0.43	15%	2.45	—	—	—	—	—	—	—	—	—	—	12	52	295	1,294
TOTAL DRY GAS SEAL LEAKS:						**0.76**	**3.33**	**---**	**—**	**1.9E-03**	**0.01**	**0.01**	**0.05**	**0.02**	**0.07**	**14**	**61**	**347**	**1,522**

Notes:

1 - Centrifugal compressors in inlet gas service include mole sieve regeneration gas compressors.

2 - Centrifugal compressors in residue gas service include TXP1, TXP2, and TXP3 expander/compressors and TXP2/TXP3 residue gas compressors.

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

Inlet Gas	Representative Gas Analysis	Worst-Case Assumption
CO2	219 lb/MMscf	300 lb/MMscf
CH4	31,049 lb/MMscf	37,300 lb/MMscf
VOC	11,271 lb/MMscf	13,600 lb/MMscf
Total HAP	127 lb/MMscf	200 lb/MMscf

Residue Gas	Representative Gas Analysis	Worst-Case Assumption
CO2	— lb/MMscf	— lb/MMscf
CH4	40,322 lb/MMscf	42,275 lb/MMscf
VOC	— lb/MMscf	200 lb/MMscf
Total HAP	--- lb/MMscf	— lb/MMscf

Attachment N - Process Piping Fugitives – Gas / Light Liquid

Unit	Description	Component (Unit) Type (Gas)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Tot Hydrocarbons (THC) lb/hr	Tot Hydrocarbons (THC) tpy	VOC 24.02 Wgt% lb/hr	VOC 24.02 Wgt% tpy	Hex,BTEX,TMP-ea 0.06 Wgt% lb/hr	Hex,BTEX,TMP-ea 0.06 Wgt% tpy	Total HAP 0.35 Wgt% lb/hr	Total HAP 0.35 Wgt% tpy	CO2 0.53 Wgt% lb/hr	CO2 0.53 Wgt% tpy	CH4 65.87 Wgt% lb/hr	CH4 65.87 Wgt% tpy	CO2e GWP = 25 lb/hr	CO2e GWP = 25 tpy
FUG-G (15E)	Process Piping Fugitives (Gas)	Valves	3,550	0.00992	87%	4.58	20.05	1.10	4.82	2.7E-03	0.01	0.02	0.07	0.02	0.11	3.02	13.21	75	330
		Pump Seals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Other	169	0.01940	0%	3.28	14.36	0.79	3.45	1.9E-03	0.01	0.01	0.05	0.02	0.08	2.16	9.46	54	237
		Connectors	4,841	0.00044	33%	1.43	6.26	0.34	1.50	8.4E-04	3.7E-03	5.1E-03	0.02	0.01	0.03	0.94	4.13	24	103
		Flanges	6,372	0.00086	0%	5.48	24.00	1.32	5.76	3.2E-03	0.01	0.02	0.08	0.03	0.13	3.61	15.81	90	395
		Open-ended lines	166	0.00441	0%	0.73	3.21	0.18	0.77	4.3E-04	1.9E-03	2.6E-03	0.01	3.9E-03	0.02	0.48	2.11	12	53
			15,098		Pre-Control:	46.84	205.17	11.25	49.28	0.03	0.12	0.17	0.72	0.25	1.09	30.86	135.15	772	3,380
					Controlled:	15.50	67.88	3.72	16.30	0.01	0.04	0.05	0.24	0.08	0.36	10.21	44.71	255	1,118

Unit	Description	Component (Unit) Type (Light Liquid)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Tot Hydrocarbons (THC) lb/hr	Tot Hydrocarbons (THC) tpy	VOC 100.00 Wgt% lb/hr	VOC 100.00 Wgt% tpy	Hex,BTEX,TMP-ea 0.23 Wgt% lb/hr	Hex,BTEX,TMP-ea 0.23 Wgt% tpy	Total HAP 1.38 Wgt% lb/hr	Total HAP 1.38 Wgt% tpy	CO2 --- Wgt% lb/hr	CO2 --- Wgt% tpy	CH4 --- Wgt% lb/hr	CH4 --- Wgt% tpy	CO2e GWP = 25 lb/hr	CO2e GWP = 25 tpy
FUG-L (15E)	Process Piping Fugitives (Light Liquid)	Valves	1,775	0.00551	84%	1.57	6.86	1.57	6.86	3.6E-03	0.02	0.02	0.09	—	—	—	—	—	—
		Pump Seals	140	0.02866	69%	1.24	5.43	1.24	5.43	2.9E-03	0.01	0.02	0.08	—	—	—	—	—	—
		Other	85	0.01653	0%	1.40	6.12	1.40	6.12	3.2E-03	0.01	0.02	0.08	—	—	—	—	—	—
		Connectors	2,421	0.00046	33%	0.75	3.29	0.75	3.29	1.7E-03	0.01	0.01	0.05	—	—	—	—	—	—
		Flanges	3,186	0.00024	0%	0.77	3.38	0.77	3.38	1.8E-03	0.01	0.01	0.05	—	—	—	—	—	—
		Open-ended lines	83	0.00309	0%	0.26	1.12	0.26	1.12	5.9E-04	2.6E-03	3.5E-03	0.02	—	—	—	—	—	—
			7,689		Pre-Control:	17.33	75.90	17.33	75.90	0.04	0.18	0.24	1.05	—	—	—	—	—	—
					Controlled:	5.98	26.20	5.98	26.20	0.01	0.06	0.08	0.36	—	—	—	—	—	—
					TOTAL PRE-CONTROL FUGITIVE EMISSIONS:	64.17	281.07	28.58	125.17	0.07	0.30	0.41	1.78	0.25	1.09	30.86	135.15	772	3,380
					TOTAL CONTROLLED FUGITIVE EMISSIONS:	21.48	94.08	9.70	42.50	0.02	0.10	0.14	0.60	0.08	0.36	10.21	44.71	255	1,118

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

2 - Gas/Vapor emissions calculated using EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, Nov 1995.

TABLE 2.4 O&G PROD (AVE)	Gas kg/hr	Gas lb/hr	Light Liquid kg/hr	Light Liquid lb/hr
Valves	0.00450	0.00992	0.00250	0.00551
Pump Seals	na	na	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-Ended Lines	0.00200	0.00441	0.00140	0.00309

3 - Light Liquid Component counts are estimated at 50% of Gas Components. margin

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

5 - To be conservative, the following emission characteristics were assumed:

Pollutant	Gas (Inlet)	Light Liquid (NGL)
Carbon Dioxide	0.53 Wgt%	— Wgt%
Methane	65.87 Wgt%	— Wgt%
VOC	24.02 Wgt%	100.00 Wgt%
Total HAP	0.35 Wgt%	1.38 Wgt%

6 - The facility has implemented an LDAR Program. Control effectiveness is estimated as follows:

CONTROL EFFECTIVENESS FOR AN LDAR PROGRAM AT A SOCMI PROCESS UNIT

Equipment Type and Service	Control Effectiveness (%) Monthly Monitoring 10,000 ppmv Leak Definition	Quarterly Monitoring 10,000 ppmv Leak Definition	HON[a]
Valves - gas	87	67	92
Valves - light liquid	84	61	88
Pumps - light liquid	69	45	75
Compressors - gas	[b]	[b]	93
Connectors - gas and light liquid	[b]	33	[b]
Pressure relief devices - gas	[b]	44	[b]

[a] Control effectiveness attributed to the requirements of the HON equipment leak regulation is estimated based on equipment-specific leak definitions and performance levels.

[b] Data not available to estimate control effectiveness.

Potentially Applicable

AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

	Pollutant	GAS-FIRED ENGINES AP-42 Table 3.2-1, 3.2-2, 3.2-3 07/00			GAS-FIRED TURBINES AP-42 Table 3.1-1, 3.1-2a, 3.1-3 04/00		
		2SLB lb/MMBtu	4SLB lb/MMBtu	4SRB lb/MMBtu	Uncontrolled lb/MMBtu	Water Injection lb/MMBtu	Lean Pre-Mix# lb/MMBtu
CRITERIA	NOX (≥ 90% Load)	3.17E+00	4.08E+00	2.21E+00	3.20E-01	1.30E-01	9.90E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.20E-02	3.00E-02	1.50E-02
	THC (TOC)	1.64E+00	1.47E+00	3.58E-01	1.10E-02	1.10E-02	1.10E-02
	NMHC (THC-CH4)	1.90E-01	2.20E-01	1.28E-01	2.40E-03	2.40E-03	2.40E-03
	NMNEHC (NMHC-C2H6)	1.19E-01	1.15E-01	5.76E-02	2.10E-03	2.10E-03	2.10E-03
	VOC	1.20E-01	1.18E-01	2.96E-02	2.10E-03	2.10E-03	2.10E-03
	SO2*** (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPs	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Ethylbenzene	1.08E-04	3.97E-05	2.48E-05	3.20E-05	3.20E-05	3.20E-05
	Formaldehyde (HCHO)	5.52E-02	5.28E-02	2.05E-02	7.10E-04	7.10E-04	2.00E-05
	n-Hexane	4.45E-04	1.11E-03	---	---	---	---
	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	1.96E-02	1.69E-02	9.42E-03	1.06E-04	1.06E-04	1.06E-04
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			FLARES 13.5-1 01/95	DIESEL ENGINES 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	9.24E-02	8.24E-02	8.24E-02	3.70E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	1.40E-01	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03	1.38E-01	3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03	*5.49E-03*	3.50E-01
	VOC	5.56E-03	5.56E-03	5.56E-03	*5.56E-03*	3.60E-01
	SO2 (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	*5.88E-04*	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	*7.45E-03*	3.10E-01
HAPs	Benzene	2.06E-06	2.06E-06	2.06E-06	*2.06E-06*	9.33E-04
	Ethylbenzene	---	---	---	---	---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05	*7.35E-05*	1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03	*1.76E-03*	---
	Toluene	3.33E-06	3.33E-06	3.33E-06	*3.33E-06*	4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---	---	---
	Xylenes	---	---	---	---	2.85E-04
	Other HAPs	1.86E-06	1.86E-06	1.86E-06	*1.86E-06*	1.05E-03
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	*2.25E-03*	*6.61E-03*
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04	*2.16E-03*	*1.32E-03*
	CO2e	*1.18E+02*	*1.18E+02*	*1.18E+02*	*1.18E+02*	*1.65E+02*

Fuel Type	40 CFR 98 - DEFAULT EMISSION FACTORS Table C-1 to Subpart C of Part 98	Table C-2 to Subpart C of Part 98		
	Default HHV	Carbon Dioxide lb CO2/MMBtu	Methane lb CH4/MMBtu	Nitrous Oxide lb N2O/MMBtu
Fuel Oil No. 2 (Diesel)	0.138 MMBtu/gal	1.61E+02	6.61E-03	1.32E-03
Natural Gas	1.028 MMBtu/scf	1.17E+02	2.20E-03	2.20E-04

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

#Revised by EPA on 11/29/13

Conversion Factors

http://www.onlineconversion.com/

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

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

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

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

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

Rev 03/01/14

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 OVM does NOT propose any changes to the monitoring, recordkeeping, reporting, and testing plans as provided in the current permit (R13-3070). However, Williams OVM does request that the several emission unit descriptions and limitations be modified, as indicated on the following pages.

5.0. Source Specific Requirements (Heaters, 1E-7E)

5.1. Limitations and Standards

5.1.1. Maximum Design Heat Input. The maximum design heat input (MDHI) for Heaters (1E-7E) shall not exceed the following:

Emission Point ID	Name	MDHI MMBtu/hr
1E	**TXP1 Heat Medium Heater**	**26.26**
2E	TXP1 Regen Gas Heater	**9.40**
3E	TXP2 Regen Gas Heater	**20.30**
4E	TXP3 Regen Gas Heater	**20.30**
5E	De-Ethanizer Hot Oil Heater	**68.33**
6E	De-Ethanizer Hot Oil Heater	**68.33**
7E	De-Ethanizer Regen Gas Heater	**10.44**

5.1.2. Maximum emissions from the **26.26 MMBtu/hr TXP1 Heat Medium Heater (1E)** shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**2.57**	**11.28**
Carbon Monoxide	**2.16**	**9.47**
Volatile Organic Compounds	**0.15**	**0.64**

5.1.3. The hourly quantity of natural gas that shall be consumed in the **26.26 MMBtu/hr TXP1 Heat Medium Heater (1E)** shall not exceed **25,748 scf/hr**.

5.1.4. The annual quantity of natural gas that shall be consumed in the **26.26 MMBtu/hr TXP1 Heat Medium Heater (1E)** shall not exceed **226 MMscf/yr**.

5.1.5. Maximum emissions from the **9.40 MMBtu/hr TXP1 Regen Gas Heater (2E)** shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**0.92**	**4.04**
Carbon Monoxide	**0.77**	**3.39**
Volatile Organic Compounds	**0.05**	**0.23**

5.1.6. The hourly quantity of natural gas that shall be consumed in the **9.40 MMBtu/hr TXP1 Regen Gas Heater (2E)** shall not exceed **9,216 scf/hr**.

5.1.7. The annual quantity of natural gas that shall be consumed in the **9.40 MMBtu/hr TXP1 Regen Gas Heater** (2E) shall not exceed **81 MMscf/yr**.

5.1.8. **{Remove Requirements} Reserved**

5.1.9. Maximum emissions from the **20.30 MMBtu/hr TXP2 Regen Gas Heater** (3E) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**0.73**	**3.20**
Carbon Monoxide	**0.81**	**3.56**
Volatile Organic Compounds	**0.39**	**1.69**

5.1.10. The hourly quantity of natural gas that shall be consumed in the **20.30 MMBtu/hr TXP2 Regen Gas Heater** (3E) shall not exceed **19,900 scf/hr.**

5.1.11. The annual quantity of natural gas that shall be consumed in the **20.30 MMBtu/hr TXP2 Regen Gas Heater** (3E) shall not exceed **175 MMscf/yr**.

5.1.12. **{Remove Requirements} Reserved**

5.1.13. Maximum emissions from the **20.30 MMBtu/hr TXP3 Regen Gas Heater** (4E) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**0.73**	**3.20**
Carbon Monoxide	**0.81**	**3.56**
Volatile Organic Compounds	**0.39**	**1.69**

5.1.14. The hourly quantity of natural gas that shall be consumed in the **20.30 MMBtu/hr TXP3 Regen Gas Heater** (4E) shall not exceed **19,900 scf/hr.**

5.1.15. The annual quantity of natural gas that shall be consumed in the **20.30 MMBtu/hr TXP3 Regen Gas Heater** (4E) shall not exceed **175 MMscf/yr**.

5.1.16. **{Remove Requirements} Reserved**

5.1.17. Maximum emissions from each of the **68.33 MMBtu/hr De-Ethanizer Hot Oil Heaters** (5E, 6E) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**2.46**	**10.77**
Carbon Monoxide	**2.53**	**11.07**
Volatile Organic Compounds	**0.38**	**1.67**

5.1.18. The hourly quantity of natural gas that shall be consumed in each of the **68.33 MMBtu/hr De-Ethanizer Hot Oil Heaters** (5E, 6E) shall not exceed **67,000 scf/hr.**

5.1.19. The annual quantity of natural gas that shall be consumed in each of the **68.33 MMBtu/hr De-Ethanizer Hot Oil Heaters** (5E, 6E) shall not exceed **587 MMscf/yr.**

5.1.20. Maximum emissions from the **10.44 MMBtu/hr De-Ethanizer Hot Oil Heater** (7E) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**1.02**	**4.48**
Carbon Monoxide	**0.86**	**3.77**
Volatile Organic Compounds	**0.06**	**0.25**

5.1.21. The hourly quantity of natural gas that shall be consumed in the **10.44 MMBtu/hr De-Ethanizer Hot Oil Heater** (7E) shall not exceed **10,250 scf/hr.**

5.1.22. The annual quantity of natural gas that shall be consumed in the **10.44 MMBtu/hr De-Ethanizer Hot Oil Heater** (7E) shall not exceed **90 MMscf/yr.**

5.1.23. **{Remove Requirements} Reserved**

5.1.24. No Change

6.0. Source-Specific Requirements (Flare Control Device (FL-1, 8E)

6.1. Limitations and Standards

6.1.1. The permittee shall install a Process Flare (8E) to control VOC and HAP emissions to safely combust natural gas and NGL during routine depressurization of portions of the plant for maintenance purposes. **The Process Flare (8E) will also be used to combust ethane.** It is estimated that up to **630.2 MMscf/yr** will be combusted for non-emergency events.

6.1.2. Maximum emissions from the Flare (8E) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Volatile Organic Compounds	**178.11**	**20.36**
Nitrogen Oxides	**641.06**	**73.27**
Carbon Monoxide	**1,279.80**	**146.27**

6.1.3. No Change

7.0. Source-Specific Requirements (Standby Generator, 9E)

7.1. Limitations and Standards

7.1.1. To demonstrate compliance with Section 7.1.2, the quantity of **propane** that shall be consumed in the in the **224 hp propane fired reciprocating engine, Olympian G150LG2 (9E)** shall not exceed **878 standard cubic feet per hour** and **440,000 standard cubic feet per year**.

7.1.2. Maximum emissions from the **224 hp propane fired reciprocating engine, Olympian G150LG2 (9E)** shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**0.99**	**0.25**
Carbon Monoxide	**1.98**	**0.49**
Volatile Organic Compounds	**0.54**	**0.13**
Formaldehyde	**0.04**	**0.01**

7.1.3. **Maximum Yearly Operation Limitation.** The maximum yearly hours of operation for the **224 hp propane fired reciprocating engine, Olympian G150LG2 (9E)** shall not exceed 500 hours per year. Compliance with the Maximum Yearly Operation Limitation shall be determined using a twelve month rolling total. A twelve month rolling total shall mean the sum of the hours of operation at any given time during the previous twelve consecutive calendar months.

7.2. Limitations and Standards

7.2.1 No Change

8.0. Source-Specific Requirements (40CFR60 Subpart JJJJ Requirements, Standby Generator, 9E)

8.1. Limitations and Standards

8.1.1. No Change

9.0. Source-Specific Requirements (40CFR60 Subpart OOOO Requirements, Gas Processing Plants, Reciprocating Engine (9E)

9.1. Limitations and Standards

9.1.1. No Change

10.0. Source-Specific Requirements (Amine Process Vent, 16E)

10.1. Limitations and Standards

10.1.1. Maximum Throughput Limitation. The maximum **ethane** feedstock to the amine system shall not exceed 44,000 bbl/day.

10.1.2. The amine system shall be designed and operated in accordance with the following:

a. Carbon dioxide will be removed from the ethane product in an amine contacting system.

b. The total ethane product shall be contacted with a diethylamine (DEA) solution in the amine contactor where the carbon dioxide in the ethane is removed.

c. The rich amine from the contactor is regenerated in the regenerator where heat input is used to drive the carbon dioxide and water and vent to atmosphere.

d. The lean amine from the bottom of the regenerator is recycled back to the amine contactor.

10.1.3. Maximum emissions from the Amine System (16E) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Volatile Organic Compounds	**0.11**	**0.49**

10.2. Monitoring Requirements

10.2.1. No Change.

11.0. Source-Specific Requirements (Truck Loadout, 14E)

11.1. Limitations and Standards

11.1.1. **Maximum Throughput Limitation.** The maximum quantity of slop oil/condensate that shall be loaded (14E) shall not exceed **4,000,000 gallons per year**..

11.1.2. The Truck Loadout (l4E) shall be operated in accordance with the plans and specifications filed in Permit Application R13-3070B.

11.2. Recordkeeping Requirements

11.2.1. No Change

12.0. Source-Specific Requirements (Storage Tanks 10E-13E)

12.1. Limitations and Standards

12.1.1. The maximum throughput to the storage tanks (10E-13E) shall not exceed the following:

Emission Point ID#	Emission Unit Description	Maximum Annual Throughput (gal/yr)
10E	**Slop Oil/Condensate Tank (00-ST-826)**	**1,000,000**
11E	**Slop Oil/Condensate Tank (00-ST-827)**	**1,000,000**
12E	Slop Oil/Condensate Tank **(00-ST-844)**	**1,000,000**
13E	Slop Oil/Condensate Tank **(00-ST-845)**	**1,000,000**

12.2. Recordkeeping Requirements

12.2.1. No Change

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
LEGAL ADVERTISEMENT

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Williams Ohio Valley Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 New Soure Source Review (NSR) Modification Permit for the existing Oak Grove Gas Plant (GP), located ~3.7 Miles Southeast of Moundsville, and North of Fork Ridge Road, in Marshall County, West Virginia.

Latitude and longitude coordinates are 39.8758 degrees North and -80.6959 degrees West, respectively.

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

79.62	tons of nitrogen oxides per year
119.07	tons of carbon monoxide per year
40.96	tons of volatile organic compounds per year
(0.69)	tons of sulfur dioxide per year
5.10	tons of particulate matter per year
(0.23)	tons of benzene per year
2.04	tons of ethylbenzene per year
0.02	tons of formaldehyde per year
3.70	tons of n-hexane per year
1.96	tons of toluene per year
2.10	tons of 2,2,4-trimethylpentane per year
2.05	tons of xylenes per year
(1.82)	tons of total hazardous air pollutants per year
150,255	tons of carbon dioxide equivalent (CO2e) per year

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

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

Dated this the _____ day of _____ 20_____.

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

ATTACHMENT Q
Business Confidential Claims
(NOT APPLICABLE)

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also

ATTACHMENT R
Authority Forms
(NOT APPLICABLE)

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also

ATTACHMENT S
Title V Permit Revision Information
(NOT APPLICABLE)

APPLICATION FEE

NSR Construction Permit

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 fees may apply, depending on the nature of the application as outlined in Section 3.4.b. of Regulation 22, and shown below:

NSPS Requirements (40CFR60) **(NSPS Dc, JJJJ, and OOOO)**	**$ 1,000**
NESHAPS or Toxic Air Pollutant Requirements (40CFR61 AND 63)	$ 2,500
PSD or Nonattainment Review (45CSR14 and 45CSR19):	
(1) New Major Sources or	$ 10,000
(2) Major Modifications	$ 5,000

Total application fee is **$2,500** [= $1,000 minimum fee + $1,000 additional fees (NSPS)]

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