Williams Ohio Valley Midstream LLC
100 Teletech Drive, Suite 2
Moundsville, WV 26041
(304) 843-4559 phone
(304) 843-3131 fax

May 4, 2016
(Via Federal Express)

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

Subject: Application for 45CSR13 Class II Administrative Permit Update
Williams Ohio Valley Midstream LLC
Whipkey Compressor Station
Marshall County, West Virginia

Dear Ms. McKeone:

Williams Ohio Valley Midstream LLC (OVM) is submitting an Application for 45CSR13 Class II Administrative Permit Update for the existing Whipkey Compressor Station, located off State Route 250 approximately 9 miles SE of Moundsville in Marshall County, West Virginia.

The requested 45CSR13 Class II Administrative Permit Update will supersede and replace Permit R13-3072, issued October 30, 2013. This application for 45CSR13 Class II Administrative Permit Update has been prepared and submitted to provide for the following proposed changes at the subject facility:

- Increase the glycol dehydrator reboiler rating from 0.375 MMBtu/hr to 0.50 MMBtu/hr.
- Decrease the 17.0 MMscfd glycol dehydrator emissions based on a smaller glycol pump and recent representative site-specific extended gas analysis.
- Update Startup/Shutdown/Maintenance (SSM) and Piping and Equipment Fugitive (FUG) emissions based on a site-specific, representative, extended gas analysis.

The table below summarizes the emission changes.

SUMMARY OF EMISSION CHANGES -- WHIPKEY COMPRESSOR STATION

CE-1 - Caterpillar G3306TA Engine - MAXIMUM EMISSIONS (Change in GWP Values)

Pollutant	Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (tpy)		
	Current	Proposed	Change	Current	Proposed	Change
Nitrogen Oxides (NOx)	---	---	---	---	---	---
Carbon Monoxide (CO)	---	---	---	---	---	---
Volatile Organic Compounds (VOC)	---	---	---	---	---	---
Carbon Dioxide Equivalent (CO2e)	238	**240**	2	1,044	**1,052**	8

RSV-1 - Glycol Dehydrator Flash Tank/Still Vent - MAXIMUM EMISSIONS (Smaller Glycol Pump, New Gas Analysis)

Pollutant	Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (tpy)		
	Current	Proposed	Change	Current	Proposed	Change
Nitrogen Oxides (NOx)	---	---	---	---	---	---
Carbon Monoxide (CO)	---	---	---	---	---	---
Volatile Organic Compounds (VOC)	9.35	**2.16**	(7.19)	40.94	**9.46**	(31.48)
Carbon Dioxide Equivalent (CO2e)	175	**137**	(38)	767	**602**	(165)

RBV-1 - Glycol Dehydrator Reboiler - MAXIMUM EMISSIONS (Increased Heat Input Rating)

Pollutant	Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (tpy)		
	Current	Proposed	Change	Current	Proposed	Change
Nitrogen Oxides (NOx)	0.04	**0.05**	0.01	0.18	**0.22**	0.04
Carbon Monoxide (CO)	0.03	**0.04**	0.01	0.15	**0.18**	0.03
Volatile Organic Compounds (VOC)	2.2E-03	**2.7E-03**	4.5E-04	0.01	**0.01**	2.0E-03
Carbon Dioxide Equivalent (CO2e)	49	**59**	10	214	**257**	43

SSM - Facility-Wide Startup, Shutdown and Maintenance - MAXIMUM EMISSIONS (New Gas Analysis)

Pollutant	Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (tpy)		
	Current	Proposed	Change	Current	Proposed	Change
Nitrogen Oxides (NOx)	---	---	---	---	---	---
Carbon Monoxide (CO)	---	---	---	---	---	---
Volatile Organic Compounds (VOC)	---	---	---	1.73	**0.85**	(0.88)
Carbon Dioxide Equivalent (CO2e)	---	---	---	91	**106**	15

FUG - Process Piping Fugitives - MAXIMUM EMISSIONS (New Gas Analysis)

Pollutant	Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (tpy)		
	Current	Proposed	Change	Current	Proposed	Change
Nitrogen Oxides (NOx)	---	---	---	---	---	---
Carbon Monoxide (CO)	---	---	---	---	---	---
Volatile Organic Compounds (VOC)	1.09	**0.58**	(0.50)	4.76	**2.55**	(2.21)
Carbon Dioxide Equivalent (CO2e)	76	**76**	(0)	333	**332**	(2)

Facility-Wide Summary

Pollutant	Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (tpy)		
	Current	Proposed	Change	Current	Proposed	Change
Nitrogen Oxides (NOx)	0.04	**0.05**	0.01	0.18	**0.22**	0.04
Caron Monoxide (CO)	0.03	**0.04**	0.01	0.15	**0.18**	0.03
Volatile Organic Compounds (VOC)	10.44	**2.75**	(7.69)	47.45	**12.87**	(34.57)
Carbon Dioxide Equivalent (CO2e)	538	**512**	(26)	2,449	**2,349**	(101)

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

If you have any questions concerning this submittal or need additional information, please contact me at (304) 843-4559 or erika.baldauff@williams.com.

Sincerely,

Erika Baldauff
Environmental Specialist

Enclosures:

Application for 45CSR13 Class II Administrative Permit Update
Check for Application Fee

APPLICATION FOR 45CSR13
CLASS II ADMINISTRATIVE PERMIT UPDATE

For the:

Williams Ohio Valley Midstream LLC

WHIPKEY COMPRESSOR STATION

Marshall County, West Virginia

Submitted to:

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

Submitted by:

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

Prepared by:

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

May 2016

APPLICATION FOR 45CSR13
CLASS II ADMINISTRATIVE PERMIT UPDATE

Williams Ohio Valley Midstream LLC
WHIPKEY COMPRESSOR STATION

Marshall County, West Virginia

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APPLICATION FOR 45CSR13
CLASS II ADMINISTRATIVE PERMIT UPDATE

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**

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

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

3. Name of facility *(if different from above):*
WHIPKEY COMPRESSOR STATION

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

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

5B. Facility's present physical address:
OFF STATE ROUTE 250
APPROXIMATELY 9 MILES SE OF MOUNDSVILLE, WV

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 SITE**
- If **NO,** you are not eligible for a permit for this source.

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

10. North American Industry Classification System **(NAICS)** code for the facility:
213112 – SUPPORT ACTIVITIES FOR OIL AND GAS OPERATIONS

11A. DAQ Plant ID No. (for existing facilities only):
051-00160

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-3072

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

12A.

- For **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 MOUNDSVILLE: HEAD NORTH ON JEFFERSON AVE FOR 0.3 MILES TOWARD 3RD STREET, TURN RIGHT ONTO 1ST STREET AND TRAVEL 0.8 MILES, THEN TURN LEFT ONTO US-250 S/WAYNESBURG PIKE AND TRAVEL 13.8 MILES, TURN LEFT ONTO BANE LANE AND TRAVEL 0.1 MILES TO FACILITY.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
39.8743 DEGREES LATITUDE AND -80.56865 DEGREES LONGITUDE.	**MOUNDSVILLE**	**MARSHALL**
12.E. UTM Northing (KM):	12F. UTM Easting (KM):	12G. UTM Zone:
4,413.895	**536.887**	**17**

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

THE DEHYDRATOR REBOILER RATING WILL BE INCREASED FROM 0.375 MMBTU/HR TO 0.50 MMBTU/HR.

THE DEHYDRATOR GLYCOL PUMP WILL BE REDUCED FROM A KIMRAY 21015 PV TO A KIMRAY 4020 PV.

INCORPORATION OF THE ABOVE CHANGES AND USE OF A NEW EXTENDED GAS ANALYSIS WILL RESULT IN EMISSION CHANGES TO:

- **DEHYDRATOR STILL VENT/FLASH TANK EMISSIONS (RSV-1)**
- **DEHYDRATOR REBOILER (RBV-1)**
- **STARTUP/SHUTDOWN/MAINTENANCE EMISSIONS (SSM)**
- **PROCESS PIPING FUGITIVE EMISSIONS (FUG)**

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

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

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

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

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

23. Provide a **Process Description** as **Attachment G.**

– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

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

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

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

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

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

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

☐ Bulk Liquid Transfer Operations
☐ 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: **Glycol Dehydration Unit**

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

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

☐ Absorption Systems
☐ Adsorption Systems
☐ Afterburner
☐ Baghouse
☐ Condenser
☐ Electrostatic Precipitator
☐ Flare
☐ Mechanical Collector
☐ Wet Collecting System
☐ Other Collectors, specify :

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

☐ Authority of Corporation or Other Business Entity
☐ Authority of 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 (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE Paul V. Hunter (Please use blue ink) DATE: 05/04/2016 (Please use blue ink)

35B. Printed name of signee: **PAUL HUNTER**		35C. Title: **GENERAL MANAGER, OHIO RIVER SUPPLY HUB**
35D. E-mail: **PAULV.HUNTER@WILLIAMS.COM**	36E. Phone: **(412) 787-5561**	36F. FAX: **(412) 787-6002**
36A. Printed name of contact person (if different from above): **ERIKA BALDAUFF**		36B. Title: **ENVIRONMENTAL SPECIALIST**
36C. E-mail: **ERIKA.BALDAUFF@WILLIAMS.COM**	36D. Phone: **(304) 843-4559**	36E. FAX: **(304) 843-3131**

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**
- ☐ **Attachment R: Authority Forms**
- ☐ **Attachment S: Title V Permit Revision Information**
- ☒ **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 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

ATTACHMENT D
Regulatory Discussion

Williams Ohio Valley Midstream LLC
WHIPKEY COMPRESSOR STATION
Application for 45CSR13 Class II Administrative Permit Update

A. Applicability of New Source Review (NSR) Regulations

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

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

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

- NOx: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- VOC: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- SO2: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- PM10/2.5: PSD Natural Minor Source with Pre-Controlled PTE < 250 tpy
- CO2e: PSD Natural Minor Source with Pre-Controlled PTE < 100,000 tpy

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

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

- PM10/2.5: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy
- NOx: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy
- SO2: NNSR Natural Minor Source with Pre-Controlled PTE < 100 tpy

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

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

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

4. Title V Operating Permit [Not Applicable]

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

- NOx: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- CO: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy

- VOC: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- SO2: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- PM10/2.5: Title V Natural Minor Source with Pre-Controlled PTE < 100 tpy
- Each HAP: Title V Natural Minor Source with Pre-Controlled HCHO PTE < 10 tpy
- Total HAPs: Title V Natural Minor Source with Pre-Controlled PTE < 25 tpy
- CO2e: Title V Natural Minor Source with Pre-Controlled < 100,000 tpy

B. Applicability of Federal Regulations

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

1. NSPS Dc, Steam Generating Units

40CFR§60.40c-§60.48c [Not Applicable]

This rule does not apply because there is no steam generating unit (or line heater) at the facility with a maximum design heat input capacity ≥ 10 MMBtu/hr and ≤ 100 MMBtu/hr (§60.40c(a)).

2. NSPS Kb, Volatile Organic Liquid Storage Vessels

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

This rule does not apply because each tank has a design capacity < 75 m3 (19,813 gal, 472 bbl) (§60.110b(a)).

3. 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).

4. NSPS KKK, Leaks from Natural Gas Processing Plants

40CFR§60.630-§60.636 [Not Applicable]

This rule does not apply because the facility is not located at a natural gas processing plant that is engaged in the extraction of natural gas liquids from field gas (§60.630(e)).

5. 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)).

6. 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)).

7. NSPS JJJJ, Stationary Spark Ignition (SI) Internal Combustion Engines (ICE)
40CFR§60.4230-§60.4248 [Not Applicable]

This rule does not apply to the 203 bhp Caterpillar G3306TA compressor engine (CE-01) because its maximum engine power is less than 500 HP and manufactured before 07/01/08 (§60.4230(a)(4)(iii)).

8. 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).

9. NSPS OOOO, Crude Oil and Natural Gas Production
40CFR§60.5360-§60.5430 [Not Applicable]

This rule does not apply to the reciprocating compressor because it commenced construction prior to 08/23/11 (§60.5360 and §60.5365(c)). The gas compressor was operated at another location prior to 08/23/11 and as provided in the NSPS General Provisions at 40 CFR 60.14(e)(6), relocation of an existing facility is not a modification.

This rule does not apply to the produced water storage vessels (tanks) because each tank does not have the potential to emit VOC ≥ 6 tpy (§60.5420).

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

10. NESHAP HH, Oil and Natural Gas Production Facilities
40CFR§63.760-§63.779 [Applicable]

This rule does apply to the dehydrator. However, because the dehydrator will have an actual annual average flowrate of natural gas < 3 MMscfd or actual annual average benzene emissions < 0.9 megagrams per year, it is exempt from all requirements except to maintain records of actual annual average flowrate of natural gas or actual annual average benzene emissions (as appropriate) to demonstrate continuing exemption status (§63.764(e)(1)).

11. 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)).

12. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175 [Not Applicable]

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

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

40CFR§63.6580-§63.6675 [Applicable]

This rule does apply to the 203 bhp Caterpillar G3306TA (4SRB) engine because it is a "new" RICE; i.e., commenced construction on or after 06/12/06 (§63.6590(a)(2)(iii)). The only requirement is compliance with 40CFR§60.4230-§60.4248 (NSPS JJJJ) for Spark Ignition Internal Combustion Engines.

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

40CFR§63.7480 – §63.7575 [Not Applicable]

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

15. 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.

16. Chemical Accident Prevention Provisions

40CFR§68.1-§68.220 [Not Applicable]

This rule does not apply because the facility does not store more than a threshold quantity of a regulated substance in a process, as determined under § 68.115.

17. Mandatory Greenhouse Gases (GHG) Reporting

40CFR§98.1-§98.9 [Not Applicable]

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

C. Applicability of Source Aggregation

This rule does not apply. The following discussion addresses source aggregation for the facility.

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

1) Belong to the same industrial grouping;
2) Are located on one or more contiguous or adjacent properties; and
3) Are under control of the same person (or persons under common control).

Natural gas is currently produced upstream from Whipkey Compressor Station (Whipkey) by multiple Marcellus Shale gas wells owned and operated by Trans Energy, Inc. (Trans Energy). Additional production wells owned by Trans Energy are expected to send gas to Whipkey in the near future. In addition, other producers' gas may also be sent to Whipkey. Whipkey will then transport the collected natural gas via a main gathering line, which collects gas from other similar stations, to downstream processing and transmission.

Same Industrial Grouping

The Whipkey Compressor Station operates under SIC code 1389 (Oil and Gas Field Services, Not Elsewhere Classified). The upstream gas production wells operate under SIC code 1311 (Crude Petroleum and Natural Gas). Therefore, both share the same two-digit major SIC code of 13 as the upstream gas production wells.

Contiguous or Adjacent

"Contiguous or Adjacent" determinations are made on a case-by-case basis. These determinations are proximity based, and it is important to focus on this criteria and whether it meets the common sense notion of a plant. Neither West Virginia nor federal regulations define the terms "contiguous" or "adjacent" or place any definitive restrictions on how distant two emission units can be and still be considered located on contiguous or adjacent properties for the purposes of a single source determination. Contiguous has a definition of being in actual contact; touching along a boundary or at a point. Adjacent has a definition of not distant, nearby, having a common endpoint or border.

The Whipkey Compressor Station is located in close proximity to the initial production wells, separated by an access road. The location for Whipkey was chosen because of suitable characteristics for construction. Specific characteristics were the availability of a reasonably flat grade and accessibility for large trucks and equipment. The station does not have to be located in the immediate vicinity of the wells to operate properly, but compression must be provided between the wells and the main gathering line to allow for adequate pressure so the gas may enter the line. While this makes it attractive to locate the facility at the wells, the facility could be moved and therefore does not meet the common sense notion of plant. Additionally, there is no other Williams OVM facility located within 0.5 miles of the Whipkey Compressor Station.

Common Control

Williams OVM operates under their parent company The Williams Companies, Inc. (Williams) and is the sole operator of Whipkey Compressor Station. The production wells that send natural gas to Whipkey are owned and operated by Trans Energy. Williams has

no ownership stake in any production well that may send natural gas to Trans Energy. This is demonstrated by the fact that Williams OVM and Williams have no ownership interest in Trans Energy or any of their respective parents, subsidiaries, or affiliates. Furthermore, neither Williams OVM nor Williams exercise operational control over any equipment owned or operated by any natural gas producer upstream of Whipkey. All employees at Whipkey are under the exclusive direction of Williams and have no reporting authority to any other entity. Employees of the production well owners have no shared reporting authority and the companies operate independent of one another. No employees are expected to frequently shuttle back and forth between Whipkey and any production wells.

At this time, contracts are in place for Whipkey to handle gas for the above mentioned producer. As commercial opportunities are identified, Whipkey will potentially receive gas from other producers in the future. Similar to the current production wells, Williams OVM 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 OVM. Similarly, Williams OVM cannot control the installation or operation of any equipment located at a well site that may be considered an air contamination source.

The above characteristics are not consistent with sources under common control. No upstream gas wells or equipment are under common control. The Whipkey Compressor Station and the wells upstream do not meet the common sense notion of plant because the station's location could be moved. Therefore, emissions from the Whipkey Compressor Station should not be aggregated with other facilities in determining major source or PSD status.

Determination

As the facilities upstream of Whipkey Compressor Station are neither "Contiguous nor Adjacent" properties, or under common control, emissions from the Whipkey Compressor Station should not be aggregated with other facilities in determining major source or PSD status.

D. Applicability of State Regulations

The following State regulations are potentially applicable to natural gas production facilities. Applicability to the facility has been determined as follows:

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

The rule does apply as the dehydrator reboiler has been determined to meet the definition of a "fuel burning unit" under 45CSR2 and is, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the dehydrator reboiler has a maximum design heat input (MDHI) rating less than 10 MMBtu/hr, the unit is not subject to Sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement for the unit is under Section 3.1 - Visible Emissions Standards.

Pursuant to 45CSR2, Section 3.1, the dehydrator reboiler is subject to an opacity limit of 10%. Proper operation and maintenance of the unit (and use of natural gas as fuel) should keep the opacity of the unit well below 10% during normal operations.

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

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

3. **Control of Air Pollution from Combustion of Refuse**
   45CSR6 [Not Applicable]

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

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

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

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

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

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

The rule does not apply because the facility is not a major source of pollutants.

7. **Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60**
   45CSR16 [Not Applicable]

This rule does not apply because the facility is not subject to any New Source Performance Standard (NSPS).

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

This rule does not apply because the facility is a minor (or "deferred") source of all regulated pollutants.

9. **Air Quality Management Fees Program**
   45CSR22 [Applicable]

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

10. **Prevent and Control Emissions of Toxic Air Pollutants**
    45CSR27 [Not Applicable]

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

11. **Air Pollution Emissions Banking and Trading**
    45CSR28 [Not Applicable]

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

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

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

13. **Requirements for Operating Permits**
    45CSR30 [Not Applicable]

This rule does not apply as the facility is a minor (or "deferred") source of all regulated pollutants.

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."

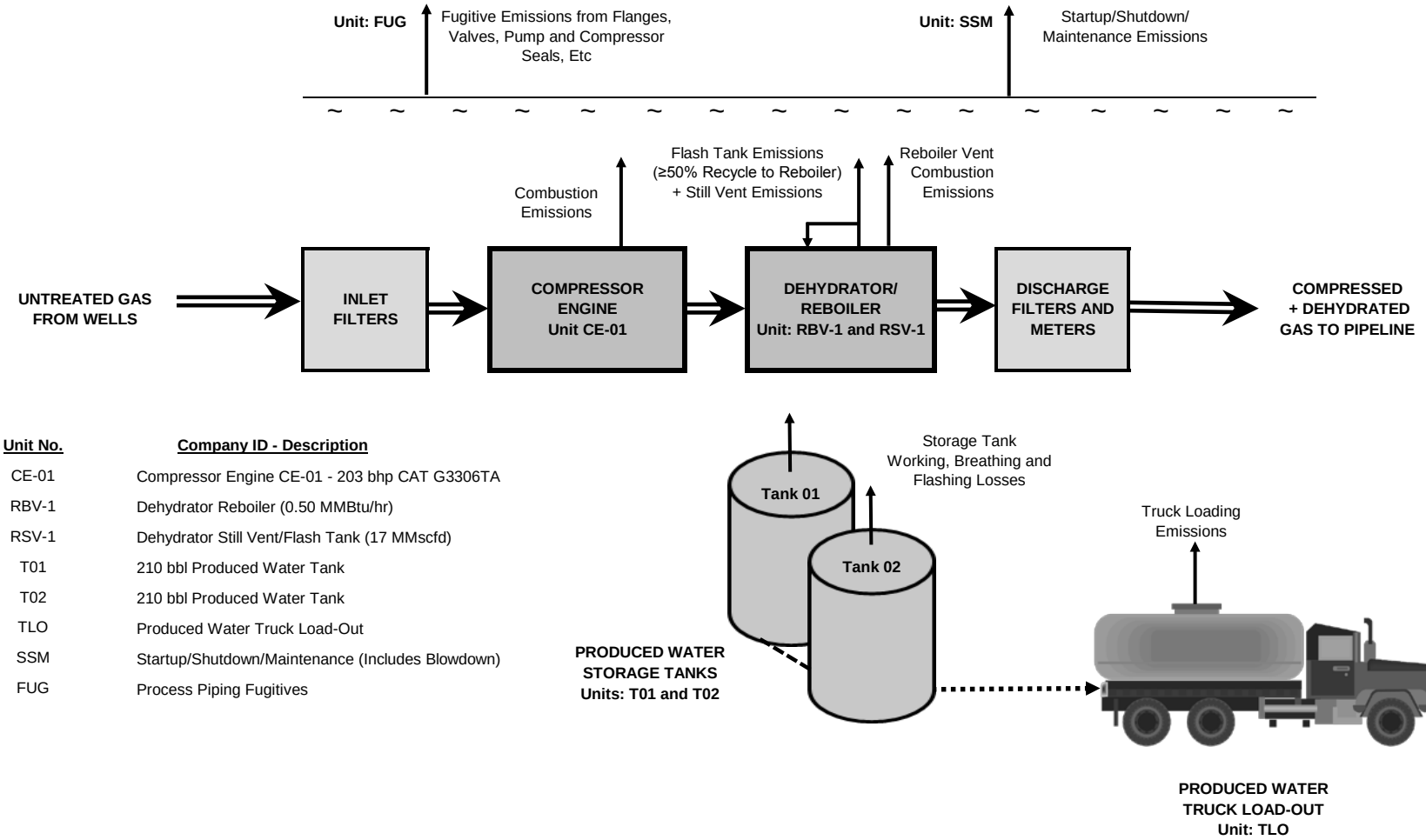
- Process Flow Diagram (PFD)

Williams Ohio Valley Midstream LLC

WHIPKEY COMPRESSOR STATION

Application for 45CSR13 Class II Administrative Permit Update

Process Flow Diagram (PFD)



Unit No.	Company ID - Description
CE-01	Compressor Engine CE-01 - 203 bhp CAT G3306TA
RBV-1	Dehydrator Reboiler (0.50 MMBtu/hr)
RSV-1	Dehydrator Still Vent/Flash Tank (17 MMscfd)
T01	210 bbl Produced Water Tank
T02	210 bbl Produced Water Tank
TLO	Produced Water Truck Load-Out
SSM	Startup/Shutdown/Maintenance (Includes Blowdown)
FUG	Process Piping Fugitives

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). "

ATTACHMENT G
Process Description

Williams Ohio Valley Midstream LLC
WHIPKEY COMPRESSOR STATION
Application for 45CSR13 Class II Administrative Permit Update

A. Project Overview

Williams Ohio Valley Midstream LLC is proposing to modify the Whipkey Compressor Station located off State Route 250 approximately 9 miles southeast of Moundsville in Marshall County. The facility receives natural gas from local production wells then compresses and dehydrates the gas for delivery to a gathering pipeline.

This application for 45CSR13 Class II Administrative Permit Update has been prepared and submitted to provide for the following proposed changes at the subject facility:

- Increase the glycol dehydrator reboiler rating from 0.375 MMBtu/hr to 0.50 MMBtu/hr.
- Decrease the 17.0 MMscfd glycol dehydrator emissions based on a smaller glycol pump and recent representative site-specific gas analysis.
- Update Startup/Shutdown/Maintenance (SSM) and Piping and Equipment Fugitive (FUG) emissions based on a site-specific, representative, extended gas analysis.

B. Compressor Engine

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

C. Dehydrator

One (1) triethylene glycol dehydrator is utilized at the facility. The dehydrator (RBV-1 and RSV-1) is used to remove water vapor from the inlet wet gas stream to meet pipeline specifications. In the dehydration process, the wet inlet gas stream flows through a contactor tower where the gas is contacted with lean glycol. The lean glycol absorbs the water in the gas stream and becomes rich glycol laden with water and trace amounts of hydrocarbons. The rich glycol is then routed to a flash tank where the glycol pressure is reduced to liberate the lighter end hydrocarbons. At least 50 percent of the lighter end hydrocarbons are routed from the flash tank for use as reboiler fuel. The rich glycol is then sent from the flash tank to the regenerator where the glycol is heated to drive off the water vapor and any remaining hydrocarbons. Once boiled, the glycol is returned to a lean state and used again in the process.

D. Condensate Tank

The produced water tanks receive liquids from the dehydrator and inlet separator. Liquids removed through the dehydration process are cooled, condensed and sent to the 210 barrel atmospheric storage tanks (T01 and T02). The inlet separator removes produced fluids (primarily water) and these liquids are also sent to the 210 bbl atmospheric storage tanks.

E. Truck Loading

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

F. Startup, Shutdown and Maintenance

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

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."

- NATURAL GAS MSDS
- INLET GAS ANALYSIS
- INLET GAS COMPOSITION

WELLHEAD NATURAL GAS

Safety Data Sheet

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

Version: 1.1 Revision Date: 05/21/2015

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.

CAS No. 74-82-8

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 800-945-5426
ehs@williams.com

Emergency Telephone Number

Emergency number **Chemtrec** - 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

NFPA 704 Hazard Class

Health: 1 Flammability: 4 Instability: 0

0 (Minimal)
1 (Slight)
2 (Moderate)
3 (Serious)
4 (Severe)

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 (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.

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

Conditions for Safe Storage, Including Any Incompatibilities

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.

Specific End Use(s) Industrial use

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Chemical Name	ACGIH	OSHA	NIOSH
Methane	STEL: 1000 ppm	--	REL (TWA): 800 ppm REL (TWA):1900 mg/m^3
Ethane	Minimal oxygen content - asphyxia	1926.55 - Simple asphyxiant	--
Propane	Minimal oxygen content - asphyxia	TWA: 1000 ppm TWA: 1800 mg/m3	REL (TWA): 1000 ppm REL (TWA):1800 mg/m^3 IDLH: 2100 PPM (10%)

Carbon dioxide	TWA: 5000 ppm STEL: 30000 ppm	PEL (TWA): 5000 ppm PEL (TWA): 9000 mg/m^3	REL (TWA): 5000 ppm REL (TWA): 9000 mg/m^3 REL (STEL): 30000 ppm REL (STEL): 54000 mg/m^3 IDLH: 40000 mg/m^3
Butane	STEL: 1000 ppm	--	REL (TWA): 800 ppm REL (TWA):1900 mg/m^3
Hydrogen Sulfide	STEL: 5 ppm TWA: 1 ppm	1910.1000 - Ceiling: 20 ppm 1926.55 - TWA: 15 mg/m^3 1926.55 - TWA: 10 ppm	REL (Ceiling): 10 ppm REL (Ceiling):15 mg/m^3 IDLH: 100 ppm

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

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 safety glasses.

Skin and Body Protection: Wear appropriate protective clothing.

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	:	Gasoline-like or natural gas odor. May contain hydrogen sulfide, which has a rotten egg odor.
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 (air = 1)
Relative Density	:	Not available
Specific Gravity	:	Not available
Solubility	:	Negligible
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	:	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 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

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

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)	LC50 Inhalation Rat (mg/l)

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

SECTION 12: ECOLOGICAL INFORMATION

GHS Classification:

No classified hazards

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	Product is biodegradable.

Bioaccumulative Potential

WELLHEAD NATURAL GAS	
Bioaccumulative Potential	Not expected to bioaccumulate.

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

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

HYDROGEN SULFIDE (7783-06-4)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.45 (at 25 °C)

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

UN Number

UN-No.(DOT): 1971

DOT NA no.: UN1971

UN Proper Shipping Name

DOT Proper Shipping Name : UN1971, Natural gas, compressed (with high methane content), 2.1

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

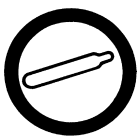
Wellhead Natural Gas	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard

Listed on the United States TSCA (Toxic Substances Control Act) inventory
Methane (74-82-8)
Ethane (74-84-0)
Propane (74-98-6)
Butane (106-97-8)
Carbon dioxide (124-38-9)
Nitrogen (7727-37-9)

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 %

Canadian Regulations

WELLHEAD NATURAL GAS	
WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas



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 SDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION

Revision date : 05/21/2015

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

Guide to Abbreviations:

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

Disclaimer of Expressed and implied Warranties:

The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Party Responsible for the Preparation of This Document

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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

Williams Ohio Valley Midstream LLC (OVM)

WHIPKEY COMPRESSOR STATION

Application for 45CSR13 Class II Administrative Permit Update

Attachment H - Gas Analysis

Extended Gas Analysis Summary

Whipkey Dehy Inlet Extended Analysis, Sample Dated 03/17/2016

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Water	109-86-4	H2O	18.02	---	---	---	---	---
Carbon Monoxide	630-08-0	CO	28.01	---	---	---	---	---
Nitrogen	7727-37-9	N2	28.01	**0.3297**	0.00330	0.0924	0.4690	**243.38**
Oxygen	7782-44-7	O2	32.00	---	---	---	---	---
Hydrogen Sulfide	2148-87-8	H2S	34.09	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	**0.1230**	0.00123	0.0541	0.2749	**142.65**
Methane*	75-82-8	CH4	16.04	**81.8390**	0.81839	13.1290	66.6745	**34,597.13**
Ethane*	74-84-0	C2H6	30.07	**12.5702**	0.12570	3.7797	19.1951	**9,960.26**
Propane**	74-98-6	C3H8	44.10	**3.3748**	0.03375	1.4881	7.5574	**3,921.50**
i-Butane**	75-28-5	C4H10	58.12	**0.4713**	0.00471	0.2739	1.3911	**721.85**
n-Butane**	106-97-8	C4H10	58.12	**0.7165**	0.007165	0.4164	2.1149	**1,097.41**
Cyclopentane**	287-92-3	C5H10	70.10	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	**0.2078**	0.002078	0.1499	0.7614	**395.08**
n-Pentane**	109-66-0	C5H12	72.15	**0.1492**	0.001492	0.1076	0.5467	**283.67**
Neopentane	---	C5H12	72.15	---	---	---	---	---
Cyclohexane**	110-82-7	C6H12	84.16	**0.0108**	0.000108	0.0091	0.0462	**23.95**
Other Hexanes**	110-54-3	C6H14	86.18	**0.0961**	0.000961	0.0828	0.4206	**218.23**
Methylcyclohexanes**	varies	C7H14	98.19	**0.0075**	0.000075	0.0074	0.0374	**19.41**
Heptanes**	varies	C7H16	100.20	**0.0476**	0.000476	0.0477	0.2422	**125.69**
C8+ Heavies**	varies	C8+	130.00 est	**0.0095**	0.000095	0.0124	0.0627	**32.54**
Benzene***	71-43-2	C6H6	78.11	**0.0011**	0.000011	0.0009	0.0044	**2.26**
Ethylbenzene***	100-41-4	C8H10	106.17	---	---	---	---	---
n-Hexane***	110-54-3	C6H14	86.18	**0.0438**	0.000438	0.0377	0.1917	**99.46**
Toluene***	108-88-3	C7H8	92.14	**0.0021**	0.000021	0.0019	0.0098	**5.10**
2,2,4-Trimethylpentane**	540-84-1	C8H18	114.23	---	---	---	---	---
Xylenes***	1330-20-7	C8H10	106.17	---	---	---	---	---

Total:	**100.00**	**1.0000**	**19.69**	**100.00**	**51,890**
THC:	**99.55**	**0.9955**	**19.54**	**99.26**	**51,504**
Total CH4:	**81.84**	**0.8184**	**13.13**	**66.67**	**34,597**
Total VOC:	**5.14**	**0.0514**	**2.64**	**13.39**	**6,946**
Total HAP:	**0.047**	**0.0005**	**0.04**	**0.21**	**107**

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

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

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

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Assumption (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Nitrogen	7727-37-9	N2	0.3297	0.4690	243.38	0.000	0.000	0.00
Carbon Dioxide	124-38-9	CO2	0.1230	0.2749	142.65	0.148	0.330	171.18
Methane*	75-82-8	CH4	81.8390	66.6745	34,597.13	98.21	83.61	41,516.56
Ethane*	74-98-6	C2H6	12.5702	19.1951	9,960.26	0.000	0.000	0.00
VOC**	Various	C3 thru C10+	5.1381	13.3864	6,946.15	6.166	16.064	8,335.38
Benzene***	71-43-2	C6H6	0.0011	0.0044	2.26	0.0013	0.005	2.72
Ethylbenzene***	100-41-4	C8H10	---	---	---	0.0500	0.250	150.00
n-Hexane***	110-54-3	C6H14	0.0438	0.1917	99.46	0.0526	0.230	119.36
Toluene***	108-88-3	C7H8	0.0021	0.0098	5.10	0.0025	0.012	6.12
2,2,4-Trimethylpentane**	540-84-1	C8H18	---	---	---	0.0500	0.250	150.00
Xylenes***	1330-20-7	C8H10	---	---	---	0.0500	0.250	150.00
Total HAP***	Various	C6 thru C8	0.0470	0.2059	106.83	0.2064	0.997	578.19

Gas Analytical Services

BOSSIER CITY, LA

318-226-7237

Good

LELAP Certification #

04049

Customer	: 2259 - WILLIAMS OHIO VALLEY MIDSTREAM LLC	**Date Sampled**	: 03/17/2016
Station ID	: 9401	**Date Analyzed**	: 03/28/2016
Cylinder ID	: w7019	**Effective Date**	: 04/01/2016
Producer	: ENVIRONMENTAL	**Cyl Pressure**	: 832
Lease	: WHIPKEY DEHY INLET	**Temp**	: 92
Area	: 503 - ENV-BILL THOMPSON	**Cylinder Type**	: Spot
State	: WV	**Sample By**	: LEE HA

COMPONENT	MOL%	GPM@14.73(PSIA)
Oxygen	0.0000	0.000
Nitrogen	0.3297	0.000
Methane	81.8390	0.000
Carbon-Dioxide	0.1230	0.000
Ethane	12.5702	3.372
Propane	3.3748	0.932
Iso-Butane	0.4713	0.155
Normal-Butane	0.7165	0.227
Iso-Pentane	0.2078	0.076
Normal-Pentane	0.1492	0.054
2,2-Dimethylbutane	0.0096	0.004
2,3-Dimethylbutane/CycloC5	0.0120	0.004
2-methylpentane	0.0465	0.019
3-methylpentane	0.0280	0.011
Normal-Hexane	0.0438	0.018
2,2-Dimethylpentane	0.0020	0.001
Methylcyclopentane	0.0067	0.002
BENZENE	0.0011	0.000
3,3-Dimethylpentane	0.0017	0.001
CYCLOHEXANE	0.0041	0.001
2-Methylhexane	0.0176	0.008
2,3-Dimethylpentane	0.0033	0.001
3-Methylhexane	0.0114	0.005
1,t2-DMCYC5 / 2,2,4-TMC5	0.0002	0.000
1,t3-Dimethylcyclopentane	0.0001	0.000
N-Heptane	0.0116	0.005
METHYLCYCLOHEXANE	0.0072	0.003
2,5-Dimethylhexane	0.0008	0.000
2,3-Dimethylhexane	0.0009	0.000
TOLUENE	0.0021	0.001
2-Methylheptane	0.0024	0.001
4-Methylheptane	0.0014	0.001
3-Methylheptane	0.0011	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
2,6-Dimethylheptane / 1,C2-DMCYC6	0.0000	0.000

Ethylcyclohexane	0.0000	0.000	
ETHYLBENZENE	0.0000	0.000	
M-XYLENE	0.0000	0.000	
P-XYLENE	0.0000	0.000	
O-XYLENE	0.0000	0.000	
NONANE	0.0000	0.000	
N-DECANE	0.0000	0.000	
N-UNDECANE	0.0000	0.000	
TOTAL	**100.0000**	**4.904**	

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9968 **C5+ GPM** : 0.21800

Ideal Gravity: 0.6798 **Real Gravity:** 0.6817 **C5+ Mole %** : 0.5755

BTU @ (PSIA)	**@14.65**	**@14.696**	**@14.73**	**@15.025**
Ideal GPM	4.865	4.881	4.892	4.990
Ideal BTU Dry	1,194.01	1,197.76	1,200.53	1,224.57
Ideal BTU Sat	1,173.11	1,176.86	1,179.63	1,203.68
Real GPM	4.881	4.896	4.907	5.006
Real BTU Dry	1,197.77	1,201.55	1,204.33	1,228.53
Real BTU Sat	1,177.27	1,181.05	1,183.84	1,208.04

Comments: ENVIROMENTAL
BILL THOMPSON
LEE HA

Gas Analysis performed in accordance with GPA 2286 **Sample Count** : 210000720

Analytical Calculations performed in accordance with GPA 2172 **COC** :

Measurement Analyst: _____ **DEBORAH J MURPHY**

ATTACHMENT I

Emission Units Table

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

Attachment I

EMISSION UNITS TABLE

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

Unit ID[1]	Point ID[2]	Description	Year Installed/ Modified	Capacity	Type[3] and Date	Control[4]
CE-01	1E	Caterpillar G3306TA Engine	2013	203 bhp	Existing	01-NSCR
RBV-1	2E	Glycol Dehydrator Reboiler	2013/2016	0.50 MMBtu/hr	Modified	na
RSV-1	3E	Glycol Dehydrator Flash Tank and Still Column	2013/2016	17.0 MMscfd	Modified	na
T01	4E	Produced Water Storage Tank	2013	210 bbl	Existing	na
T02	5E	Produced Water Storage Tank	2013	210 bbl	Existing	na
TLO	6E	Truck Loadout	2013	---	Existing	na
SSM	7E	Facility-Wide Startup, Shutdown and Maintenance	2013/2016	---	Modified	na
FUG	8E	Process Piping Fugitives	2013/2016	---	Modified	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
- Table 2 – Release Parameter Data

Williams Ohio Valley Midstream LLC (OVM)

WHIPKEY COMPRESSOR STATION

Application for 45CSR13 Class II Administrative Permit Update

Attachment J - Emission Points Data Summary Sheet

Caterpillar G3306TA Compressor Engine

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
		203 bhp CAT G3306TA (4SRB @ 1,800 rpm) Compressor Engine w/ NSCR Catalyst						NOX	7.42	32.48	0.90	3.93	Gas	EE	
								CO	7.42	32.48	0.90	3.93	Gas	EE	
								VOC	0.17	0.73	0.13	0.58	Gas	EE	
								SO2	1.1E-03	4.7E-03	1.1E-03	4.7E-03	Gas	EE	
								PM10/2.5	0.04	0.16	0.04	0.16	Solid/Gas	EE	
								Benzene	2.9E-03	0.01	2.3E-03	0.01	Gas	EE	
								Ethylbenzene	4.5E-05	2.0E-04	3.6E-05	1.6E-04	Gas	EE	
								HCHO	0.11	0.49	0.09	0.39	Gas	EE	
								n-Hexane	---	---	---	---	Gas	EE	
								Methanol	---	---	---	---	Gas	EE	
CE-01 (1E)	Upward Vertical	CE-01 (1E)	CE-01 (1E)	na	na	C	8,760	Toluene	1.0E-03	4.5E-03	8.2E-04	3.6E-03	Gas	EE	
								2,2,4-TMP	---	---	---	---	Gas	EE	
								Xylenes	3.6E-04	1.6E-03	2.8E-04	1.2E-03	Gas	EE	
								Other HAP	---	---	---	---	Gas	EE	
								Total HAP	0.13	0.56	0.10	0.45	Gas	Sum	
								CO2	229	1,002	229	1,002	Gas	EE	
								CH4	0.46	2.00	0.46	2.00	Gas	EE	
								N2O	4.0E-04	1.8E-03	4.0E-04	1.8E-03	Gas	EE	
								CO2e	240	1,052	240	1,052	Gas	Wgt Sum	

Continued …

Dehydrator Reboiler

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
		0.50 MMBtu/hr Dehydrator Reboiler						NOX	0.05	0.22	0.05	0.22	Gas	AP-42	
								CO	0.04	0.18	0.04	0.18	Gas	AP-42	
								VOC	2.7E-03	0.01	2.7E-03	0.01	Gas	AP-42	
								SO2	2.9E-04	1.3E-03	2.9E-04	1.3E-03	Gas	AP-42	
								PM10/2.5	3.7E-03	0.02	3.7E-03	0.02	Solid/Gas	AP-42	
								Benzene	1.0E-06	4.5E-06	1.0E-06	4.5E-06	Gas	AP-42	
								Ethylbenzene	---	---	---	---	Gas	---	
								HCHO	3.7E-05	1.6E-04	3.7E-05	1.6E-04	Gas	AP-42	
								n-Hexane	---	---	---	---	Gas	AP-42	
								Methanol	---	---	---	---	Gas	---	
RBV-01 (2E)	Upward Vertical	RBV-01 (2E)	RBV-01 (2E)	na	na	C	8,760	Toluene	1.7E-06	7.3E-06	1.7E-06	7.3E-06	Gas	AP-42	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	---	---	---	---	Gas	AP-42	
								Total HAP	9.2E-04	4.1E-03	9.2E-04	4.1E-03	Gas	Sum	
								CO2	58.44	256.69	58.44	256.69	Gas	AP-42	
								CH4	1.1E-03	4.8E-03	1.1E-03	4.8E-03	Gas	AP-42	
								N2O	1.1E-04	4.8E-04	1.1E-04	4.8E-04	Gas	AP-42	
								CO2e	59	257	59	257	Gas	Wgt Sum	

Continued …

Dehydrator Still Vent and Flash Tank Vent

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
		17.0 MMscfd Dehydrator Still Vent and Flash Gas Vent						NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
								VOC	2.16	9.46	2.16	9.46	Gas	GLYCalc	
								SO2	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	0.04	0.17	0.04	0.17	Gas	GLYCalc	
								Ethylbenzene	0.04	0.18	0.04	0.18	Gas	GLYCalc	
								HCHO	---	---	---	---	Gas	GLYCalc	
								n-Hexane	0.04	0.18	0.04	0.18	Gas	GLYCalc	
								Methanol	---	---	---	---	Gas	---	
RSV-01 (3E)	Upward Vertical	RSV-01 (3E)	RSV-01 (3E)	na	na	C	8,760	Toluene	0.12	0.52	0.12	0.52	Gas	GLYCalc	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	0.06	0.27	0.06	0.27	Gas	GLYCalc	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	0.30	1.33	0.30	1.33	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	5.50	24.08	5.50	24.08	Gas	GLYCalc	
								N2O	---	---	---	---	Gas	---	
								CO2e	137	602	137	602	Gas	Wgt Sum	

Continued …

Produced Water Tanks

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
	210 bbl Produced Water Tanks							VOC	0.56	2.45	0.56	2.45	Gas	EE	
								SO2	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	0.06	0.24	0.06	0.24	Gas	EE	
								Ethylbenzene	---	---	---	---	Gas	---	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	---	---	---	---	Gas	---	
T-01 and T-02 (4E and 5E) **EACH**	Upward Vertical	T-01 and T-02 (4E and 5E) EACH	T-01 and T-02 (4E and 5E) EACH	na	na	C	8,760	Methanol	---	---	---	---	Gas	---	
								Toluene	---	---	---	---	Gas	---	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	0.08	0.37	0.08	0.37	Gas	EE	
								Total HAP	0.14	0.61	0.14	0.61	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	---	---	---	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	---	

Continued …

Produced Water Truck Loadout

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOX	---	---	---	---	Gas	---	
								CO	---	---	---	---	Gas	---	
	Produced Water Truck Loadout							VOC	---	0.34	---	0.34	Gas	EE	
								SO2	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	---	0.03	---	0.03	Gas	EE	
								Ethylbenzene	---	---	---	---	Gas	---	
								HCHO	---	---	---	---	Gas	---	
								n-Hexane	---	---	---	---	Gas	---	
								Methanol	---	---	---	---	Gas	---	
TLO (6E)	Upward Vertical	TLO (6E)	TLO (6E)	na	na	I	8,760	Toluene	---	---	---	---	Gas	---	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	---	---	---	Gas	---	
								Other HAP	---	0.05	---	0.05	Gas	EE	
								Total HAP	---	0.08	---	0.08	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	---	---	---	Gas	---	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	---	---	---	Gas	---	

Continued …

Startup/Shutdown/Maintenance (w/Blowdown)

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(Chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] *(ppmv or mg/m^3)*
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
								NOX	---	---	---	---	Gas	---	
	Startup/Shutdown/Maintenance (w/Blowdown)							CO	---	---	---	---	Gas	---	
								VOC	---	0.85	---	0.85	Gas	EE	
								SO2	---	---	---	---	Gas	---	
								PM10/2.5	---	---	---	---	Solid/Gas	---	
								Benzene	---	2.8E-04	---	2.8E-04	Gas	EE	
								Ethylbenzene	---	0.02	---	0.02	Gas	EE	
								HCHO	---	---	---	---	Gas	EE	
								n-Hexane	---	0.01	---	0.01	Gas	EE	
								Methanol	---	---	---	---	Gas	---	
SSM (7E)	Upward Vertical	SSM (7E)	SSM (7E)	na	na	I	na	Toluene	---	6.2E-04	---	6.2E-04	Gas	EE	
								2,2,4-TMP	---	---	---	---	Gas	---	
								Xylenes	---	0.02	---	0.02	Gas	EE	
								Other HAP	---	---	---	---	Gas	---	
								Total HAP	---	0.06	---	0.06	Gas	Sum	
								CO2	---	---	---	---	Gas	---	
								CH4	---	4.24	---	4.24	Gas	EE	
								N2O	---	---	---	---	Gas	---	
								CO2e	---	106	---	106	Gas	Wgt Sum	

Continued …

Table 1 Notes

Criteria Pollutants	
Pollutant	**CAS**
NO2	10102-44-0
CO	630-08-0
VOC	na
Propane	74-98-6
i-Butane	75-28-5
n-Butane	106-97-8
SO2	7446-09-5
PM10/2.5	na

Hazardous Air Pollutants (HAPs)	
Pollutant	**CAS**
Benzene	71-43-2
Ethylbenzene	100-41-4
Formadehyde	50-00-0
n-Hexane	110-54-3
Methanol	67-56-1
Toluene	108-88-3
2,2,4-TMP	540-84-1
Xylenes	1330-20-7
Other HAP	na
Total HAP	na

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

Table 1: Notes

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

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

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^{o}F)	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	0.5	1,064	970	82.3	1,200	6.0	4,413.895	536.887
2E	0.6	120	na	na	1,200	10.0	4.413.895	536.887

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

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

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

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

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☐ Yes ☑ No ☐ If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☑ No ☐ If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☑ Yes ☐ No ((Truck Load-Out (TLO (6E)) 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 UNIT DATA SHEET.**
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☑ No ☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered “NO” to all of the items above, it is not necessary to complete the following table, “Fugitive Emissions Summary.”

FUGITIVE EMISSIONS DATA SUMMARY SHEET - Continued

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS[1]	Maximum Potential Pre-Controlled Emissions[2]		Maximum Potential Controlled Emissions[3]		Est. Method Used[4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Paved Haul Roads	na	---	---	---	---	---
Unpaved Haul Roads	na	---	---	---	---	---
Storage Pile Emissions	na	---	---	---	---	---
Loading/Unloading Operations	na	((Truck Load-Out (TLO (6E)) is included in the Point Source Emissions))				
Wastewater Treatment	na	---	---	---	---	---
Equipment Leaks (FUG (8E))	**VOC**	**0.58**	**2.55**	**0.58**	**2.55**	**AP-42**
	Benzene	**1.9E-04**	**8.3E-04**	**1.9E-04**	**0.00**	**AP-42**
	Ethylbenzene	**9.1E-03**	**4.0E-02**	**9.1E-03**	**0.04**	**AP-42**
	n-Hexane	**8.3E-03**	**3.6E-02**	**8.3E-03**	**0.04**	**AP-42**
	Toluene	**4.3E-04**	**1.9E-03**	**4.3E-04**	**0.00**	**AP-42**
	2,2,4-TMP	**---**	**---**	**---**	**---**	**AP-42**
	Xylenes	**9.1E-03**	**4.0E-02**	**9.1E-03**	**0.04**	**AP-42**
	Total HAP	**0.04**	**0.16**	**0.04**	**0.16**	**Sum**
	CO2	**---**	**---**	**---**	**---**	**AP-42**
	CH4	**3.03**	**13.26**	**3.03**	**13.26**	**AP-42**
	N2O	**---**	**---**	**---**	**---**	**---**
	CO2e	**76**	**332**	**76**	**332**	**Wgt Sum**
General Clean-up VOC Emissions	na	---	---	---	---	---
Other	na	---	---	---	---	---

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

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

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

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

Williams Ohio Valley Midstream LLC (OVM)

WHIPKEY COMPRESSOR STATION

Application for 45CSR13 Class II Administrative Permit Update

Attachment K - Fugitive Emissions

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]				
	Heavy Liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC				
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves[11]	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Open Ended Lines[12]	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Sampling Connections[13]	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Compressors	Gas VOC				
	Non-VOC				
Flanges / Connectors	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
Other*	Gas VOC				
	Light Liquid VOC				
	Non-VOC				
				TOTAL (lb/yr)	**5,096**
				TOTAL (tpy)	**2.55**

This Facility is NOT Subject to Leak Detection and Repair (LDAR) Regulations.

Please Reference the Fugitive Emissions Summary Data Sheet .

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

Attachment K
DESCRIPTION OF FUGITIVE EMISSIONS - Continued

Notes for Leak Source Data Sheet

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

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

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

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

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

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

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

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

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

9. LIST CO, H2S, mineral acids, NO, SO, etc. DO NOT LIST H, H2O, N, O, and Noble Gases.

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

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

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

13. Do not include closed-purge sampling connections.

ATTACHMENT L

Emissions Unit Data Sheet(s)

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

- Natural Gas Glycol Dehydration Unit Data Sheet
- 40 CFR Part 63; Subpart HH & HHH Registration Form

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		**KW International**	
		Max Dry Gas Flow Rate (MMscf/day)		**17**	
		Design Heat Input (MMBtu/hr) - HHV		**0.50**	
		Design Type (DEG or TEG)		**TEG**	
		Source Status[2]		**MS**	
		Date Installed/Modified/Removed[3]		**2013 / 2016**	
		Regenerator Still Vent APCD[4]		**NA**	
		Fuel HV (Btu/scf) - LHV		**920**	
		H_2S Content (gr/100 scf)		**0.2**	
		Operation (hrs/yr)		**8,760**	
Source ID #[1]	Vent	Reference[5]	PTE[6]	lbs/hr	tons/yr
RBV-1	Reboiler Vent	AP	NOx	**0.05**	**0.22**
		AP	CO	**0.04**	**0.18**
		AP	VOC	**2.7E-03**	**0.01**
		AP	SOx	**2.9E-04**	**1.3E-03**
		AP	PM10/2.5	**3.7E-03**	**0.02**
		AP	Tot HAP	**9.2E-04**	**4.1E-03**
		40CFR98	CO2e	**59**	**257**
RSV-1	Glycol Dehydrator Regenerator Still Vent/Flash Tank Vent	GRI-GLYCalc	VOC	**2.16**	**9.46**
		GRI-GLYCalc	n-Hexane	**0.04**	**0.18**
		GRI-GLYCalc	Benzene	**0.04**	**0.17**
		GRI-GLYCalc	Toluene	**0.12**	**0.52**
		GRI-GLYCalc	Ethylbenzene	**0.04**	**0.18**
		GRI-GLYCalc	Xylenes	**0.06**	**0.27**
		GRI-GLYCalc	Tot HAP	**0.30**	**1.33**
		GRI-GLYCalc	CO2e	**137**	**602**
		Dehydrator emissions incorporate a 20% contingency on the GRI-GLYCalc results			

Notes to **NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET**

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

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

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

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

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

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

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

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

West Virginia Department of Environmental Protection

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

Division of Air Quality

40 CFR Part 63; Subpart HH & HHH Registration Form

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

Section A: Facility Description			
Affected facility actual annual average natural gas throughput (scf/day): 17 MMSCF/Day			
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day): N/A			
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	Yes	**X**	No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	Yes	**X**	No
The affected facility is: ☒ prior to a NG processing plant ☐ a NG processing plant ☐ prior to the point of custody transfer and there is no NG processing plant			
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	Yes	**X**	No
The affected facility exclusively processes, stores, or transfers black oil.	Yes	**X**	No
Initial producing gas-to-oil ratio (GOR): _____scf/bbl API gravity: _____degrees			

Section B: Dehydration Unit (if applicable) [1]		
Description: 17 MMscfd TEG Dehydrator		
Date of Installation: 2013	Annual Operating Hours: 8,760	Burner rating (MMbtu/hr): 0.50
Exhaust Stack Height (ft): 6.0	Stack Diameter (ft): 0.6	Stack Temp. (°F): 120
Glycol Type: ☒ TEG ☐ EG ☐ Other:		
Glycol Pump Type: ☐ Electric ☒ Gas	If gas, what is the volume ratio? 0.08 ACFM/gpm	
Condenser installed? ☐ Yes ☒ No	Exit Temp. na °F	Condenser Pressure na psig
Incinerator/flare installed? ☐ Yes ☒ No	Destruction Eff. _____%	
Other controls installed? ☐ Yes ☒ No	Describe:	
Wet Gas[2]: (Upstream of Contact Tower)	Gas Temp.: 100 °F Gas Pressure 900 psig Saturated Gas? ☒ Yes ☐ No If no, water content _____ lb/MMSCF	
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate(MMSCFD) Actual 17.0 Design 17.0 Water Content 5.0 lb/MMSCF	
Lean Glycol:	Circulation rate (gpm) Actual[3] 0.67 Maximum[4] 0.67 Pump make/model: Kimray 4020 PV	
Glycol Flash Tank (if applicable):	Temp.: 150 °F Pressure 50 psig Vented? Yes ** ☒ No ☐ If no, describe vapor control: ** ≥50% of flash tank offgas used as reboiler fuel	
Stripping Gas (if applicable): NA	Source of gas:	Rate __ scfm

ATTACHMENT N

Supporting Emissions Calculations

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

Emission Summary Spreadsheets

- Facility-Wide Potential to Emit (PTE)
- Summary of Pre-Control Emissions
- Greenhouse Gas (GHG) Emissions
- Caterpillar G3306TA Compressor Engine - 203 bhp (4SRB@1,800 rpm) w/ NSCR
- Dehydrator – 17 MMscfd
- Dehydrator - 0.50 MMBtu/hr Reboiler
- Produced Water Storage Tanks
- Truck Loadout
- Startup/Shutdown/Maintenance
- Process Piping Fugitives

GRI-GLYCalc Input and Output

- Input Summary
- Emissions Summary Report
- Aggregate Emissions Report

Controlled Emissions

Controlled Potential to Emit (PTE) Summary - Criteria Polutants

Unit ID	Point ID	Control ID	Description	NOx		CO		VOC		SOx		PM10/2.5	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	01-NSCR	Caterpillar Engine	0.90	3.93	0.90	3.93	0.13	0.58	1.1E-03	4.7E-03	0.04	0.16
RBV-1	2E	na	Dehydrator Reboiler	0.05	0.22	0.04	0.18	2.7E-03	0.01	2.9E-04	1.3E-03	3.7E-03	0.016
RSV-1	3E	na	Dehydrator Still Vent/Flash Tank	---	---	---	---	2.16	9.46	---	---	---	---
T01	4E	na	Produced Water Tank	---	---	---	---	0.56	2.45	---	---	---	---
T02	5E	na	Produced Water Tank	---	---	---	---	0.56	2.45	---	---	---	---
TLO	6E	na	Truck Loadout	---	---	---	---	---	0.34	---	---	---	---
SSM	7E	na	Startup/Shutdown/Maintenance	---	---	---	---	---	0.85	---	---	---	---
FUG	8E	na	Process Piping Fugitives	---	---	---	---	0.58	2.55	---	---	---	---
TOTAL PTE:				**0.95**	**4.15**	**0.94**	**4.11**	**3.99**	**18.69**	**1.4E-03**	**0.01**	**0.04**	**0.17**
WV-DEP Permit 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	
Title V Permit Threshold:				---	100	---	100	---	100	---	100	---	100

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

Unit ID	HCHO (HAP)		n-Hexane		Benzene		Toulene		Ethylbenzene		Xylenes		Total HAP	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	0.09	0.39	---	---	2.3E-03	0.01	8.2E-04	3.6E-03	3.6E-05	1.6E-04	2.8E-04	1.2E-03	0.10	0.45
RBV-1	---	---	8.8E-04	3.9E-03	---	---	---	---	---	---	---	---	9.2E-04	0.004
RSV-1	---	---	0.04	0.18	0.04	0.17	0.12	0.52	0.04	0.18	0.06	0.27	0.30	1.33
T01	---	---	---	---	0.056	0.24	---	---	---	---	---	---	0.14	0.61
T02	---	---	---	---	0.056	0.24	---	---	---	---	---	---	0.14	0.61
TLO	---	---	---	---	---	0.03	---	---	---	---	---	---	---	0.08
SSM	---	---	---	0.01	---	2.8E-04	---	6.2E-04	---	0.015	---	0.02	---	0.06
FUG	---	---	0.01	0.04	1.9E-04	8.3E-04	4.3E-04	1.9E-03	9.1E-03	0.04	0.01	0.04	0.04	0.16
PTE:	**0.09**	**0.39**	**0.05**	**0.23**	**0.15**	**0.70**	**0.12**	**0.53**	**0.05**	**0.24**	**0.07**	**0.33**	**0.72**	**3.31**
WV-DEP:	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	
Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	25

Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.

2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).

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

4 - HCHO is formaldehyde; Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), acetaldehyde, acrolein, and methanol.

Pre-Controlled Emissions

Pre-Controlled Potential to Emit (PTE) Summary - Criteria Polutants

Unit ID	Point ID	Control ID	Description	NOx		CO		VOC		SOx		PM10/2.5	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	01-NSCR	Caterpillar Engine	7.42	32.48	7.42	32.48	0.17	0.73	1.1E-03	4.7E-03	0.04	0.16
RBV-1	2E	na	Dehydrator Reboiler	0.05	0.22	0.04	0.18	2.7E-03	0.012	2.9E-04	1.3E-03	3.7E-03	0.02
RSV-1	3E	na	Dehydrator Still Vent/Flash Tank	---	---	---	---	2.16	9.46	---	---	---	---
T01	4E	na	Produced Water Tank	---	---	---	---	0.56	2.45	---	---	---	---
T02	5E	na	Produced Water Tank	---	---	---	---	0.56	2.45	---	---	---	---
TLO	6E	na	Truck Loadout	---	---	---	---	---	0.34	---	---	---	---
SSM	7E	na	Startup/Shutdown/Maintenance	---	---	---	---	---	0.85	---	---	---	---
FUG	8E	na	Process Piping Fugitives	---	---	---	---	0.58	2.55	---	---	---	---
TOTAL PTE:				**7.46**	**32.70**	**7.46**	**32.66**	**4.03**	**18.83**	**1.4E-03**	**0.01**	**0.04**	**0.17**
WV-DEP Permit 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	
Title V Permit Threshold:				---	100	---	100	---	100	---	100	---	100

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

Unit ID	HCHO (HAP)		n-Hexane		Benzene		Toulene		Ethylbenzene		Xylenes		Total HAP	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	0.11	0.49	---	---	2.9E-03	0.01	1.0E-03	4.5E-03	4.5E-05	2.0E-04	3.6E-04	1.6E-03	0.13	0.56
RBV-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RSV-1	---	---	0.04	0.18	0.04	0.17	0.12	0.52	0.04	0.18	0.06	0.27	0.30	1.33
T01	---	---	---	---	0.056	0.24	---	---	---	---	---	---	0.14	0.61
T02	---	---	---	---	0.056	0.24	---	---	---	---	---	---	0.14	0.61
TLO	---	---	---	---	---	0.03	---	---	---	---	---	---	---	0.08
SSM	---	---	---	0.01	---	2.8E-04	---	6.2E-04	---	0.015	---	0.02	---	0.06
FUG	---	---	0.01	0.04	1.9E-04	8.3E-04	4.3E-04	1.9E-03	9.1E-03	0.04	0.01	0.04	0.04	0.16
PTE:	**0.11**	**0.49**	**0.05**	**0.23**	**0.15**	**0.71**	**0.12**	**0.53**	**0.05**	**0.24**	**0.07**	**0.33**	**0.75**	**3.42**
WV-DEP:	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	
Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	25

Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hrs/yr.

2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).

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

4 - HCHO is formaldehyde; Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), acetaldehyde, acrolein, and methanol.

Greenhouse Gas (GHG) Emissions

Greenhouse Gas (GHG) Emissions Summary

Unit ID	Point ID	Control 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
CE-01	1E	01-NSCR	Caterpillar Engine	0.04	8,760	1,002	1,002	2	50	1.8E-03	1	1,052
RBV-1	2E	na	Dehydrator Reboiler	0.50	8,760	257	257	4.8E-03	0.12	4.8E-04	0.14	257
RSV-1	3E	na	Dehydrator Still Vent/Flash Tank	---	8,760	---	---	24	602	---	---	602
T01	4E	na	Produced Water Tank	---	8,760	---	---	---	---	---	---	---
T02	5E	na	Produced Water Tank	---	8,760	---	---	---	---	---	---	---
TLO	6E	na	Truck Loadout	---	Intermittent	---	---	---	---	---	---	---
SSM	7E	na	Startup/Shutdown/Maintenance	---	Intermittent	---	---	4	106	---	---	106
FUG	8E	na	Process Piping Fugitives	---	8,760	---	---	13	332	---	---	332

TOTAL FACILITY-WIDE PTE:	**1,258**		**44**		**2.2E-03**		**2,349**
NNSR/PSD Threshold: (	**250**	**- OR -**	**250**	**- OR -**	**250**	**) - AND -**	**100,000**
Title V Major Source Threshold:	**na**		**na**		**na**		**100,000**

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.

Caterpillar G3306TA Compressor Engine - 203 bhp (4SRB@1,800 rpm) w/ NSCR

Engine Combustion PTE Calculations

Unit ID	Description	Reference	Pollutant	Pre-Controlled			Control Efficiency	Controlled		
				g/bhp-hr	lb/hr	tpy		g/bhp-hr	lb/hr	tpy
CE-01	Caterpillar	Vendor Specs	NOX	16.57	7.42	32.48	87.9%	2.00	0.90	3.93
	G3306TA (4SRB)	Vendor Specs	CO	16.57	7.42	32.48	87.9%	2.00	0.90	3.93
	203 bhp	Vendor Specs	NMNEHC	0.12	0.05	0.24	20.0%	0.10	0.04	0.19
	1,800 rpm	Sum (NMNEHC+HCHO)	VOC	0.37	0.17	0.73	20.0%	0.30	0.13	0.58
	Three-Way Catalyst (NSCR)	AP-42 Table 3.2-3	SO2	0.002	0.00	0.00	0.0%	2.4E-03	1.1E-03	4.7E-03
	8,760 hr/yr	AP-42 Table 3.2-3	PM10/2.5	0.08	0.04	0.16	0.0%	0.08	0.04	0.16
	905 Btu/scf (LHV)	Vendor Specs	HCHO	0.25	0.11	0.49	20.0%	0.20	0.09	0.39
	1,006 Btu/scf (HHV)	AP-42 Table 3.2-3	Benzene	0.01	2.9E-03	0.01	20.0%	5.2E-03	2.3E-03	0.01
	8,098 Btu/bhp-hr (LHV)	AP-42 Table 3.2-3	Toluene	2.3E-03	1.0E-03	4.5E-03	20.0%	1.8E-03	8.2E-04	3.6E-03
	8,998 Btu/bhp-hr (HHV)	AP-42 Table 3.2-3	Ethylbenzene	1.0E-04	4.5E-05	2.0E-04	20.0%	8.1E-05	3.6E-05	1.6E-04
	1.64 MMBtu/hr (LHV)	AP-42 Table 3.2-3	Xylene	8.0E-04	3.6E-04	1.6E-03	20.0%	6.4E-04	2.8E-04	1.2E-03
	1.83 MMBtu/hr (HHV)	AP-42 Table 3.2-3	n-Hexane	---	---	---	---	---	---	---
	14,401 MMBtu/yr (LHV)	AP-42 Table 3.2-3	Other HAP	0.03	0.01	0.06	20.0%	0.02	0.01	0.04
	1,816 scf/hr (LHV)	Sum	Total HAP	0.29	0.13	0.56	20.0%	0.23	0.10	0.45
	0.04 MMscf/day (LHV)	Vendor Specs	CO2	511	229	1,002	0.0%	511	229	1,002
	0.31 MMscf/wk (LHV)	Vendor Specs (Est.)	CH4	1.02	0.46	2.00	0.0%	1.02	0.46	2.00
	15.91 MMscf/yr (LHV)	40CFR98 Table C-1	N2O	9.0E-04	4.0E-04	1.8E-03	0.0%	9.0E-04	4.0E-04	1.8E-03
		40CFR98 Table C-1	CO2e	537	240	1,052	0.0%	537	240	1,052

Notes: 1 - The emission estimates are based on operation at 100% of rated load.

2 - As per vendor specifications, NMNEHC (non-methane non-ethane hydrocarbon) does not include HCHO. VOC is the sum of NMNEHC and HCHO.

3 - PM10/2.5 is Filterable and Condensable Particulate Matter; including PM10 and PM2.5

4 - HCHO is Formaldehyde; Total HAP includes HCHO, Acetaldehyde, Acrolein, BTEX (Benzene, Toluene, Ethylbenzene, Xylene), Methanol, and n-Hexane.

5 - The control efficiency (CE) for each HAP is assumed to be the same as the CE for NMNEHC, except for HCHO where the vendor provides specific data.

6 - The fuel heating value is based on 905 Btu/scf (LHV).

Proposed Fuel Consumption, assuming an average LHV of 905 Btu/scf:

1,816 scf/hr = 43,595 scf/day = **15.91 MMscf/yr**

Dehydrator - 17 MMscfd

Dehydrator PTE Calculations

Unit ID	Description	Capacity	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
					lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
RSV-1	Dehy 01 (RSV-1) Reboiler Still Vent and Flash Tank Vent (Still Vent Routed to Atmosphere and 50% of Flash Tank Offgas Used as Reboiler Fuel)	Flow Rate **17.0** MMscfd **8,760** hr/yr	GRI-GLYCalc 4.0	VOC	na	na	2.16	9.46	0	**2.16**	**9.46**
			GRI-GLYCalc 4.0	n-Hexane	na	na	0.04	0.18	0	**0.04**	**0.18**
			GRI-GLYCalc 4.0	Benzene	na	na	0.04	0.17	0	**0.04**	**0.17**
			GRI-GLYCalc 4.0	Toluene	na	na	0.12	0.52	0	**0.12**	**0.52**
			GRI-GLYCalc 4.0	Ethylbenzene	na	na	0.04	0.18	0	**0.04**	**0.18**
			GRI-GLYCalc 4.0	Xylenes	na	na	0.06	0.27	0	**0.06**	**0.27**
			GRI-GLYCalc 4.0	Tot HAP	na	na	0.30	1.33	0	**0.30**	**1.33**
			GRI-GLYCalc 4.0	CH4	na	na	5	24	0	**5**	**24**
			40CFR98 - Table A-1	CO2e	na	na	137	602	0	**137**	**602**

Notes: 1 - Used GRI-GLYCalc V4.0 to calculate combined regenerator vent/flash gas emissions.

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

17 MMscfd Dehydrator

	GRI-GLYCalc 4.0 Model Results*		Worst-Case Assumption	
	lb/hr	tpy	lb/hr	tpy
VOC	1.80	7.89	2.16	9.46
n-Hexane	0.03	0.15	0.04	0.18
Benzene	0.03	0.14	0.04	0.17
Toluene	0.10	0.44	0.12	0.52
Ethybenzene	0.03	0.15	0.04	0.18
Xylenes	0.05	0.23	0.06	0.27
Total HAP	0.25	1.11	0.30	1.33
CH4	5	20	5	24

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

Wet Gas:	100 oF and 900 psig
Gas Analysis:	See Attachment H□
Dry Gas:	17 MMscfd, 5.0 lb/MMscf □
Lean Glycol:	0.67 gpm
Glycol Pump:	Kimray 4020PV, Gas Injection□
Flash Tank:	150 oF, 50 psig (50% Recycle)
Stripping Gas:	None
Condenser:	None

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

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

Dehydrator - 0.50 MMBtu/hr Reboiler

Reboiler PTE Calculations

Unit ID	Description	Capacity	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
					lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
RBV-1	Reboiler 01 (RBV-1) Reboiler Combustion Emissions	Heat Input **0.50** MMBtu/hr (HHV) **8,760** hr/yr	EPA AP-42 Table 1.4-1	NOx	100.00	0.10	0.05	0.22	na	**0.05**	**0.22**
			EPA AP-42 Table 1.4-1	CO	84.00	0.08	0.04	0.18	na	**0.04**	**0.18**
			EPA AP-42 Table 1.4-2	VOC	5.50	0.01	2.7E-03	0.01	na	**2.7E-03**	**1.2E-02**
			EPA AP-42 Table 1.4-2	SOx	0.60	5.9E-04	2.9E-04	1.3E-03	na	**2.9E-04**	**1.3E-03**
			EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	3.7E-03	0.02	na	**3.7E-03**	**0.02**
			EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	3.7E-05	1.6E-04	na	**3.7E-05**	**1.6E-04**
			EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	8.8E-04	3.9E-03	na	**8.8E-04**	**3.9E-03**
			EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	1.0E-06	4.5E-06	na	**1.0E-06**	**4.5E-06**
			EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	1.7E-06	7.3E-06	na	**1.7E-06**	**7.3E-06**
			EPA AP-42 Table 1.4-3	Tot HAP	1.88	1.8E-03	9.2E-04	4.1E-03	na	**9.2E-04**	**4.1E-03**
			40CFR98 - Table C-1	CO2	119,226	117	58	257	na	**58**	**257**
			40CFR98 - Table C-2	CH4	2	2.2E-03	1.1E-03	4.8E-03	na	**1.1E-03**	**4.8E-03**
			40CFR98 - Table C-2	N2O	0.2	2.2E-04	1.1E-04	4.8E-04	na	**1.1E-04**	**4.8E-04**
			40CFR98 - Table A-1	CO2e	119,342	117	59	257	na	**59**	**257**

Notes: 1 - The combustion emission factors are based on a default fuel heat content of 1,020 Btu/scf (HHV).

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

3 - Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), acetaldehyde, acrolein, and methanol.

Produced Water Storage Tanks

Storage Tank PTE Calculations

Unit ID	Tank ID	Material Stored	Capacity		Turnovers per Year	Throughput		EPA-450/3-85-001a VOC Emission Factor (Working and Breathing Losses)	HYSYS VOC Emission Factor (Flashing Losses)	VOC		Benzene 10.00% of VOC		Total HAP 25.00% of VOC	
			gal	bbl		gal/yr	bbl/yr			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
T01	Tank 01	Produced Water	8,820	210	8	70,560	1,680	0.039 lb/bbl	2.873 lb/bbl	0.56	2.45	0.056	0.24	0.14	0.61
T02	Tank 02	Produced Water	8,820	210	8	70,560	1,680	0.039 lb/bbl	2.873 lb/bbl	0.56	2.45	0.056	0.24	0.14	0.61
		TOTAL VOLUME:	**17,640**	**420**	**8**	**141,120**	**3,360**		**TOTAL EMISSIONS:**	**1.12**	**4.89**	**0.112**	**0.49**	**0.28**	**1.22**

Notes:

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

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

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

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

3 - Total HAP is estimated at 25.0% of VOC emissions. This is a very conservative estimate based on an investigation of other produced water emission estimating protocols, as exemplified above (e.g., (0.0001+0.0003+0.000006+0.00006)/0.01 = 4.7%).

4 - The HYSYS simulation software is used to estimate flashing losses from the produced water storage tanks.

Truck Load-Out

Truck Load-Out PTE Calculations

Unit ID	Description	S sat. fac.	P psia	MW lb/lb-mol	T ^{o}R	CE %	L_L lb/kgal	T-Put kgal/yr	VOC AP-42 Sect 5.2 tpy	Benzene 10.00% of VOC tpy	Total HAP 25.00% of VOC tpy
TLO	Truck Load-Out	1.45	1.5	92	520	0.0%	4.79	141	0.34	0.03	0.08

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

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

where: L_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.

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

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

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

3 - It is estimated that each tank will be emptied up to: **8** times per year.

4 - The total storage tank capacity at the facility is: **420** bbl.

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

Startup, Shutdown and Maintenance (SSM)

SSM PTE Calculations

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

Unit ID	Description	CH4	CO2e	VOC	n-Hexane	Benzene	Toluene	E-benzene	Xylenes	Total HAP
		41,517 lb/MMscf	1,037,914 lb/MMscf	8,335 lb/MMscf	119 lb/MMscf	3 lb/MMscf	6 lb/MMscf	150 lb/MMscf	150 lb/MMscf	578 lb/MMscf
		tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy
SSM	a. Cold-Start Engine	2	38	0.30	4.3E-03	9.9E-05	2.2E-04	5.5E-03	5.5E-03	0.02
SSM	b. Compressor Blowdown	3	68	0.55	0.01	1.8E-04	4.0E-04	0.010	0.01	0.04
TOTAL FACILITY-WIDE SSM EMISSIONS:		**4**	**106**	**0.85**	**0.01**	**2.8E-04**	**6.2E-04**	**0.015**	**0.02**	**0.06**

Notes:

1 - SSM Emissions are the sum of:
a. Unburned fuel resulting from "cold-start" of the idle gas-fired engine; and
b. Natural gas that is purged (aka blowdown) from the compressor and associated piping and equipment.

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

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

Pollutant	Analysis	Assumed
CH4	34,597 lb/MMscf	41,517 lb/MMscf
VOC	6,946 lb/MMscf	8,335 lb/MMscf
n-Hexane	99 lb/MMscf	119 lb/MMscf
Benzene	2 lb/MMscf	3 lb/MMscf

Pollutant	Analysis	Assumed
Toluene	5 lb/MMscf	6 lb/MMscf
E-benzene	--- lb/MMscf	150 lb/MMscf
Xylenes	--- lb/MMscf	150 lb/MMscf
Total HAP	107 lb/MMscf	578 lb/MMscf

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

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

Williams Ohio Valley Midstream LLC (OVM)

WHIPKEY COMPRESSOR STATION

Application for 45CSR13 Class II Administrative Permit Update

Process Piping Fugitives

Fugitive PTE Calculations (Gas/Vapor)

Unit ID	Description	Component (Unit) Type	Unit Count	THC Factor	THC Emissions	CH4 83.61% Wgt		CO2e 2090% Wgt		VOC 16.06% Wgt	
				lb/hr/Unit	lb/hr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG	Equipment and Piping Fugitives **8,760 hr/yr**	Valves	257	0.00992	2.55	2.13	9.34	53.29	233.42	0.41	1.79
		Pump Seals	0	0.00529	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Others	30	0.01940	0.58	0.49	2.13	12.17	53.28	0.09	0.41
		Connectors	737	0.00044	0.32	0.27	1.19	6.79	29.75	0.05	0.23
		Flanges	120	0.00086	0.10	0.09	0.38	2.16	9.45	0.02	0.07
		Open-ended lines	14	0.00441	0.06	0.05	0.23	1.29	5.65	0.01	0.04
		TOTAL FUGITIVE EMISSIONS:				**3**	**13**	**76**	**332**	**0.58**	**2.55**

Component (Unit) Type	n-Hexane 0.23% Wgt		Benzene 0.01% Wgt		Toluene 0.01% Wgt		Ethylbenzene 0.25% Wgt		Xylenes 0.25% Wgt		Total HAP 1.00% Wgt	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Valves	0.01	0.03	1.3E-04	5.8E-04	3.0E-04	1.3E-03	6.4E-03	0.03	0.01	0.03	0.03	0.11
Pump Seals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	1.3E-03	0.01	3.0E-05	1.3E-04	6.9E-05	3.0E-04	1.5E-03	6.4E-03	1.5E-03	6.4E-03	0.01	2.5E-02
Connectors	7.5E-04	3.3E-03	1.7E-05	7.5E-05	3.8E-05	1.7E-04	8.1E-04	3.6E-03	8.1E-04	3.6E-03	3.2E-03	0.01
Flanges	2.4E-04	1.0E-03	5.4E-06	2.4E-05	1.2E-05	5.3E-05	2.6E-04	1.1E-03	2.6E-04	1.1E-03	1.0E-03	4.5E-03
Open-ended lines	1.4E-04	6.2E-04	3.2E-06	1.4E-05	7.3E-06	3.2E-05	1.5E-04	6.8E-04	1.5E-04	6.8E-04	6.2E-04	2.7E-03
TOTAL FUGITIVES:	**0.01**	**0.04**	**1.9E-04**	**8.3E-04**	**4.3E-04**	**1.9E-03**	**9.1E-03**	**0.04**	**0.01**	**0.04**	**0.04**	**0.16**

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

2 - Gas/Vapor emissions calculated using EPA factors for Oil and Gas Production Operations.
(Protocol for Equipment Leak Emission Estimates, 1995, EPA-453/R-95-017).

3 - Component counts are based on the default counts for compressor stations (GRI-HAPCalc model).

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

Pollutant	Gas Analysis	Estimated
CH4	66.67 % WGT	83.61 % WGT
VOC	13.39 % WGT	16.06 % WGT
n-Hexane	0.19 % WGT	0.23 % WGT
Benzene	0.004 % WGT	0.01 % WGT

Pollutant	Gas Analysis	Estimated
Toluene	0.01 % WGT	0.01 % WGT
E-benzene	--- % WGT	0.25 % WGT
Xylenes	--- % WGT	0.25 % WGT
Total HAP	0.21 % WGT	1.00 % WGT

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Whipkey Station
File Name: C:\projects2\wfs\OVM\Whipkey\Admin Revision #2\Whipkey 17 MMscfd TEG Dehy 04.25.16.ddf
Date: April 25, 2016

DESCRIPTION:

Description: 17 MMscfd TEG Dehydrator
Extended inlet gas analysis for Whipkey, sample dated 03-17-16. Kimray 4020 PV Glycol Pump. Flash Tank Offgas to Reboiler for Fuel (50% recycle). No Still Vent Controls.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 100.00 deg. F
Pressure: 900.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1230
Nitrogen	0.3297
Methane	81.8390
Ethane	12.5702
Propane	3.3748
Isobutane	0.4713
n-Butane	0.7165
Isopentane	0.2078
n-Pentane	0.1492
n-Hexane	0.0438
Cyclohexane	0.0108
Other Hexanes	0.0961
Heptanes	0.0476
Methylcyclohexane	0.0075
2,2,4-Trimethylpentane	0.0005
Benzene	0.0011
Toluene	0.0021
Ethylbenzene	0.0005
Xylenes	0.0005
C8+ Heavies	0.0095

DRY GAS:

Flow Rate: 17.0 MMSCF/day
Water Content: 5.0 lbs. H2O/MMSCF

LEAN GLYCOL:

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

PUMP:

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

FLASH TANK:

Flash Control: Combustion device
Flash Control Efficiency: 50.00 %
Temperature: 150.0 deg. F
Pressure: 50.0 psig

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: Whipkey Station
File Name: C:\projects2\wfs\OVM\Whipkey\Admin Revision #2\Whipkey 17 MMscfd TEG Dehy 04.25.16.ddf
Date: April 25, 2016

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0580	1.393	0.2542
Ethane	0.0538	1.290	0.2355
Propane	0.0636	1.526	0.2785
Isobutane	0.0170	0.409	0.0747
n-Butane	0.0365	0.876	0.1599
Isopentane	0.0132	0.316	0.0577
n-Pentane	0.0128	0.306	0.0559
n-Hexane	0.0084	0.203	0.0370
Cyclohexane	0.0144	0.346	0.0631
Other Hexanes	0.0126	0.302	0.0551
Heptanes	0.0236	0.566	0.1032
Methylcyclohexane	0.0135	0.323	0.0589
2,2,4-Trimethylpentane	0.0001	0.002	0.0004
Benzene	0.0291	0.699	0.1277
Toluene	0.0923	2.216	0.4044
Ethylbenzene	0.0330	0.792	0.1446
Xylenes	0.0502	1.205	0.2200
C8+ Heavies	0.0466	1.117	0.2039
Total Emissions	0.5787	13.889	2.5347
Total Hydrocarbon Emissions	0.5787	13.889	2.5347
Total VOC Emissions	0.4669	11.206	2.0450
Total HAP Emissions	0.2133	5.118	0.9340
Total BTEX Emissions	0.2047	4.913	0.8967

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.5238	108.572	19.8144
Ethane	1.5096	36.229	6.6119
Propane	0.6701	16.081	2.9348
Isobutane	0.1329	3.190	0.5821
n-Butane	0.2224	5.337	0.9740
Isopentane	0.0775	1.861	0.3396
n-Pentane	0.0614	1.474	0.2689
n-Hexane	0.0254	0.609	0.1112
Cyclohexane	0.0136	0.326	0.0595
Other Hexanes	0.0499	1.197	0.2185
Heptanes	0.0403	0.968	0.1766
Methylcyclohexane	0.0105	0.253	0.0462
2,2,4-Trimethylpentane	0.0003	0.008	0.0014
Benzene	0.0031	0.075	0.0136
Toluene	0.0072	0.172	0.0314
Ethylbenzene	0.0016	0.040	0.0072
Xylenes	0.0016	0.040	0.0072
C8+ Heavies	0.0159	0.382	0.0698

Total Emissions	7.3672	176.813	32.2683
Total Hydrocarbon Emissions	7.3672	176.813	32.2683
Total VOC Emissions	1.3338	32.011	5.8420
Total HAP Emissions	0.0393	0.942	0.1720
Total BTEX Emissions	0.0136	0.326	0.0594

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.0477	217.144	39.6288
Ethane	3.0191	72.459	13.2237
Propane	1.3401	32.163	5.8697
Isobutane	0.2658	6.380	1.1643
n-Butane	0.4448	10.675	1.9481
Isopentane	0.1551	3.722	0.6792
n-Pentane	0.1228	2.947	0.5379
n-Hexane	0.0508	1.218	0.2223
Cyclohexane	0.0271	0.652	0.1189
Other Hexanes	0.0998	2.394	0.4370
Heptanes	0.0806	1.935	0.3532
Methylcyclohexane	0.0211	0.506	0.0923
2,2,4-Trimethylpentane	0.0006	0.015	0.0028
Benzene	0.0062	0.149	0.0273
Toluene	0.0143	0.344	0.0628
Ethylbenzene	0.0033	0.079	0.0144
Xylenes	0.0033	0.079	0.0144
C8+ Heavies	0.0319	0.764	0.1395
Total Emissions	14.7344	353.625	64.5366
Total Hydrocarbon Emissions	14.7344	353.625	64.5366
Total VOC Emissions	2.6676	64.022	11.6841
Total HAP Emissions	0.0785	1.885	0.3440
Total BTEX Emissions	0.0271	0.652	0.1189

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.5819	109.965	20.0687
Ethane	1.5633	37.520	6.8473
Propane	0.7336	17.607	3.2133
Isobutane	0.1500	3.599	0.6568
n-Butane	0.2589	6.214	1.1340
Isopentane	0.0907	2.177	0.3973
n-Pentane	0.0742	1.780	0.3248
n-Hexane	0.0338	0.812	0.1481
Cyclohexane	0.0280	0.672	0.1226
Other Hexanes	0.0625	1.499	0.2736
Heptanes	0.0639	1.533	0.2798
Methylcyclohexane	0.0240	0.576	0.1051
2,2,4-Trimethylpentane	0.0004	0.010	0.0018
Benzene	0.0323	0.774	0.1413
Toluene	0.0995	2.388	0.4358
Ethylbenzene	0.0347	0.832	0.1518
Xylenes	0.0519	1.245	0.2272
C8+ Heavies	0.0625	1.500	0.2737

Total Emissions	7.9459	190.702	34.8030
Total Hydrocarbon Emissions	7.9459	190.702	34.8030
Total VOC Emissions	1.8007	43.217	7.8870
Total HAP Emissions	0.2525	6.061	1.1060
Total BTEX Emissions	0.2183	5.239	0.9561

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Whipkey Station
File Name: C:\projects2\wfs\OVM\Whipkey\Admin Revision #2\Whipkey 17 MMscfd TEG Dehy 04.25.16.ddf
Date: April 25, 2016

DESCRIPTION:

Description: 17 MMscfd TEG Dehydrator
Extended inlet gas analysis for Whipkey, sample dated 03-17-16. Kimray 4020 PV Glycol Pump. Flash Tank Offgas to Reboiler for Fuel (50% recycle). No Still Vent Controls.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0580	1.393	0.2542
Ethane	0.0538	1.290	0.2355
Propane	0.0636	1.526	0.2785
Isobutane	0.0170	0.409	0.0747
n-Butane	0.0365	0.876	0.1599
Isopentane	0.0132	0.316	0.0577
n-Pentane	0.0128	0.306	0.0559
n-Hexane	0.0084	0.203	0.0370
Cyclohexane	0.0144	0.346	0.0631
Other Hexanes	0.0126	0.302	0.0551
Heptanes	0.0236	0.566	0.1032
Methylcyclohexane	0.0135	0.323	0.0589
2,2,4-Trimethylpentane	0.0001	0.002	0.0004
Benzene	0.0291	0.699	0.1277
Toluene	0.0923	2.216	0.4044
Ethylbenzene	0.0330	0.792	0.1446
Xylenes	0.0502	1.205	0.2200
C8+ Heavies	0.0466	1.117	0.2039
Total Emissions	0.5787	13.889	2.5347
Total Hydrocarbon Emissions	0.5787	13.889	2.5347
Total VOC Emissions	0.4669	11.206	2.0450
Total HAP Emissions	0.2133	5.118	0.9340
Total BTEX Emissions	0.2047	4.913	0.8967

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.5238	108.572	19.8144
Ethane	1.5096	36.229	6.6119
Propane	0.6701	16.081	2.9348
Isobutane	0.1329	3.190	0.5821
n-Butane	0.2224	5.337	0.9740

Isopentane	0.0775	1.861	0.3396
n-Pentane	0.0614	1.474	0.2689
n-Hexane	0.0254	0.609	0.1112
Cyclohexane	0.0136	0.326	0.0595
Other Hexanes	0.0499	1.197	0.2185
Heptanes	0.0403	0.968	0.1766
Methylcyclohexane	0.0105	0.253	0.0462
2,2,4-Trimethylpentane	0.0003	0.008	0.0014
Benzene	0.0031	0.075	0.0136
Toluene	0.0072	0.172	0.0314
Ethylbenzene	0.0016	0.040	0.0072
Xylenes	0.0016	0.040	0.0072
C8+ Heavies	0.0159	0.382	0.0698
Total Emissions	7.3672	176.813	32.2683
Total Hydrocarbon Emissions	7.3672	176.813	32.2683
Total VOC Emissions	1.3338	32.011	5.8420
Total HAP Emissions	0.0393	0.942	0.1720
Total BTEX Emissions	0.0136	0.326	0.0594

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.0477	217.144	39.6288
Ethane	3.0191	72.459	13.2237
Propane	1.3401	32.163	5.8697
Isobutane	0.2658	6.380	1.1643
n-Butane	0.4448	10.675	1.9481
Isopentane	0.1551	3.722	0.6792
n-Pentane	0.1228	2.947	0.5379
n-Hexane	0.0508	1.218	0.2223
Cyclohexane	0.0271	0.652	0.1189
Other Hexanes	0.0998	2.394	0.4370
Heptanes	0.0806	1.935	0.3532
Methylcyclohexane	0.0211	0.506	0.0923
2,2,4-Trimethylpentane	0.0006	0.015	0.0028
Benzene	0.0062	0.149	0.0273
Toluene	0.0143	0.344	0.0628
Ethylbenzene	0.0033	0.079	0.0144
Xylenes	0.0033	0.079	0.0144
C8+ Heavies	0.0319	0.764	0.1395
Total Emissions	14.7344	353.625	64.5366
Total Hydrocarbon Emissions	14.7344	353.625	64.5366
Total VOC Emissions	2.6676	64.022	11.6841
Total HAP Emissions	0.0785	1.885	0.3440
Total BTEX Emissions	0.0271	0.652	0.1189

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.5819	109.965	20.0687
Ethane	1.5633	37.520	6.8473
Propane	0.7336	17.607	3.2133
Isobutane	0.1500	3.599	0.6568
n-Butane	0.2589	6.214	1.1340

Isopentane	0.0907	2.177	0.3973
n-Pentane	0.0742	1.780	0.3248
n-Hexane	0.0338	0.812	0.1481
Cyclohexane	0.0280	0.672	0.1226
Other Hexanes	0.0625	1.499	0.2736
Heptanes	0.0639	1.533	0.2798
Methylcyclohexane	0.0240	0.576	0.1051
2,2,4-Trimethylpentane	0.0004	0.010	0.0018
Benzene	0.0323	0.774	0.1413
Toluene	0.0995	2.388	0.4358
Ethylbenzene	0.0347	0.832	0.1518
Xylenes	0.0519	1.245	0.2272
C8+ Heavies	0.0625	1.500	0.2737
Total Emissions	7.9459	190.702	34.8030
Total Hydrocarbon Emissions	7.9459	190.702	34.8030
Total VOC Emissions	1.8007	43.217	7.8870
Total HAP Emissions	0.2525	6.061	1.1060
Total BTEX Emissions	0.2183	5.239	0.9561

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	39.8831	20.0687	49.68
Ethane	13.4592	6.8473	49.13
Propane	6.1481	3.2133	47.74
Isobutane	1.2390	0.6568	46.99
n-Butane	2.1080	1.1340	46.21
Isopentane	0.7369	0.3973	46.09
n-Pentane	0.5937	0.3248	45.30
n-Hexane	0.2593	0.1481	42.87
Cyclohexane	0.1821	0.1226	32.66
Other Hexanes	0.4921	0.2736	44.40
Heptanes	0.4564	0.2798	38.69
Methylcyclohexane	0.1513	0.1051	30.52
2,2,4-Trimethylpentane	0.0032	0.0018	43.64
Benzene	0.1549	0.1413	8.80
Toluene	0.4672	0.4358	6.72
Ethylbenzene	0.1590	0.1518	4.54
Xylenes	0.2344	0.2272	3.08
C8+ Heavies	0.3434	0.2737	20.31
Total Emissions	67.0713	34.8030	48.11
Total Hydrocarbon Emissions	67.0713	34.8030	48.11
Total VOC Emissions	13.7291	7.8870	42.55
Total HAP Emissions	1.2780	1.1060	13.46
Total BTEX Emissions	1.0156	0.9561	5.85

EQUIPMENT REPORTS:

ABSORBER

Calculated Absorber Stages:	2.04	
Specified Dry Gas Dew Point:	5.00	lbs. H2O/MMSCF
Temperature:	100.0	deg. F
Pressure:	900.0	psig
Dry Gas Flow Rate:	17.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.2802	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	63.16	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	0.98	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.91%	92.09%
Carbon Dioxide	99.95%	0.05%
Nitrogen	100.00%	0.00%
Methane	100.00%	0.00%
Ethane	99.99%	0.01%
Propane	99.98%	0.02%
Isobutane	99.98%	0.02%
n-Butane	99.97%	0.03%
Isopentane	99.97%	0.03%
n-Pentane	99.97%	0.03%
n-Hexane	99.95%	0.05%
Cyclohexane	99.79%	0.21%
Other Hexanes	99.96%	0.04%
Heptanes	99.92%	0.08%
Methylcyclohexane	99.78%	0.22%
2,2,4-Trimethylpentane	99.96%	0.04%
Benzene	97.83%	2.17%
Toluene	97.08%	2.92%
Ethylbenzene	96.37%	3.63%
Xylenes	94.63%	5.37%
C8+ Heavies	99.77%	0.23%

FLASH TANK

Flash Control:	Combustion device	
Flash Control Efficiency:	50.00	%
Flash Temperature:	150.0	deg. F
Flash Pressure:	50.0	psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.54%	0.46%
Carbon Dioxide	6.62%	93.38%
Nitrogen	0.57%	99.43%
Methane	0.64%	99.36%
Ethane	1.75%	98.25%
Propane	4.53%	95.47%
Isobutane	6.03%	93.97%
n-Butane	7.59%	92.41%
Isopentane	8.03%	91.97%
n-Pentane	9.64%	90.36%
n-Hexane	14.52%	85.48%
Cyclohexane	36.49%	63.51%
Other Hexanes	11.68%	88.32%
Heptanes	22.89%	77.11%

Methylcyclohexane	41.08%	58.92%
2,2,4-Trimethylpentane	13.39%	86.61%
Benzene	83.27%	16.73%
Toluene	87.62%	12.38%
Ethylbenzene	91.86%	8.14%
Xylenes	94.64%	5.36%
C8+ Heavies	63.71%	36.29%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	12.11%	87.89%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	2.74%	97.26%
n-Pentane	2.60%	97.40%
n-Hexane	2.07%	97.93%
Cyclohexane	7.60%	92.40%
Other Hexanes	4.61%	95.39%
Heptanes	1.56%	98.44%
Methylcyclohexane	8.48%	91.52%
2,2,4-Trimethylpentane	5.76%	94.24%
Benzene	5.92%	94.08%
Toluene	8.93%	91.07%
Ethylbenzene	11.26%	88.74%
Xylenes	13.64%	86.36%
C8+ Heavies	16.75%	83.25%

STREAM REPORTS:

WET GAS STREAM

Temperature: 100.00 deg. F
Pressure: 914.70 psia
Flow Rate: 7.09e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.33e-001	4.48e+001
Carbon Dioxide	1.23e-001	1.01e+002
Nitrogen	3.29e-001	1.72e+002
Methane	8.17e+001	2.45e+004
Ethane	1.26e+001	7.06e+003
Propane	3.37e+000	2.78e+003

Isobutane	4.71e-001	5.11e+002
n-Butane	7.16e-001	7.77e+002
Isopentane	2.08e-001	2.80e+002
n-Pentane	1.49e-001	2.01e+002
n-Hexane	4.37e-002	7.05e+001
Cyclohexane	1.08e-002	1.70e+001
Other Hexanes	9.60e-002	1.55e+002
Heptanes	4.75e-002	8.90e+001
Methylcyclohexane	7.49e-003	1.37e+001
2,2,4-Trimethylpentane	4.99e-004	1.07e+000
Benzene	1.10e-003	1.60e+000
Toluene	2.10e-003	3.61e+000
Ethylbenzene	4.99e-004	9.91e-001
Xylenes	4.99e-004	9.91e-001
C8+ Heavies	9.49e-003	3.02e+001
Total Components	100.00	3.68e+004

DRY GAS STREAM

Temperature: 100.00 deg. F
Pressure: 914.70 psia
Flow Rate: 7.08e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.05e-002	3.54e+000
Carbon Dioxide	1.23e-001	1.01e+002
Nitrogen	3.30e-001	1.72e+002
Methane	8.18e+001	2.45e+004
Ethane	1.26e+001	7.06e+003
Propane	3.37e+000	2.78e+003
Isobutane	4.71e-001	5.11e+002
n-Butane	7.16e-001	7.77e+002
Isopentane	2.08e-001	2.80e+002
n-Pentane	1.49e-001	2.01e+002
n-Hexane	4.38e-002	7.04e+001
Cyclohexane	1.08e-002	1.69e+001
Other Hexanes	9.61e-002	1.55e+002
Heptanes	4.76e-002	8.90e+001
Methylcyclohexane	7.48e-003	1.37e+001
2,2,4-Trimethylpentane	5.00e-004	1.07e+000
Benzene	1.08e-003	1.57e+000
Toluene	2.04e-003	3.51e+000
Ethylbenzene	4.82e-004	9.55e-001
Xylenes	4.73e-004	9.38e-001
C8+ Heavies	9.48e-003	3.01e+001
Total Components	100.00	3.68e+004

LEAN GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 6.70e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.85e+001	3.71e+002
Water	1.50e+000	5.66e+000
Carbon Dioxide	1.31e-012	4.96e-012
Nitrogen	1.74e-013	6.56e-013
Methane	7.54e-018	2.84e-017
Ethane	8.69e-008	3.28e-007
Propane	5.04e-009	1.90e-008
Isobutane	8.79e-010	3.32e-009
n-Butane	1.44e-009	5.44e-009
Isopentane	9.85e-005	3.72e-004
n-Pentane	9.04e-005	3.41e-004
n-Hexane	4.72e-005	1.78e-004
Cyclohexane	3.14e-004	1.19e-003
Other Hexanes	1.61e-004	6.09e-004
Heptanes	9.89e-005	3.73e-004
Methylcyclohexane	3.30e-004	1.25e-003
2,2,4-Trimethylpentane	1.51e-006	5.70e-006
Benzene	4.86e-004	1.83e-003
Toluene	2.40e-003	9.06e-003
Ethylbenzene	1.11e-003	4.19e-003
Xylenes	2.10e-003	7.94e-003
C8+ Heavies	2.48e-003	9.37e-003
Total Components	100.00	3.77e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 100.00 deg. F
Pressure: 914.70 psia
Flow Rate: 7.85e-001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	8.56e+001	3.71e+002
Water	1.08e+001	4.69e+001
Carbon Dioxide	1.93e-002	8.36e-002
Nitrogen	1.49e-002	6.46e-002
Methane	2.10e+000	9.11e+000
Ethane	7.09e-001	3.07e+000
Propane	3.24e-001	1.40e+000
Isobutane	6.53e-002	2.83e-001
n-Butane	1.11e-001	4.81e-001
Isopentane	3.89e-002	1.69e-001
n-Pentane	3.14e-002	1.36e-001
n-Hexane	1.37e-002	5.94e-002
Cyclohexane	9.86e-003	4.27e-002
Other Hexanes	2.61e-002	1.13e-001
Heptanes	2.41e-002	1.05e-001
Methylcyclohexane	8.26e-003	3.58e-002
2,2,4-Trimethylpentane	1.71e-004	7.39e-004
Benzene	8.58e-003	3.72e-002
Toluene	2.67e-002	1.16e-001
Ethylbenzene	9.34e-003	4.05e-002
Xylenes	1.42e-002	6.15e-002
C8+ Heavies	2.03e-002	8.78e-002
Total Components	100.00	4.33e+002

FLASH TANK OFF GAS STREAM

Temperature: 150.00 deg. F
Pressure: 64.70 psia
Flow Rate: 2.77e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.64e+000	2.16e-001
Carbon Dioxide	2.43e-001	7.81e-002
Nitrogen	3.14e-001	6.43e-002
Methane	7.72e+001	9.05e+000
Ethane	1.37e+001	3.02e+000
Propane	4.16e+000	1.34e+000
Isobutane	6.26e-001	2.66e-001
n-Butane	1.05e+000	4.45e-001
Isopentane	2.94e-001	1.55e-001
n-Pentane	2.33e-001	1.23e-001
n-Hexane	8.06e-002	5.08e-002
Cyclohexane	4.42e-002	2.71e-002
Other Hexanes	1.58e-001	9.98e-002
Heptanes	1.10e-001	8.06e-002
Methylcyclohexane	2.94e-002	2.11e-002
2,2,4-Trimethylpentane	7.67e-004	6.40e-004
Benzene	1.09e-002	6.22e-003
Toluene	2.13e-002	1.43e-002
Ethylbenzene	4.25e-003	3.30e-003
Xylenes	4.25e-003	3.29e-003
C8+ Heavies	2.56e-002	3.19e-002
Total Components	100.00	1.51e+001

FLASH TANK GLYCOL STREAM

Temperature: 150.00 deg. F
Flow Rate: 7.51e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
TEG	8.87e+001	3.71e+002	886834.
Water	1.12e+001	4.67e+001	111680.
Carbon Dioxide	1.32e-003	5.54e-003	13.
Nitrogen	8.79e-005	3.68e-004	1.
Methane	1.39e-002	5.80e-002	139.
Ethane	1.29e-002	5.38e-002	129.
Propane	1.52e-002	6.36e-002	152.
Isobutane	4.07e-003	1.70e-002	41.
n-Butane	8.73e-003	3.65e-002	87.
Isopentane	3.24e-003	1.35e-002	32.
n-Pentane	3.13e-003	1.31e-002	31.
n-Hexane	2.06e-003	8.62e-003	21.
Cyclohexane	3.73e-003	1.56e-002	37.
Other Hexanes	3.16e-003	1.32e-002	32.
Heptanes	5.72e-003	2.39e-002	57.
Methylcyclohexane	3.51e-003	1.47e-002	35.
2,2,4-Trimethylpentane	2.37e-005	9.90e-005	0.
Benzene	7.41e-003	3.10e-002	74.

Toluene	2.42e-002	1.01e-001	242.
Ethylbenzene	8.89e-003	3.72e-002	89.
Xylenes	1.39e-002	5.82e-002	139.
C8+ Heavies	1.34e-002	5.59e-002	134.
Total Components	100.00	4.18e+002	1000000.

FLASH GAS EMISSIONS

Flow Rate: 6.37e+002 scfh
Control Method: Combustion Device
Control Efficiency: 50.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.02e+001	1.52e+001
Carbon Dioxide	2.84e+001	2.09e+001
Nitrogen	1.37e-001	6.43e-002
Methane	1.68e+001	4.52e+000
Ethane	2.99e+000	1.51e+000
Propane	9.06e-001	6.70e-001
Isobutane	1.36e-001	1.33e-001
n-Butane	2.28e-001	2.22e-001
Isopentane	6.41e-002	7.75e-002
n-Pentane	5.07e-002	6.14e-002
n-Hexane	1.76e-002	2.54e-002
Cyclohexane	9.61e-003	1.36e-002
Other Hexanes	3.45e-002	4.99e-002
Heptanes	2.40e-002	4.03e-002
Methylcyclohexane	6.40e-003	1.05e-002
2,2,4-Trimethylpentane	1.67e-004	3.20e-004
Benzene	2.37e-003	3.11e-003
Toluene	4.64e-003	7.17e-003
Ethylbenzene	9.25e-004	1.65e-003
Xylenes	9.25e-004	1.65e-003
C8+ Heavies	5.57e-003	1.59e-002
Total Components	100.00	4.35e+001

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.69e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.95e+001	4.11e+001
Carbon Dioxide	5.49e-003	5.54e-003
Nitrogen	5.73e-004	3.68e-004
Methane	1.58e-001	5.80e-002
Ethane	7.80e-002	5.38e-002
Propane	6.29e-002	6.36e-002
Isobutane	1.28e-002	1.70e-002
n-Butane	2.74e-002	3.65e-002
Isopentane	7.96e-003	1.32e-002
n-Pentane	7.71e-003	1.28e-002

n-Hexane	4.28e-003	8.44e-003
Cyclohexane	7.48e-003	1.44e-002
Other Hexanes	6.38e-003	1.26e-002
Heptanes	1.03e-002	2.36e-002
Methylcyclohexane	5.98e-003	1.35e-002
2,2,4-Trimethylpentane	3.57e-005	9.33e-005
Benzene	1.63e-002	2.91e-002
Toluene	4.37e-002	9.23e-002
Ethylbenzene	1.36e-002	3.30e-002
Xylenes	2.06e-002	5.02e-002
C8+ Heavies	1.19e-002	4.66e-002
Total Components	100.00	4.16e+001

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 (R13-3072). However, Williams OVM does request that the emission unit descriptions and limitations be modified, as indicated on the following pages.

1.0. Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
CE-1	CE-1	Compressor Engine Caterpillar G3306TALE	2013	203 bhp	Three-Way Catalyst
RSV-1	RSV-1	TEG Dehydrator Still Vent	2013	17 MMscf/day	None
RBV-1	RBV-1	TEG Dehydrator Reboiler	2013	**0.50 MMBtu/hr**	None
T01	T01	Produced Fluids Tank	2013	8,820 gallons	NA
T02	T02	Produced Fluids Tank	2013	8,820 gallons	NA
TLO	TLO	Produced Fluids Truck Loading	2013	141,120 gallons/yr	None

2.0. General Conditions No Change

3.0. Facility-Wide Requirements No Change

4.0. Source-Specific Requirements No Change

5.0. Source-Specific Requirements (Engine, CE-1) No Change

6.0. Source-Specific Requirements (Reboiler, RBV-1)

6.1. Limitations and Standards

6.1.1. Maximum Design Heat Input. The maximum design heat input for the Reboiler RBV-1 shall not exceed **0.50 MMBTU/hr**.

6.1.2. Maximum emissions from the **0.50 MMBTU/hr** Reboiler RBV-1 shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	**0.05**	**0.22**
Carbon Monoxide	**0.04**	**0.18**

6.1.3. To demonstrate compliance with Section 6.1.2., the quantity of natural gas that shall be consumed in the **0.50 MMBTU/hr** Reboiler RBV-1 shall not exceed **490 cubic feet per hour** and **4.29×10^6** cubic feet per year.

6.1.4. - 6.3.1. No Change

6.4.1. To demonstrate compliance with Sections 6.1.1., 6.1.2., 6.1.3., the permittee shall maintain records of the amount of natural gas consumed in the **0.50 MMBTU/hr** Reboiler RBV-1. Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.

6.4.2. - 6.5.1. No change

7.0. Source-Specific Requirements (TEG Dehydration Unit, RSV-1)

7.1. Limitations and Standards

7.1.1. No Change.

7.1.2. Maximum emissions from the glycol dehydration unit/still column (RSV-1) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Volatile Organic Compounds	**2.16**	**9.46**
n-Hexane	**0.04**	**0.18**
Benzene	**0.04**	**0.17**
Toluene	**0.12**	**0.52**
Xylenes	**0.06**	**0.27**

7.1.3. - 7.1.5. No Change

7.1.6. At least **50%** of the vapors from the flash tank will be sent to reboiler RBV-1 to be used as fuel.

7.2.1. - 7.4.2. No Change

8.0. Source-Specific Requirements (Tanks and Tank Unloading; T01, T02, and TLO)

8.1. Limitations and Standards

8.1.1. - 8.1.2. 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."

- 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 through 45CSR§13-8.5).

- An Affidavit of Publication shall be submitted immediately upon receipt.

ATTACHMENT P
Public Notice

Williams Ohio Valley Midstream LLC (OVM)
WHIPKEY COMPRESSOR STATION
Application for 45CSR13 Class II Administrative Permit Update

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 Class II Administrative Permit Update for an existing natural gas compressor station off State Route 250 approximately 9 miles SE of Moundsville, WV. The latitude and longitude coordinates are 39.8743 degrees and -80.56865 degrees.

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

0.04	tons of nitrogen oxides per year
0.03	tons of carbon monoxide per year
(34.57)	tons of volatile organic compounds per year
(8.99)	tons of hazardous air pollutants per year
(100.57)	tons of carbon dioxide equivalent per year

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

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

Dated this the _____ day of May 2016.

By: Williams Ohio Valley Midstream LLC
Paul Hunter
General Manager Ohio River Supply Hub
Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275

APPLICATION FEE
NSR Permit Modification

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

Any permittee other than a small business as defined in section 507(c) of the federal Clean Air Act which requests a Class II administrative update to a valid existing permit pursuant to this section shall submit a permit application fee of three hundred dollars (**$300**).

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

-	NSPS Requirements:	$1,000	NA
-	NESHAP Requirements:	**$2,500**	(Subpart HH – Glycol Dehydrator)
-	New Major Source:	$10,000	NA
-	Major Modification:	$5,000	NA

Total application fee is **$2,800**.

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

COMPANY NUMBER: 4000

CHECK NUMBER: 4000140812

PAY DATE	SUPPLIER NO.	SUPPLIER NAME	CHECK TOTAL
28-APR-16	526257	WV DEP - DIVISION OF AIR QUALITY	2,800.00

Invoice Date	Invoice Or Credit Memo / Invoice Description	Gross	Discount	Net
25-APR-16	25-APR-16-526257 /	2,800.00	0.00	2,800.00
		Page Totals	0.00	2,800.00

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

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

Check Number: 4000140812
Check Date: 28-APR-16

Two Thousand Eight Hundred Dollars And Zero Cents

Pay To The Order Of:
WV DEP - DIVISION OF AIR QUALITY
601 57TH ST SE
CHARLESTON, WV 25304 United States

PAY (USD)	$2,800.00

Authorized Signature

MA1353 (6/11)

⑈4000140812⑈ ⑆071923226⑆ 00940116 7⑈

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