

aww
13-3231
051-00211



Williams Ohio Valley Midstream LLC
100 Teletech Drive, Suite 2
Moundsville, WV 26041
(304) 843-3125
(304) 843-3131 fax

January 6, 2015
(Via Federal Express)

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

**Subject: Application for 45CSR13 NSR Modification Permit
Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
Marshall County, West Virginia**

Dear Ms. McKeone,

Williams Ohio Valley Midstream LLC (OVM) is submitting an Application for 45CSR13 New Source Review (NSR) Modification Permit for the existing (but currently exempt) OVM Keaton Dehydration Station (DS), located West of Adams Hill Rd (County Hwy 250/4), approximately 2.2 miles N-NW of Cameron in Marshall County, West Virginia.

This application for 45CSR13 NSR Modification Permit has been prepared and submitted to request authorization to increase the dehydrator's design capacity and lean glycol recirculation rate; resulting in the PTE VOC and HAP exceeding the WVDEP-DAQ exemption thresholds.

Accordingly, the permit will allow for continued operation of the facility, as follows:

Emission Units

Unit ID	Point ID	Description	Year Installed	Design Capacity
RSV-01	1E	Dehydrator - Flash Tank and Still Vent	2012	6.0 MMscfd
RBV-01	2E	Dehydrator - Reboiler	2012	0.22 MMBtu/hr
FUG	3E	Piping and Equipment Fugitives	2012	na

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.

Bev McKeone
WVDEP – Division of Air Quality
January 6, 2015
Page 02 of 02

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

Sincerely,

A handwritten signature in cursive script that reads "Shanda R. Durham". The signature is written in black ink and is positioned below the word "Sincerely,".

Shanda R. Durham
Environmental Specialist

Enclosures:

Application for NSR Construction Permit w/ Attachments A through S
Check for Application Fee

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

For the:

**Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION 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**

January 2015

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

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
Marshall County, West Virginia

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APPLICATION FOR NSR MODIFICATION PERMIT

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APPLICATION FEE

**APPLICATION FOR
45CSR13 NSR
MODIFICATION PERMIT**

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

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



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
 601 57th Street, SE
 Charleston, WV 25304
 (304) 926-0475
www.dep.wv.gov/daq

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

PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):
 CONSTRUCTION MODIFICATION RELOCATION
 CLASS I ADMINISTRATIVE UPDATE TEMPORARY
 CLASS II ADMINISTRATIVE UPDATE AFTER-THE-FACT
 ((EXISTING, HOWEVER EXEMPT, FACILITY))

PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):
 ADMINISTRATIVE AMENDMENT MINOR MODIFICATION
 SIGNIFICANT MODIFICATION NOT APPLICABLE
 IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS ATTACHMENT S TO THIS APPLICATION

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

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office): WILLIAMS OHIO VALLEY MIDSTREAM LLC (OVM)		2. Federal Employer ID No. (FEIN): 27-0856707	
3. Name of facility (if different from above): KEATON DEHYDRATION STATION		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: 100 TELETECH DRIVE, SUITE 2 MOUNDSVILLE, WV 26041		5B. Facility's present physical address: WEST OF ADAMS HILL RD (CO HWY 250/4) (~2.2 MILES N-NW OF CAMERON)	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> 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 <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - If YES, please explain: APPLICANT OWNS THE DEHYDRATION STATION - If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): NATURAL GAS DEHYDRATION STATION		10. North American Industry Classification System (NAICS) code for the facility: 211111 - CRUDE PETROLEUM AND NATURAL GAS EXTRACTION	
11A. DAQ Plant ID No. (existing facilities): NA - CURRENTLY EXEMPT		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities): NA - CURRENTLY EXEMPT	
12A. Directions to the facility: - For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road; - For Construction or Relocation permits , please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a MAP as Attachment B . FROM MAIN ST IN CAMERON: 1) HEAD NORTH ON US 250/WAYNESBORO PIKE ~ 1.8 MI; 2) TURN LEFT ONTO CLOUSTON WOODS/GRAVE CREEK RD ~ 1.2 MI; 3) SLIGHT RIGHT ONTO ADAMS HILL RD/CO RD 250/4 ~0.5 MI; 4) SLIGHT LEFT ONTO GRAVEL ACCESS ROAD ~ 0.2 MI.			
			
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.			

12.B. New site address (if applicable): WEST OF ADAMS HILL RD	12C. Nearest city or town: CAMERON	12D. County: MARSHALL
12.E. UTM Northing (KM): 4,412.00 km Northing	12F. UTM Easting (KM): 535.96 km Easting	12G. UTM Zone: 17S
13. Briefly describe the proposed change(s) at the facility: THIS APPLICATION IS PREPARED AND SUBMITTED TO: <ul style="list-style-type: none"> • INCREASE THE DEHYDRATION UNIT'S DESIGN CAPACITY AND LEAN GLYCOL CIRCULATION RATE (RESULTING IN VOC EMISSIONS EXCEEDING THE WVDEP-DAQ EXEMPTION THRESHOLD) 		
14A. Provide the date of anticipated installation or change: – If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: NA		14B. Date of anticipated Start-Up if a permit is granted: UPON PERMIT ISSUANCE
14C. Provide a Schedule of the planned Installation of/Change to and Start-Up of each of the units proposed in this permit application as Attachment C (if more than one unit is involved).		
15. Provide maximum projected Operating Schedule of activity/activities outlined in this application: Hours Per Day: 24 Days Per Week: 7 Weeks Per Year: 52		
16. Is demolition or physical renovation at an existing facility involved? <input type="checkbox"/> YES <input checked="" type="checkbox"/> 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 (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as Attachment D .		

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).
20. Include a Table of Contents as the first page of your application package.
21. Provide a Plot Plan , e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E (Refer to Plot Plan Guidance). – Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).
22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F .
23. Provide a Process Description as Attachment G . – Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).
24. Provide Material Safety Data Sheets (MSDS) for all materials processed, used or produced as Attachment H . – For chemical processes, provide a MSDS for each compound emitted to the air.
25. Fill out the Emission Units Table and provide it as Attachment I .
26. Fill out the Emission Points Data Summary Sheet (Table 1 and Table 2) and provide it as Attachment J .
27. Fill out the Fugitive Emissions Data Summary Sheet and provide it as Attachment K .
<i>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</i>

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

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

General Emission Unit, specify:

- 6.0 MMSCFD TEG DEHYDRATION UNIT (RSV-01)
- 0.22 MMBTU/HR REBOILER (RBV-01)
- FUGITIVE LEAK SOURCES (FUG)

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

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

- | | | |
|--|---|--|
| <input type="checkbox"/> Absorption Systems | <input type="checkbox"/> Baghouse | <input type="checkbox"/> Flare |
| <input type="checkbox"/> Adsorption Systems | <input type="checkbox"/> Condenser | <input type="checkbox"/> Mechanical Collector |
| <input type="checkbox"/> Afterburner | <input type="checkbox"/> Electrostatic Precipitator | <input type="checkbox"/> Wet Collecting System |
| <input type="checkbox"/> Other Collectors, specify: NA | | |

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

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

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

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

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

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

YES NO

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

Section III. Certification of Information

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

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

Submit completed and signed Authority Form as Attachment R.

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE: _____

Don Wicburg
(Please use blue ink)

DATE: 1/6/2015

(Please use blue ink)

35B. Printed name of signee: DON WICBURG	35C. Title: VICE PRESIDENT AND GENERAL MANAGER
35D. E-mail: DON.WICBURG@WILLIAMS.COM	36E. Phone: (304) 843-3158
36A. Printed name of contact person: SHANDA R. DURHAM	36F. FAX: (304) 843-3131
36C. E-mail: SHANDA.DURHAM@WILLIAMS.COM	36B. Title: ENVIRONMENTAL SPECIALIST
	36D. Phone: (304) 843-3125
	36E. FAX: (304) 843-3131

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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



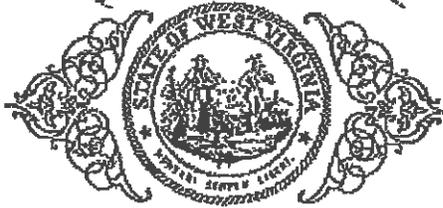
ATTACHMENT A
Business Certificate

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

- **Certificate of Amendment to the Certificate of Authority**
From: CAIMAN EASTERN MIDSTREAM, LLC
To: WILLIAMS OHIO VALLEY MIDSTREAM LLC
Date: May 15, 2012

 - **Certificate of Authority of a Foreign Limited Liability Company**
To: CAIMAN EASTERN MIDSTREAM, LLC
Date: September 11, 2009
-

State of West Virginia



Certificate

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

the attached true and exact copy of the Articles of Amendment to the Articles of Organization of
CAIMAN EASTERN MIDSTREAM, LLC

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

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

WILLIAMS OHIO VALLEY MIDSTREAM LLC



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

Natalie E. Tennant

Secretary of State

State of West Virginia



Certificate

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

CAIMAN EASTERN MIDSTREAM, LLC

Control Number: 99GIS

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

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

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



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

Natalie E. Tennant

Secretary of State

ATTACHMENT B
Location/Topographic Map

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

- **Address:**
Williams Ohio Valley Midstream LLC
Keaton Dehydration Station
West of Adams Hill Rd (Co Hwy 250/4)
(~2.2 Miles N-NW of Cameron)
Cameron, Marshall County, WV 26033

 - **Latitude and Longitude:**
39°51'26.20"North x -80°34'46.50" West
(39.857278° North x -80.579583° West)

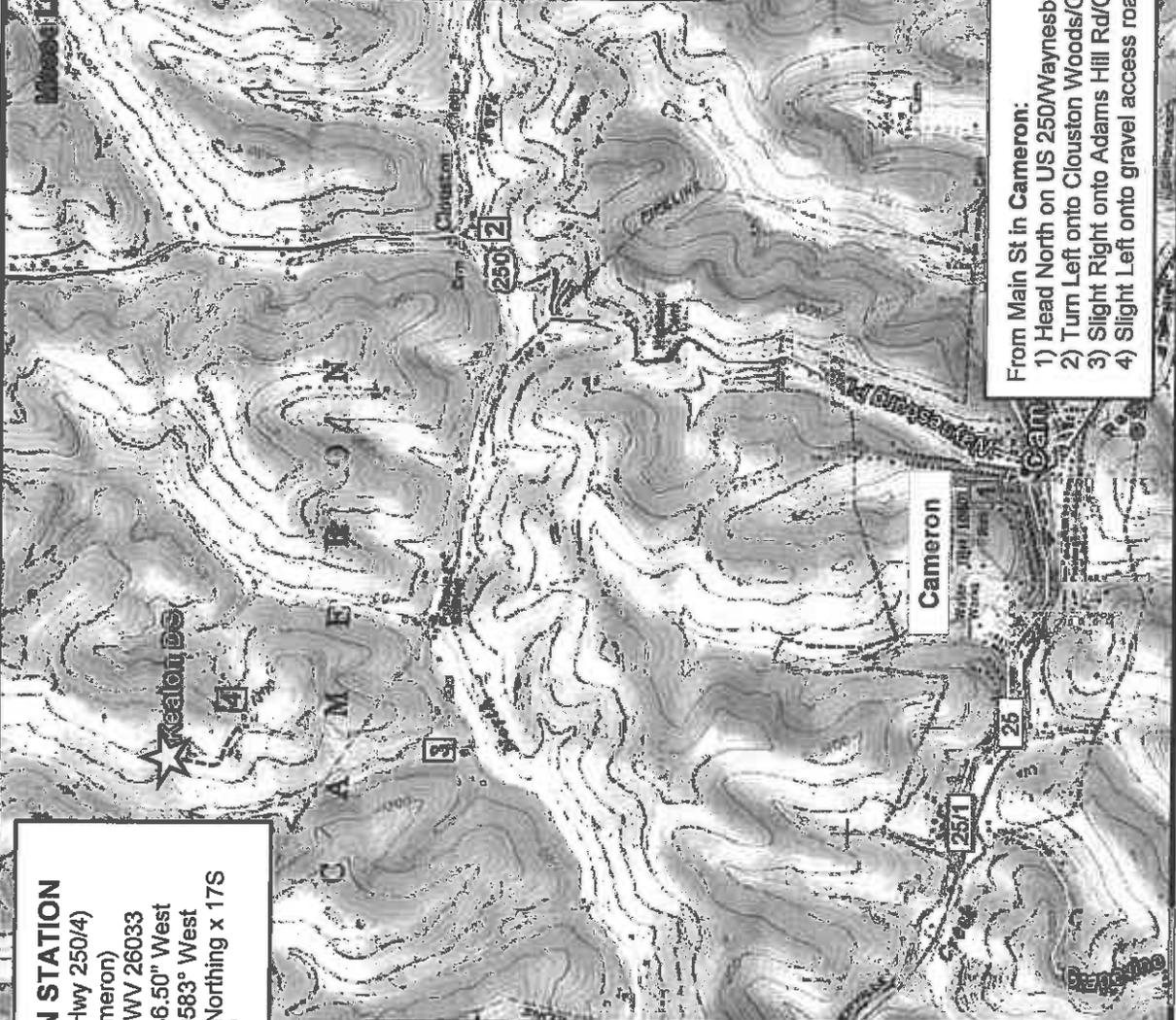
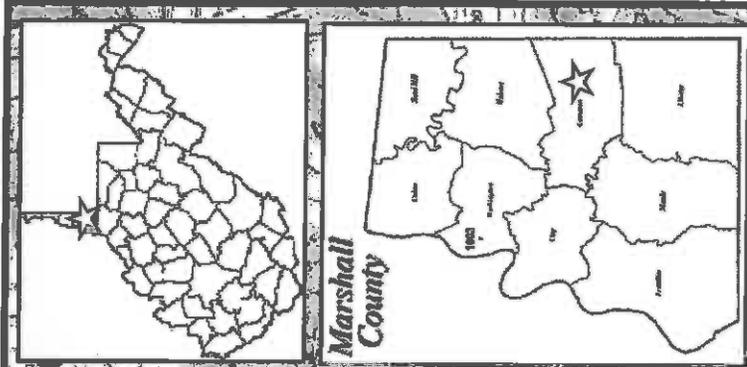
 - **UTM:**
536.0 km Easting x 4,412.0 km Northing x 17S

 - **Directions:**
From Main St in Cameron:
 - 1) Head North on US 250/Waynesboro Pike ~ 1.8 Mi;
 - 2) Turn Left onto Clouston Woods/Grave Creek Rd ~ 1.2 mi;
 - 3) Slight Right onto Adams Hill Rd/Co Rd 250/4 ~ 0.5 mi;
 - 4) Slight Left onto gravel access road ~ 0.2 mi.

 - **USGS:**
7.5" Topographic – Cameron WV – 2014
-

Attachment B - Area (Topographic) Map

KEATON DEHYDRATION STATION
 West of Adams Hill Rd (Co Hwy 250/4)
 (~2.2 Miles N-NW of Cameron)
 Cameron, Marshall County, WV 26033
 39°51'26.20"North x -80°34'46.50" West
 39.857278° North x -80.579583° West
 536.0 km Easting x 4,412.0 km Northing x 175
 Elevation: ~1,285'



- From Main St in Cameron:
- 1) Head North on US 250/Waynesboro Pike ~ 1.8 Mi;
 - 2) Turn Left onto Clouston Woods/Grave Creek Rd ~ 1.2 mi;
 - 3) Slight Right onto Adams Hill Rd/Co Rd 250/4 ~ 0.5 mi;
 - 4) Slight Left onto gravel access road ~ 0.2 mi.

ATTACHMENT C

Installation and Start-Up Schedule

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

The OVM Keaton Dehydration Station is an existing, though currently exempt, operation. Increasing the dehydrator's design capacity and glycol circulation rate will result in the PTE exceeding the WVDEP-DAQ exemption thresholds. It is anticipated that the facility modification will be implemented immediately upon issuance of the permit.

ATTACHMENT D

Regulatory Discussion

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

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

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
45CSR13 NSR Modification Permit Application

Attachment D
REGULATORY DISCUSSION

A. Applicability of New Source Review (NSR) Regulations

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

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

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

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

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

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

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

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

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

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

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

- 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 Area Source with Pre-Controlled PTE < 10 tpy
- Total HAPs: Title V Area Source with Pre-Controlled PTE < 25 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 A, General Provisions

40CFR§60.1-§60.19

[Not Applicable]

This rule does not apply because there is no equipment or operations subject to New Source Performance Standards (NSPS).

2. NSPS Dc, Steam Generating Units

40CFR§60.40c-§60.48c

[Not Applicable]

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

3. NSPS Kb, Volatile Organic Liquid Storage Vessels

40CFR§60.110b-§60.117b

[Not Applicable]

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

4. NSPS GG, Stationary Gas Turbines

40CFR§60.330-§60.335

[Not Applicable]

This rule does not apply because there is no stationary gas turbine at the facility (§60.330).

5. NSPS KKK, Leaks from Natural Gas Processing Plants

40CFR§60.630-§60.636

[Not Applicable]

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

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

40CFR§60.640-§60.648

[Not Applicable]

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

7. NSPS IIII, Compression Ignition Reciprocating Internal Combustion Engines

40CFR§60.4200-§60.4219

[Not Applicable]

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

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

40CFR§60.4230-§60.4248

[Not Applicable]

This rule does not apply because there is no stationary internal combustion engine at the facility (§60.4230(a)(1)).

9. NSPS KKKK, Stationary Combustion Turbines

40CFR§60.4300-§60.4420

[Not Applicable]

This rule does not apply because there is no stationary combustion turbine at the facility (§60.4300).

10. NSPS OOOO, Crude Oil and Natural Gas Production, Transmission and Distribution

40CFR§60.5360-§60.5430

[Not Applicable]

This rule does not apply because the facility is not a natural gas well, gas processing plant or sweetening plant; neither does it have compressors, storage vessels w/ PTE > 6 tpy, or pneumatic controllers located prior to custody transfer w/ bleed rates > 6 scfh (§60.5365(d)(i)).

11. NESHAP A, General Provisions

40CFR§63.1-§63.16

[Applicable]

This rule does apply to the dehydrator (RSV-01) because it is subject to NESHAP HH. Requirements include:

- a. Notification requirements (§63.9)
- b. Recordkeeping requirements (§63.10)

12. NESHAP HH, Oil and Natural Gas Production Facilities

40CFR§63.760-§63.779

[Applicable]

This rule does apply to the dehydrator (RSV-01 (1E)). However, because the dehydrator will have an actual annual average benzene emissions < 0.9 megagrams per year (1.0 tpy), it is exempt from all NESHAP HH requirements except to maintain records of actual annual average benzene emissions to demonstrate continuing exemption status (§63.764(e)(1)(ii) and §63.775(c)(8)).

13. NESHAP HHH, Natural Gas Transmission and Storage Facilities

40CFR§63.1270-§63.1289

[Not Applicable]

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

14. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175

[Not Applicable]

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

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

40CFR§63.6580-§63.6675

[Not Applicable]

This rule does not apply because there is no stationary reciprocating internal combustion engine at the facility (§63.6560).

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

40CFR§63.7480 – §63.7575

[Not Applicable]

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

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

40CFR§63.11193 – §63.11237

[Not Applicable]

This rule does not apply because gas-fired boilers are not subject to the requirements of this subpart (§63.11195(e)). Specifically, “boiler” is defined as an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water.

18. Chemical Accident Prevention Provisions

40CFR§68.1-§68.220

[Not Applicable]

This rule does not apply because the facility does not store more than a threshold quantity of a regulated substance in a process (§68.115).

19. Compliance Assurance Monitoring (CAM)

40CFR§64.1-§64.10

[Not Applicable]

This rule does not apply because there is no control device used at the facility.

20. Mandatory Greenhouse Gases (GHG) Reporting

40CFR§98.1-§98.9

[Not Applicable]

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

C. Applicability of Source Aggregation

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

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

i) Same Industrial Grouping

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

ii) Contiguous or Adjacent

The determination of whether two or more facilities are “contiguous” or “adjacent” is made on a case-by-case basis. This determination is proximity based, and it is important to focus on this criterion and whether two contiguous or adjacent facilities, considered as a single source, meet the common sense notion of a plant. The functional interrelationship of the two or more facilities is not a relevant inquiry in determining whether the facilities are “contiguous” or “adjacent.”

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

The closest Williams-owned facility to the Keaton Dehydration Facility is the Whipkey Compression Station, which is located over ½ mile away. The Whipkey Compressor Station does not meet the common sense definition of being “contiguous” with or “adjacent” to the Keaton Dehydration Facility.

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

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

iii) Common Control

Williams OVM operates under its parent company The Williams Companies, Inc. (Williams) and is the sole operator of the subject facility. The closest Williams-operated facility to the subject facility is the Whipkey Compressor Station, located approximately 1.3 miles to the north-northeast. This facility is the closest to Keaton to have common ownership but it is not “contiguous” with or “adjacent” to the Keaton Dehydration facility.

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

Furthermore, neither Williams OVM, nor Williams, exercise operational control over any equipment owned or operated by any natural gas producer upstream of the subject facility. All employees at the subject facility are under the exclusive direction of Williams and are not under the control of any other entity. Similarly, Williams has no authority over employees of the production wells. These companies operate wholly independent of one another. No employees are expected to shuttle back and forth between the subject facility and any production well.

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

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

Summary

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

D. Applicability of State Regulations

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

1. Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45CSR2

[Applicable]

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

2. Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors

45CSR4

[Applicable]

This rule does apply and states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution

Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable. No odors have been deemed objectionable.

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

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

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

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

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

This rule does apply. Williams OVM has 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 neither a new major source of pollutants nor is the proposed modification a modification to an existing major source.

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

This rule does not apply because the facility is not subject to any New Source Performance Standards (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 in an area designated as attainment for all regulated air pollutants.

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

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

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

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

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

[Not Applicable]

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

12. Air Pollution Emissions Banking and Trading
45CSR28

[Not Applicable]

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

13. Emission Statements for VOC and NOX
45CSR29

[Not Applicable]

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

14. Requirements for Operating Permits
45CSR30

[Not Applicable]

This rule does not apply because the facility is a non-major "deferred" source of all regulated pollutants.

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

ATTACHMENT E

Plot Plan

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

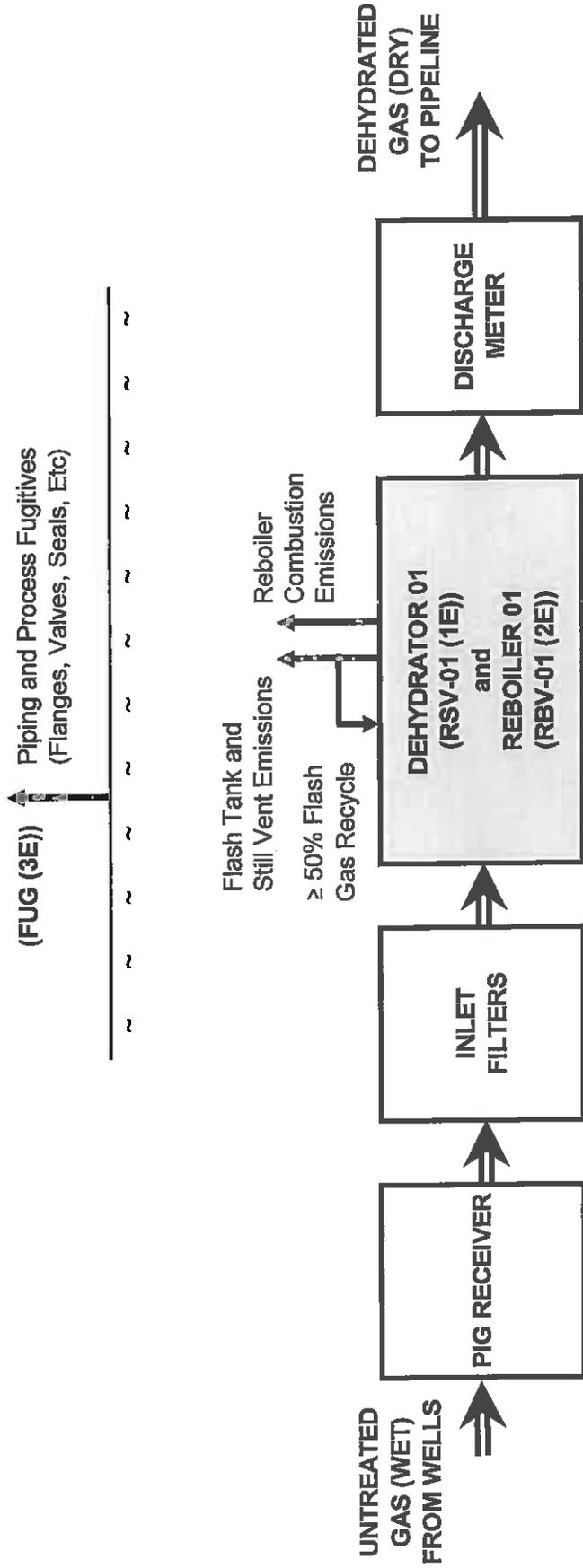
- **Plot Plan – Keaton Dehydration Station**
-

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) – OVM Keaton Dehydration Station**
-

Attachment F - Process Flow Diagram (PFD)



ID No.	EQUIPMENT
RSV-01 (1E)	6.0 MMscfd Dehydrator
RBV-01 (2E)	0.22 MMBtu/hr Reboiler
FUG (3E)	Piping and Process 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). “

• **Process Description**

- A. 6.0 MMscfd Tri-Ethylene Glycol (TEG) Dehydrator (RSV-01 (1E))
 - B. 0.22 MMBtu/hr Tri-Ethylene Glycol (TEG) Reboiler (RBV-01 (2E))
 - C. Storage Tanks
 - D. Piping and Equipment Fugitive Emissions (FUG) (3E))
-

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
NSR 45CSR13 Modification Permit Application

Attachment G
PROCESS DESCRIPTION

This application for 45CSR13 NSR ATF Construction Permit has been prepared and submitted to request authorization for continued operation of following equipment:

- One (1) 6.0 MMscfd Triethylene Glycol (TEG) Dehydrator-01 (RSV-01 (1E))
- One (1) 0.22 MMBtu/hr Triethylene Glycol (TEG) Reboiler-01 (RBV-01 (2E))
- Facility Process Piping Fugitives (FUG (3E))

A. 6.0 MMscfd Tri-Ethylene Glycol (TEG) Dehydrator (RSV-01 (1E))

One (1) 6.0 MMscfd Triethylene Glycol (TEG) Dehydrator (RSV-01 (1E)) is utilized at the facility. The dehydrator is comprised of a Contactor/Absorber Tower (no vented emissions), a Flash Tank, and a Regenerator/Still Vent.

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

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

The rich glycol is then sent from the flash tank to the regenerator/still where the TEG is heated to drive off the water vapor and any remaining hydrocarbons. Once boiled, the glycol is returned to a lean state and used again in the process.

B. 0.22 MMBtu/hr Tri-Ethylene Glycol (TEG) Reboiler (RBV-01 (2E))

One (1) 0.22 MMBtu/hr Tri-Ethylene Glycol (TEG) Reboiler (RBV-01 (2E)) is utilized to supply heat for the Triethylene Glycol (TEG) Regenerator/Still Vent.

C. Storage Tanks

There is one 225 gallon TEG storage tank and one 275 gallon methanol storage tank, each with de-minimis (insignificant) emissions.

D. Piping and Equipment Fugitive Emissions (FUG) (3E))

Fugitive emissions from the 6.0 MMscfd TEG Dehydrator-01 (RSV-01 (1E)) and associated 0.22 MMBtu/hr TEG Reboiler-01 (BLR-01 (2E)) result from leaks from different component types (connectors, valves, pumps, etc.) in gas-vapor service.

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

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

- **INLET GAS COMPOSITION – Design Basis**
 - **INLET GAS SUMMARY**
 - **MATERIAL SAFETY DATA SHEETS (MSDS):**
 - Wellhead Natural Gas
 - Triethylene Glycol (TEG)
 - Methanol
-

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
 Attachment H
INLET GAS COMPOSITION - Design Basis

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

Good

Customer	: 2259 - WILLIAMS	Date Sampled	: 07/02/2013
Station ID	: 52042-50	Date Analyzed	: 07/11/2013
Cylinder ID	: w1102	Effective Date	: 08/01/2013
Producer	: 009402-TRANS ENERGY INC	Cyl Pressure	: 885
Lease	: KEATON MASTER	Temp	: 81
Area	: 500 - OHIO VALLEY MID	Cylinder Type	: Spot
State	: WV	Sample By	: JR

<u>COMPONENT</u>	<u>MOL%</u>	<u>GPM@14.73(PSIA)</u>
Methane	81.7627	0.000
Ethane	12.6780	3.401
Propane	3.3269	0.919
Iso-Butane	0.4304	0.141
Normal-Butane	0.6998	0.221
Iso-Pentane	0.1945	0.071
Normal-Pentane	0.1485	0.054
Nitrogen	0.3313	0.000
Carbon-Dioxide	0.1345	0.000
Oxygen	0.0000	0.000
BENZENE	0.0012	0.000
TOLUENE	0.0037	0.001
ETHYLBENZENE	0.0006	0.000
M-XYLENE/P-XYLENE	0.0000	0.000
2,2-Dimethylbutane	0.0084	0.004
2,3-Dimethylbutane/CycloC5	0.0113	0.004
2-methylpentane	0.0460	0.019
3-methylpentane	0.0294	0.012
Normal-Hexane	0.0482	0.020
2,2-Dimethylpentane	0.0010	0.000
Methylcyclopentane	0.0076	0.003
3,3-Dimethylpentane	0.0043	0.002
CYCLOHEXANE	0.0055	0.002
2-Methylhexane	0.0228	0.011
2,3-Dimethylpentane	0.0048	0.002
3-Methylhexane	0.0157	0.007
1,3-Dimethylcyclopentane	0.0002	0.000
1,2-DMCYC5 / 2,2,4-TMC5	0.0004	0.000
N-Heptane	0.0192	0.009
METHYLCYCLOHEXANE	0.0135	0.006
2,5-Dimethylhexane	0.0015	0.001
2,3-Dimethylhexane	0.0017	0.001
2-Methylheptane	0.0088	0.003
4-Methylheptane	0.0027	0.001
3-Methylheptane	0.0047	0.002
1,4-Dimethylcyclohexane	0.0023	0.001
N-OCTANE / 1,1,2-DMCYC6	0.0074	0.004
1,3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCY6	0.0016	0.001
2,4,4 TMC6	0.0006	0.000
2,6-Dimethylheptane / 1,C2-DMCY6	0.0015	0.001
Ethylcyclohexane	0.0009	0.000
M-XYLENE	0.0010	0.000
P-XYLENE	0.0069	0.003
O-XYLENE	0.0000	0.000
NONANE	0.0044	0.002
N-DECANE	0.0046	0.003
N-UNDECANE	0.0010	0.001
TOTAL	100.0000	4.933

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
Attachment H
INLET GAS SUMMARY

Inlet Gas - Keaton Master - 07/02/13

Component	CAS	Formula	Molecular Weight	Mole % (Vol %)	Mole Fraction	Weighted Sum	Weight %	lb/MMscf
Nitrogen	7727-37-9	N2	32.00	0.3313	0.003313	0.1060	0.537	279.36
Hydrogen Sulfide	2148-87-8	H2S	34.08	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.01	0.1345	0.001345	0.0592	0.300	155.98
Methane*	75-82-8	CH4	16.04	81.7627	0.817629	13.1168	66.439	34,564.98
Ethane*	74-84-0	C2H6	30.07	12.6780	0.126780	3.8122	19.309	10,045.71
Propane**	74-98-6	C3H8	44.10	3.3269	0.033269	1.4670	7.431	3,865.85
i-Butane**	75-28-5	C4H10	58.12	0.4304	0.004304	0.2502	1.267	659.21
n-Butane**	106-97-8	C4H10	58.12	0.6996	0.006996	0.4066	2.080	1,071.52
Cyclopentane**	287-92-3	C5H10	70.13	---	---	---	---	---
i-Pentane**	78-78-4	C5H12	72.15	0.1945	0.001945	0.1403	0.711	369.79
n-Pentane**	109-66-0	C5H12	72.15	0.1485	0.001485	0.1071	0.543	282.34
Cyclohexane***	110-82-7	C6H12	84.16	0.0131	0.000131	0.0110	0.056	29.05
Other Hexanes**	varies	C6H14	86.18	0.0951	0.000951	0.0820	0.415	215.96
Methylcyclohexane**	varies	C7H14	98.19	0.0141	0.000141	0.0138	0.070	36.48
Heptanes**	varies	C7H16	100.20	0.0678	0.000678	0.0679	0.344	179.03
C8+ Heavies**	varies	C8H18	114.5 est.	0.0415	0.000415	0.0475	0.241	125.22
Benzene***	71-43-2	C6H6	78.11	0.0012	0.000012	0.0009	0.005	2.47
Ethylbenzene***	100-41-4	C8H10	106.17	0.0006	0.000006	0.0006	0.003	1.68
n-Hexane***	110-54-3	C6H14	86.18	0.0482	0.000482	0.0415	0.210	109.46
Toluene***	108-88-3	C7H8	92.14	0.0037	0.000037	0.0034	0.017	8.98
2,2,4-TMP***	540-84-1	C8H18	114.23	0.0001	0.000001	0.0001	0.000	0.15
Xylenes***	1330-20-7	C8H10	106.17	0.0080	0.000080	0.0084	0.043	22.24

Totals:	100.00	1.00	19.74	100.00	52,025
Total THC:	99.53	1.00	19.58	99.16	51,590
Total VOC:	5.09	0.05	2.65	13.42	6,979
Total HAP:	0.06	0.001	0.06	0.28	145

* = Hydrocarbon (HC)

** = also Volatile Organic Compound (VOC)

*** = also Hazardous Air Pollutant (HAP)

*UGC (Universal Gas Constant) = 379.482 scf/lb-mol @ 60 °F and 14.696 psia.

Pound "X"/scf = M% of "X" * MW of "X" / UGC

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

Component	CAS	Formula	Representative Gas Analysis			Worst-Case (120%)		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.13	0.30	156	0.17	0.38	200
Methane	75-82-8	CH4	81.76	66.44	34,565	98.17	79.77	41,500
Ethane	74-84-0	C2H6	12.68	19.31	10,046	15.27	23.26	12,100
VOC	Various	C3+	5.09	13.42	6,979	6.13	16.15	8,400
Benzene	71-43-2	C6H6	1.2E-03	4.7E-03	2	4.9E-03	0.02	10
Ethylbenzene	110-54-3	C8H10	6.0E-04	3.2E-03	2	3.6E-03	0.02	10
n-Hexane	110-54-3	C6H14	0.05	0.21	109	0.06	0.27	140
Toluene	108-88-3	C7H8	3.7E-03	0.02	9	0.01	0.04	20
2,2,4-TMP	540-84-1	C8H18	5.0E-05	2.9E-04	0.2	3.3E-03	0.02	10
Xylenes	1330-20-7	C8H10	0.01	0.04	22	0.01	0.06	30
Total HAP	Various	C6+	0.06	0.28	145	0.09	0.42	220

INLET GAS SUMMARY



Ingenuity takes energy.

Wellhead Natural Gas

Safety Data Sheet

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

Revision Date: 10/02/2013

Version: 1.0

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

Product Identifier

Product Form: Mixture

Product Name: Wellhead Natural Gas

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

Intended Use of the Product

Use of the Substance/Mixture: Fuel.

Name, Address, and Telephone of the Responsible Party

Company

Williams, Inc.

One Williams Center

Tulsa, OK 74172, US

T 800-688-7507

enterpriseehs@williams.com

Emergency Telephone Number

Emergency number : 800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

Classification (GHS-US)

Simple Asphy

Flam. Gas 1 H220

Compressed gas H280

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US)



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

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			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 (H₂S).

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing Media

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

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

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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, CO₂). Hydrocarbon, sulfur dioxide (SO₂), and Hydrogen sulfide (H₂S) fatal and irritating gases

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

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

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

For Non-Emergency Personnel

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

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

Environmental Precautions

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

Methods and Material for Containment and Cleaning Up

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

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

Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

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

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product

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

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

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

Conditions for Safe Storage, Including Any Incompatibilities Not available

Specific End Use(s)

Fuel.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Hydrogen sulfide (7783-06-4)		
USA ACGIH	ACGIH TWA (ppm)	1 ppm
USA ACGIH	ACGIH STEL (ppm)	5 ppm
USA OSHA	OSHA PEL (Ceiling) (ppm)	20 ppm
USA NIOSH	NIOSH REL (ceiling) (mg/m ³)	15 mg/m ³
USA NIOSH	NIOSH REL (ceiling) (ppm)	10 ppm
USA IDLH	US IDLH (ppm)	100 ppm
Alberta	OEL Ceiling (mg/m ³)	21 mg/m ³
Alberta	OEL Ceiling (ppm)	15 ppm
Alberta	OEL TWA (mg/m ³)	14 mg/m ³
Alberta	OEL TWA (ppm)	10 ppm
British Columbia	OEL Ceiling (ppm)	10 ppm
Manitoba	OEL STEL (ppm)	5 ppm
Manitoba	OEL TWA (ppm)	1 ppm
New Brunswick	OEL STEL (mg/m ³)	21 mg/m ³
New Brunswick	OEL STEL (ppm)	15 ppm
New Brunswick	OEL TWA (mg/m ³)	14 mg/m ³
New Brunswick	OEL TWA (ppm)	10 ppm
Newfoundland & Labrador	OEL STEL (ppm)	5 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1 ppm
Nova Scotia	OEL STEL (ppm)	5 ppm
Nova Scotia	OEL TWA (ppm)	1 ppm
Nunavut	OEL Ceiling (mg/m ³)	28 mg/m ³
Nunavut	OEL Ceiling (ppm)	20 ppm
Nunavut	OEL STEL (mg/m ³)	21 mg/m ³
Nunavut	OEL STEL (ppm)	15 ppm
Nunavut	OEL TWA (mg/m ³)	14 mg/m ³
Nunavut	OEL TWA (ppm)	10 ppm
Northwest Territories	OEL Ceiling (mg/m ³)	28 mg/m ³
Northwest Territories	OEL Ceiling (ppm)	20 ppm
Northwest Territories	OEL STEL (mg/m ³)	21 mg/m ³
Northwest Territories	OEL STEL (ppm)	15 ppm
Northwest Territories	OEL TWA (mg/m ³)	14 mg/m ³
Northwest Territories	OEL TWA (ppm)	10 ppm
Ontario	OEL STEL (ppm)	15 ppm
Ontario	OEL TWA (ppm)	10 ppm
Prince Edward Island	OEL STEL (ppm)	5 ppm
Prince Edward Island	OEL TWA (ppm)	1 ppm
Québec	VECD (mg/m ³)	21 mg/m ³
Québec	VECD (ppm)	15 ppm

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Québec	VEMP (mg/m ³)	14 mg/m ³
Québec	VEMP (ppm)	10 ppm
Saskatchewan	OEL STEL (ppm)	15 ppm
Saskatchewan	OEL TWA (ppm)	10 ppm
Yukon	OEL STEL (mg/m ³)	27 mg/m ³
Yukon	OEL STEL (ppm)	15 ppm
Yukon	OEL TWA (mg/m ³)	15 mg/m ³
Yukon	OEL TWA (ppm)	10 ppm

Propane (74-98-6)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	1800 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	1800 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	1000 ppm
USA IDLH	US IDLH (ppm)	2100 ppm (10% LEL)
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m ³)	1800 mg/m ³
Québec	VEMP (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Butane (106-97-8)

USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	1900 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	800 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL STEL (ppm)	750 ppm
British Columbia	OEL TWA (ppm)	600 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
New Brunswick	OEL TWA (mg/m ³)	1900 mg/m ³
New Brunswick	OEL TWA (ppm)	800 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Nunavut	OEL STEL (mg/m ³)	2576 mg/m ³
Nunavut	OEL STEL (ppm)	1000 ppm
Nunavut	OEL TWA (mg/m ³)	1901 mg/m ³
Nunavut	OEL TWA (ppm)	800 ppm
Northwest Territories	OEL STEL (mg/m ³)	2576 mg/m ³
Northwest Territories	OEL STEL (ppm)	1000 ppm
Northwest Territories	OEL TWA (mg/m ³)	1901 mg/m ³
Northwest Territories	OEL TWA (ppm)	800 ppm
Ontario	OEL TWA (ppm)	800 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Québec	VEMP (mg/m ³)	1900 mg/m ³

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Québec	VEMP (ppm)	800 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Yukon	OEL STEL (mg/m ³)	1600 mg/m ³
Yukon	OEL STEL (ppm)	750 ppm
Yukon	OEL TWA (mg/m ³)	1400 mg/m ³
Yukon	OEL TWA (ppm)	600 ppm

Carbon dioxide (124-38-9)		
USA ACGIH	ACGIH TWA (ppm)	5000 ppm
USA ACGIH	ACGIH STEL (ppm)	30000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	9000 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m ³)	9000 mg/m ³
USA NIOSH	NIOSH REL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m ³)	54000 mg/m ³
USA NIOSH	NIOSH REL (STEL) (ppm)	30000 ppm
USA IDLH	US IDLH (ppm)	40000 ppm
Alberta	OEL STEL (mg/m ³)	54000 mg/m ³
Alberta	OEL STEL (ppm)	30000 ppm
Alberta	OEL TWA (mg/m ³)	9000 mg/m ³
Alberta	OEL TWA (ppm)	5000 ppm
British Columbia	OEL STEL (ppm)	15000 ppm
British Columbia	OEL TWA (ppm)	5000 ppm
Manitoba	OEL STEL (ppm)	30000 ppm
Manitoba	OEL TWA (ppm)	5000 ppm
New Brunswick	OEL STEL (mg/m ³)	54000 mg/m ³
New Brunswick	OEL STEL (ppm)	30000 ppm
New Brunswick	OEL TWA (mg/m ³)	9000 mg/m ³
New Brunswick	OEL TWA (ppm)	5000 ppm
Newfoundland & Labrador	OEL STEL (ppm)	30000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	5000 ppm
Nova Scotia	OEL STEL (ppm)	30000 ppm
Nova Scotia	OEL TWA (ppm)	5000 ppm
Nunavut	OEL STEL (mg/m ³)	27000 mg/m ³
Nunavut	OEL STEL (ppm)	15000 ppm
Nunavut	OEL TWA (mg/m ³)	9000 mg/m ³
Nunavut	OEL TWA (ppm)	5000 ppm
Northwest Territories	OEL STEL (mg/m ³)	27000 mg/m ³
Northwest Territories	OEL STEL (ppm)	15000 ppm
Northwest Territories	OEL TWA (mg/m ³)	9000 mg/m ³
Northwest Territories	OEL TWA (ppm)	5000 ppm
Ontario	OEL STEL (ppm)	30000 ppm
Ontario	OEL TWA (ppm)	5000 ppm
Prince Edward Island	OEL STEL (ppm)	30000 ppm
Prince Edward Island	OEL TWA (ppm)	5000 ppm
Québec	VECD (mg/m ³)	54000 mg/m ³
Québec	VECD (ppm)	30000 ppm
Québec	VEMP (mg/m ³)	9000 mg/m ³
Québec	VEMP (ppm)	5000 ppm
Saskatchewan	OEL STEL (ppm)	30000 ppm

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Saskatchewan	OEL TWA (ppm)	5000 ppm
Yukon	OEL STEL (mg/m ³)	27000 mg/m ³
Yukon	OEL STEL (ppm)	15000 ppm
Yukon	OEL TWA (mg/m ³)	9000 mg/m ³
Yukon	OEL TWA (ppm)	5000 ppm
Nitrogen (7727-37-9)		
Methane (74-82-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm
Ethane (74-84-0)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
Alberta	OEL TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

Exposure Controls

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

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



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

Hand Protection: Wear chemically resistant protective gloves. Insulated gloves

Eye Protection: Chemical goggles or face shield.

Skin and Body Protection: Not available

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

Thermal Hazard Protection: Wear suitable protective clothing.

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

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State : Gas

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

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions.

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

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

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

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

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

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity : Not classified

LD50 and LC50 Data Not available

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

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Aspiration Hazard: Not classified

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

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

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

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

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data

Hydrogen sulfide (7783-06-4)	
LC50 Inhalation Rat (mg/l)	0.99 mg/l (Exposure time: 1 h)
ATE (gases)	100.000 ppmV/4h
Propane (74-98-6)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)
Butane (106-97-8)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)
Ethane (74-84-0)	
LC50 Inhalation Rat (mg/l)	658 mg/l (Exposure time: 4 h)

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Wellhead Natural Gas (CAS Mixture)	
LC50 Fish 1	0.002 mg/l (Exposure time: 96 h - Species: Coregonus clupeaformis)
Hydrogen sulfide (7783-06-4)	
LC50 Fish 1	0.0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 Daphnia 1	0.022 mg/l (Exposure time: 96 h - Species: Gammarus pseudolimnaeus)
LC 50 Fish 2	0.016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])

Persistence and Degradability

Wellhead Natural Gas	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Wellhead Natural Gas	
Bioaccumulative Potential	Not established.
Hydrogen sulfide (7783-06-4)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	0.45 (at 25 °C)
Propane (74-98-6)	
Log Pow	2.3
Butane (106-97-8)	
Log Pow	2.89
Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83
Ethane (74-84-0)	
Log Pow	<= 2.8

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Mobility in Soil Not available

Other Adverse Effects

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

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

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

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

SECTION 14: TRANSPORT INFORMATION

In Accordance With ICAO/IATA/DOT/TDG

UN Number

UN-No.(DOT): 1971

DOT NA no.: UN1971

UN Proper Shipping Name

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

Hazard Labels (DOT) : 2.1 - Flammable gases



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

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

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

Additional Information

Emergency Response Guide (ERG) Number : 115

Transport by sea

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

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

Air transport

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

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

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Wellhead Natural Gas	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard
Hydrogen sulfide (7783-06-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on SARA Section 302 (Specific toxic chemical listings)	
Listed on SARA Section 313 (Specific toxic chemical listings)	
SARA Section 302 Threshold Planning Quantity (TPQ)	500
SARA Section 313 - Emission Reporting	1.0 %

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

US State Regulations

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

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

Propane (74-98-6)

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

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

Butane (106-97-8)

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

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

Carbon dioxide (124-38-9)

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

Nitrogen (7727-37-9)

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

Methane (74-82-8)

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

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

Ethane (74-84-0)

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

Canadian Regulations

Wellhead Natural Gas

WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas
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Hydrogen sulfide (7783-06-4)

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

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WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects
Propane (74-98-6)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
Butane (106-97-8)	
Listed on the Canadian DSL (Domestic Substances List) inventory. Listed on the Canadian Ingredient Disclosure List	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
Carbon dioxide (124-38-9)	
Listed on the Canadian DSL (Domestic Substances List) inventory. Listed on the Canadian Ingredient Disclosure List	
WHMIS Classification	Class A - Compressed Gas
Nitrogen (7727-37-9)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas
Methane (74-82-8)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas
Ethane (74-84-0)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas

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

SECTION 16: OTHER INFORMATION

Revision date : 10/02/2013

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

GHS Full Text Phrases:

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

Party Responsible for the Preparation of This Document

Wellhead Natural Gas

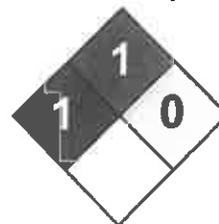
Safety Data Sheet

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

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

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

North America GHS US 2012 & WHMIS



Health	1
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet Triethylene glycol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Triethylene glycol

Catalog Codes: SLT2644

CAS#: 112-27-6

RTECS: YE4550000

TSCA: TSCA 8(b) inventory: Triethylene glycol

Ch#: Not available.

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

Chemical Formula: C6H14O4

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

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

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

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

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

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

Section 3: Hazards Identification

Potential Acute Health Effects:

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

Potential Chronic Health Effects:

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

Section 4: First Aid Measures

Eye Contact:

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

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

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

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

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

Flammable Limits: LOWER: 0.9% UPPER: 9.2%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

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

Fire Fighting Media and Instructions:

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

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

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

Large Spill:

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

Section 7: Handling and Storage

Precautions:

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

Storage:

Att H - MSDS - Tri-Ethylene Glycol (TEG) - Page 3 of 5
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection: Splash goggles. Lab coat.

Personal Protection in Case of a Large Spill:

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 150.18 g/mole

Color: Colorless.

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

Boiling Point: 285°C (545°F)

Melting Point: -5°C (23°F)

Critical Temperature: Not available.

Specific Gravity: 1.1274 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 5.17 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Ingestion.

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

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

Other Toxic Effects on Humans:

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

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

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

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

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

Other Classifications:

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

DSCL (EEC): R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

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

Health: 1

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:31 PM

Last Updated: 05/21/2013 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Methyl alcohol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl alcohol

Catalog Codes: SLM3064, SLM3952

CAS#: 67-56-1

RTECS: PC1400000

TSCA: TSCA 8(b) inventory: Methyl alcohol

CI#: Not applicable.

Synonym: Wood alcohol, Methanol; Methylol; Wood Spirit; Carbinol

Chemical Name: Methanol

Chemical Formula: CH₃OH

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: 1-800-901-7247

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Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl alcohol	67-56-1	100

Toxicological Data on Ingredients: Methyl alcohol: ORAL (LD50): Acute: 5628 mg/kg [Rat]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 64000 ppm 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to eyes. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 12°C (53.6°F). OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 6% UPPER: 36.5%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. **SMALL FIRE:** Use DRY chemical powder. **LARGE FIRE:** Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition, it emits acrid smoke and irritating fumes. **CAUTION: MAY BURN WITH NEAR INVISIBLE FLAME**

Special Remarks on Explosion Hazards:

Forms an explosive mixture with air due to its low flash point. Explosive when mixed with Chloroform + sodium methoxide and diethyl zinc. It boils violently and explodes.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 from OSHA (PEL) [United States] TWA: 200 STEL: 250 (ppm) from ACGIH (TLV) [United States] [1999] STEL: 250 from NIOSH [United States] TWA: 200 STEL: 250 (ppm) from NIOSH SKIN TWA: 200 STEL: 250 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Alcohol like. Pungent when crude.

Taste: Not available.

Molecular Weight: 32.04 g/mole

Color: Colorless.

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

Boiling Point: 64.5°C (148.1°F)

Melting Point: -97.8°C (-144°F)

Critical Temperature: 240°C (464°F)

Specific Gravity: 0.7915 (Water = 1)

Vapor Pressure: 12.3 kPa (@ 20°C)

Vapor Density: 1.11 (Air = 1)

Volatility: Not available.

Odor Threshold: 100 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.8

Ionicity (in Water): Non-ionic.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizers. Violent reaction with alkyl aluminum salts, acetyl bromide, chloroform + sodium methoxide, chromic anhydride, cyanuric chloride, lead perchlorate, phosphorous trioxide, nitric acid. Exothermic reaction with sodium hydroxide + chloroform. Incompatible with beryllium dihydride, metals (potassium and magnesium), oxidants (barium perchlorate, bromine, sodium hypochlorite, chlorine, hydrogen peroxide), potassium tert-butoxide, carbon tetrachloride, alkali metals, metals (aluminum, potassium magnesium, zinc), and dichloromethane. Rapid autocatalytic dissolution of aluminum, magnesium or zinc in 9:1 methanol + carbon tetrachloride - sufficiently vigorous to be rated as potentially hazardous. May attack some plastics, rubber, and coatings.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 5628 mg/kg [Rat]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 64000 4 hours [Rat].

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. Causes damage to the following organs: eyes. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

Passes through the placental barrier. May affect genetic material. May cause birth defects and adverse reproductive effects (paternal and maternal effects and fetotoxicity) based on animal studies.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 29400 mg/l 96 hours [Fathead Minnow].

BOD5 and COD: Not available.

Products of Biodegradation:

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

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation:

Methanol in water is rapidly biodegraded and volatilized. Aquatic hydrolysis, oxidation, photolysis, adsorption to sediment, and bioconcentration are not significant fate processes. The half-life of methanol in surface water ranges from 24 hrs. to 168 hrs. Based on its vapor pressure, methanol exists almost entirely in the vapor phase in the ambient atmosphere. It is degraded by reaction with photochemically produced hydroxyl radicals and has an estimated half-life of 17.8 days. Methanol is physically removed from air by rain due to its solubility. Methanol can react with NO₂ in polluted air to form methyl nitrate. The half-life of methanol in air ranges from 71 hrs. (3 days) to 713 hrs. (29.7 days) based on photooxidation half-life in air.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Methyl alcohol UNNA: 1230 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Methyl alcohol Illinois toxic substances disclosure to employee act: Methyl alcohol Illinois chemical safety act: Methyl alcohol New York release reporting list: Methyl alcohol Rhode Island RTK hazardous substances: Methyl alcohol Pennsylvania RTK: Methyl alcohol Minnesota: Methyl alcohol Massachusetts RTK: Methyl alcohol Massachusetts spill list: Methyl alcohol New Jersey: Methyl alcohol New Jersey spill list: Methyl alcohol Louisiana spill reporting: Methyl alcohol California Directors List of Hazardous Substances (8CCR 339): Methyl alcohol Tennessee Hazardous Right to Know : Methyl alcohol TSCA 8(b) inventory: Methyl alcohol SARA 313 toxic chemical notification and release reporting: Methyl alcohol CERCLA: Hazardous substances.: Methyl alcohol: 5000 lbs. (2268 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable. R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R39- Danger of very serious irreversible effects. R39/23/24/25- Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed. S7- Keep container tightly closed. S16- Keep away from sources of ignition - No smoking. S36/37- Wear suitable protective clothing and gloves. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information**References:**

-SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. LOLI, HSDB, RTECS, HAZARTEXT, REPROTOX databases

Other Special Considerations: Not available.

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ATTACHMENT I
Emission Units Table

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

- **Emissions Unit Table**
-

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**
 - **Dehydrator – Flash Tank and Still Vent Emissions (RSV-01 (1E))**
 - **Dehydrator – Reboiler Emissions (RBV-01 (2E))**
 - **Table 2 – Release Parameter Data**
-

EMISSION POINTS DATA SUMMARY SHEET - Continued

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				
RSV-01 (1E)	Upward Vertical Stack	6.0 MMiscd Dehydrator - Flash Tank and Still Vent														
									NOX							
									CO							
									VOC	5.08	22.25	5.08	22.25	Gas	AP-42	
									SO2							
									PM10/2.5							
									Benzene	0.09	0.38	0.09	0.38	Gas	AP-42	
									Ethylbenzene	0.10	0.44	0.10	0.44	Gas	AP-42	
									HCHO							
									n-Hexane	0.07	0.29	0.07	0.29	Gas	AP-42	
									Toluene	0.42	1.85	0.42	1.85	Gas	AP-42	
							2,2,4-TMP	1.4E-04	6.0E-04	1.4E-04	6.0E-04	Gas	AP-42			
							Xylenes	1.83	8.01	1.83	8.01	Gas	AP-42			
							Other HAP									
							Total HAP	2.50	10.97	2.50	10.97	Gas	AP-42			
							CO2e	144	631	144	631	Gas	EPA			

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

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

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
Attachment J

EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 1: Emissions Data - Continued

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission 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			
RBV-01 (2E)	Upward Vertical Stack	RBV-01 (2E)	RBV-01 (2E)	na	na	C	8,760	NOX	0.02	0.10	0.02	0.10	Gas	AP-42	
								CO	0.02	0.08	0.02	0.08	Gas	AP-42	
								VOC	1.2E-03	0.01	1.2E-03	0.01	Gas	AP-42	
								SO2	1.3E-04	5.7E-04	1.3E-04	5.7E-04	Gas	AP-42	
								PM10/2.5	1.7E-03	0.01	1.7E-03	0.01	Solid/Gas	AP-42	
								Benzene	4.6E-07	2.0E-06	4.6E-07	2.0E-06	Gas	AP-42	
								Ethylbenzene	—	—	—	—	—	—	
								HCHO	1.6E-05	7.1E-05	1.6E-05	7.1E-05	Gas	AP-42	
								n-Hexane	3.9E-04	1.7E-03	3.9E-04	1.7E-03	Gas	AP-42	
								Toluene	7.4E-07	3.2E-06	7.4E-07	3.2E-06	Gas	AP-42	
								2,2,4-TMP	—	—	—	—	—	—	
								Xylenes	—	—	—	—	—	—	
								Other HAP	4.1E-07	1.8E-06	4.1E-07	1.8E-06	Gas	AP-42	
Total HAP	4.1E-04	1.8E-03	4.1E-04	1.8E-03	Gas	AP-42									
CO2e	26	115	26	115	Gas	EPA									

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

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

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**
-

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
Attachment K
FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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.)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS DATA SHEET.
6.) Will there be General Clean-up VOC Operations? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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."

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
Attachment K

FUGITIVE EMISSIONS 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.

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS ¹	Maximum Potential Pre-Controlled Emissions ²		Maximum Potential Controlled Emissions ³		Est. Method Used ⁴
		lb/hr	ton/yr	lb/hr	ton/yr	
Paved Haul Roads	na	—	—	—	—	—
Unpaved Haul Roads	na	—	—	—	—	—
Storage Pile Emissions	na	—	—	—	—	—
Loading/Unloading Operations	na	—	—	—	—	—
Wastewater Treatment	na	—	—	—	—	—
Process and Piping Fugitives (FUG) (3E) (Facility is NOT subject to LDAR)	VOC	1.11	4.84	1.11	4.84	O - AP-42
	Benzene	9.1E-04	4.0E-03	9.1E-04	4.0E-03	O - AP-42
	E-Benzene	9.1E-04	4.0E-03	9.1E-04	4.0E-03	O - AP-42
	Formaldehyde	—	—	—	—	—
	n-Hexane	0.01	0.06	0.01	0.06	O - AP-42
	Toluene	1.8E-03	8.0E-03	1.8E-03	0.01	O - AP-42
	2,2,4-TMP	9.1E-04	4.0E-03	9.1E-04	4.0E-03	O - AP-42
	Xylenes	2.7E-03	0.01	2.7E-03	0.01	O - AP-42
	Other HAP	—	—	—	—	—
	Total HAP	0.02	0.09	0.02	0.09	O - AP-42
	CO2	0.02	0.08	0.02	0.08	O - EPA
	CH4	3.79	16.60	3.79	16.60	O - EPA
	N2O	—	—	—	—	—
CO2e	95	415	95	415	O - GWP	
General Clean-up VOC Emissions	na	—	—	—	—	—
Other	na	—	—	—	—	—

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS₂, VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases, etc. DO NOT LIST H₂, H₂O, N₂, O₂, and Noble Gases.
² Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in min (e.g. 5 lb VOC/20 min batch).
³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in min (e.g. 5 lb VOC/20 min batch).
⁴ Indicate method used to determine emission rate as follows:
 MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L
Emissions Unit Data Sheet(s)

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

- **Natural Gas Glycol Dehydration Unit Data Sheet**
 - TEG Dehydrator (RSV (1E))
 - TEG Dehydrator Reboiler (RBV-01 (2E))
 - **40 CFR Part 63; Subpart HH & HHH Registration Form**
 - TEG Dehydrator (RSV-01 (1E))
 - **Storage Tank Data Sheet (Not Applicable)**
 - **Leak Source Data Sheet (Not Applicable)**
-

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
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Attachment L

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Facility		Keaton DS			
		Manufacturer and Model		Unknown			
		Max Dry Gas Flow Rate (MMscfd)		6.0			
		Heat Input (MMBtu/hr) - HHV		0.22			
		Design Type (DEG or TEG)		TEG			
		Source Status ²		ES			
		Date Installed/Modified/Removed ³		2012			
		Regenerator Still Vent APCD ⁴		None			
		Fuel HV (Btu/scf) - HHV		1,020			
		H ₂ S Content (gr/100 scf)		0.2			
		Operation (hrs/yr)		8,760			
Source ID # ¹	Vent	Reference ⁵	PTE ⁶	lbs/hr	tons/yr	lbs/hr	tons/yr
RSV-01	Dehydrator 01 (Flash Tank and Still Vent) (50% Flash Tank "Recycle" as Fuel in the Reboiler)	GRI-GLYCalc	VOC	5.08	22.25		
		GRI-GLYCalc	Benzene	0.09	0.38		
		GRI-GLYCalc	E-Benzene	0.10	0.44		
		GRI-GLYCalc	Formaldehyde	---	---		
		GRI-GLYCalc	n-Hexane	0.07	0.29		
		GRI-GLYCalc	Toluene	0.42	1.85		
		GRI-GLYCalc	2,2,4-TMP	1.4E-04	6.0E-04		
		GRI-GLYCalc	Xylenes	1.83	8.01		
		GRI-GLYCalc	Other HAPs	---	---		
		GRI-GLYCalc	Total HAP	2.50	10.97		
		GRI-GLYCalc	CO ₂ e	144	631		
RBV-01	Dehydrator 01 Reboiler Vent	AP-42	NOX	0.02	0.10		
		AP-42	CO	0.02	0.08		
		AP-42	VOC	1.2E-03	0.01		
		AP-42	SO ₂	1.3E-04	5.7E-04		
		AP-42	PM _{10/2.5}	1.7E-03	0.01		
		AP-42	Benzene	4.6E-07	2.0E-06		
		AP-42	E-Benzene	---	---		
		AP-42	Formaldehyde	1.6E-05	7.1E-05		
		AP-42	n-Hexane	3.9E-04	1.7E-03		
		AP-42	Toluene	7.4E-07	3.2E-06		
		AP-42	2,2,4-TMP	---	---		
		AP-42	Xylenes	---	---		
		AP-42	Other HAPs	4.1E-07	1.8E-06		
		AP-42	Total HAP	4.1E-04	1.8E-03		
		40CFR98	CO ₂ e	26	115		

Williams Ohio Valley Midstream LLC
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ATTACHMENT L
NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET - Continued

Notes to NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

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

2. Enter the Source Status using the following codes:

- NS = Construction of New Source
- ES = Existing Source
- MS = Modification of Existing Source
- RS = Removal of Source

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

4. Enter the Air Pollution Control Device (APCD) type designation using the following codes:

- NA = None
- CD = Condenser
- FL = Flare
- CC = Condenser/Combustion Combination
- TO = Thermal Oxidizer

5. Enter the Potential Emissions Data Reference designation using the following codes:

- MD = Manufacturer's Data
- AP = AP-42
- GR = GRI-GLYCalcTM
- OT = Other (please list): _____

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

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

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

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
Attachment L

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

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

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

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

Section A: Facility Description		
Affected facility actual annual average natural gas throughput (scf/day):	6.0 MM	
Affected facility actual annual average hydrocarbon liquid throughput: (bbl/day):	na	
The affected facility processes, upgrades, or stores hydrocarbon liquids prior to custody transfer.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
The affected facility is:	<input checked="" type="checkbox"/> prior to a NG processing plant <input type="checkbox"/> NG processing plant <input type="checkbox"/> prior to the point of custody transfer and there is no NG processing plant	
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	Yes	<input checked="" type="checkbox"/> No
The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): na scf/bbl API gravity: na degrees	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Section B: Dehydration Unit (if applicable) ¹			
Description: 6.0 MMscfd - TEG Dehy 01 (RSV-01) (1E)			
Date of Installation:	2012	Annual Operating Hours:	8,760
Exhaust Stack Height (ft):	12.0	Stack Diameter (ft):	0.3
		Burner rating (MMbtu/hr):	0.22
		Stack Temp. (oF):	150
Glycol Type:	<input checked="" type="checkbox"/> TEG <input type="checkbox"/> EG <input type="checkbox"/> Other: na		
Glycol Pump Type:	<input type="checkbox"/> Elect <input checked="" type="checkbox"/> Gas	If Gas, what is the volume ratio?: 0.08 acfm/gpm	
Condenser installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Exit Temp:	na
		Condenser Pressure:	na
Incinerator/flare installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Destruction Eff.:	na
Other controls installed?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Describe:	na
Wet Gas ² : (Upstream of Contact Tower)	Gas Temperature:	65 oF	Gas Pressure: 900 psig
	Saturated Gas?:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If no, water content?: na
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate: Actual:	6.0 MMscfd	Design: 6.0 MMscfd
	Water Content:	7.0 lb/MMscf	
Lean Glycol:	Circulation Rate: Actual ³ :	0.67 gpm	Max ⁴ : 0.67 gpm
	Pump make/model:	Kimray 4020PV	
Glycol Flash Tank (if applicable):	Temp: 120 oF	Pressure: 40 psig	Vented: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	If no, describe vapor control: A minimum of 50% of flash tank off-gas is used as reboiler fuel, the remainder is vented to atmosphere.		
Stripping Gas (if applicable):	Source of Gas	na	Rate: na

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
 Attachment L

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET - Continued

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

Please attach the following required dehydration unit information:

1. System map indicating the chain of custody information. See Page 43 of this document for an example of a gas flow schematic. It is not intended that the applicant provide this level of detail for all sources. The level of detail that is necessary is to establish where the custody transfer points are located. This can be accomplished by submitting a process flow diagram indicating custody transfer points and the natural gas flow. However, the DAQ reserves the right to request more detailed information in order to make the necessary decisions.
2. Extended gas analysis from the Wet Gas Stream, including mole percent of C1-C8, benzene, ethylbenzene, toluene, xylene and n-hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

Subject to Subpart HH -- However, *EXEMPT* because the facility is an area source of HAP emissions *and* the actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere is < 0.90 megagram per year (1.0 tpy). (See 40CFR§63.764(e)(1)(ii) and §63.775(c)(8)).

Affected facility status:
(choose only one)

Subject to Subpart HHH

- Not Subject
- < 10/25 TPY
 - Affected facility exclusively handles black oil.
 - Facility-wide actual annual average NG throughput is < 650 thousand scf/day and facility-wide actual annual average hydrocarbon liquid is < 250 bpd.
 - No affected source is present.

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
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Attachment K
LEAK SOURCE DATA SHEET - Continued

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in visual or soap-bubble leak detection ppm. Do not include monitoring by methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows: Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/other (specify time period)
If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category valves, gas service: 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; EE - engineering estimate; EPA - emission factors established by EPA (cite document used); 0 - other method, such as in-house emission factor (specify).
5. Do not include in the equipment count seal-less pumps (canned motor or diaphragm) or those with enclosed venting to a control device. (Emissions from vented equipment should be included in the estimates given in the Emission Points Data Sheet.)
6. Volatile organic compounds (VOC) means the term as defined in 40 CFR. 51.100 (s).
7. A light liquid is defined as a fluid with vapor pressure equal to or greater than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if 20% w/w or more of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C, then the fluid is defined as a light liquid.
8. A heavy liquid is defined as a fluid with a vapor pressure less than 0.04 psi (0.3 Kpa) at 20°C. For mixtures, if less than 20% w/w of the stream is composed of fluids with vapor pressures greater than 0.04 psi (0.3 Kpa) at 20°C, then the fluid is defined as a heavy liquid.
9. LIST CO, H₂S, mineral acids, NO, NO₂, SO₂, etc. DO NOT LIST CO, H₂, H₂O, N₂, O₂, and Noble Gases.
10. Include all process valves whether in-line or on an open-ended line such as sample, drain and purge valves. Do not include safety-relief valves, or leakless valves such as check, diaphragm, and bellows seal valves.
11. Do not include a safety-relief valve if there is a rupture disk in place upstream of the valve, or if the valve vents to a control device.
12. Open-ended lines include purge, drain and vent lines. Do not include sampling connections, or lines sealed by plugs, caps, blinds or second valves.
13. Do not include closed-purge sampling connections.

ATTACHMENT M
Air Pollution Control Device Sheet(s)
(Not Applicable)

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

ATTACHMENT N

Supporting Emissions Calculations

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

- **Emission Summary Spreadsheets**
 - Potential to Emit (PTE) – CRITERIA – CONTROLLED
 - Potential to Emit (PTE) – HAZARDOUS AIR POLLUTANTS – CONTROLLED
 - Potential to Emit (PTE) – GREENHOUSE GASES (GHG) – CONTROLLED
 - Potential to Emit (PTE) – PRE-CONTROLLED
 - **Unit-Specific Emission Spreadsheets**
 - 6.0 MMscfd TEG Dehydrator (RSV-01 (1E))
 - 0.22 MMBtu/hr Reboiler (RBV-01 (2E))
 - Process Piping Fugitives (FUG)
 - **AP-42 and GHG Emission Factors**
 - **Dehydrator (RSV-1 (1E)) GRI-GLYCalc Model Results**
 - Summary
 - Input
 - Aggregate
-

Attachment N

POTENTIAL TO EMIT (PTE) - CRITERIA POLLUTANTS - CONTROLLED

Unit ID	Point ID	Control ID	Description	Site Rating	NOX lb/hr	tpy	CO lb/hr	tpy	VOC lb/hr	tpy	SO2 lb/hr	tpy	PM10/2.5 lb/hr	tpy
RSV-01	1E	—	Dehydrator - Flash Tank and Still Vent	6.0 MMsctd	—	—	—	—	5.08	22.25	—	—	—	—
RBV-01	2E	—	Dehydrator - Reboiler	0.22 MMsctd/hr	0.02	0.10	0.02	0.08	1.2E-03	0.01	1.3E-04	5.7E-04	1.7E-03	7.2E-03
TOTAL POINT SOURCE EMISSIONS:														
FUG	3E	—	Piping and Equipment Fugitives	na	—	—	—	—	1.11	4.84	—	—	—	—
TOTAL FUGITIVE EMISSIONS:														
TOTAL FACILITY-WIDE EMISSIONS:														
NSR THRESHOLD:														
					0.02	0.10	0.02	0.08	6.19	27.10	1.3E-04	6.7E-04	1.7E-03	0.01
					6 lb/hr AND 10 tpy									
					—	100	—	100	—	100	—	100	—	100
TVOP THRESHOLD:														

Notes: 1 - Emissions are based on operation at 100% of rated load for 8,760 hr/yr.
 2 - VOC is volatile organic compounds, as defined by EPA, and includes HCHO (formaldehyde).
 3 - PM10/2.5 is filterable and condensable particulate matter, including PM10 and PM2.5.

Attachment N

POTENTIAL TO EMIT (PTE) - HAZARDOUS AIR POLLUTANTS (HAP) - CONTROLLED

Unit ID	Benzene lb/hr	Ethylbenzene lb/hr	Formaldehyde lb/hr	n-Hexane lb/hr	Toluene lb/hr	2,2,4-TMP lb/hr	Xylenes lb/hr	Other HAP lb/hr	Total HAP lb/hr
RSV-01	0.08	0.10	---	0.07	0.42	1.4E-04	1.83	---	2.50
RBV-01	4.8E-07	---	1.8E-05	3.8E-04	7.4E-07	---	---	4.1E-07	10.87
PS:	0.08	0.10	1.8E-05	0.07	4.2E-01	1.4E-04	1.83	4.1E-07	1.8E-03
FUG	9.1E-04	9.1E-04	---	0.01	1.8E-03	4.0E-03	2.7E-03	---	0.02
FUG:	4.0E-03	4.0E-03	---	0.01	1.8E-03	4.0E-03	2.7E-03	---	0.02
TOTAL:	0.08	0.10	1.8E-05	0.08	0.42	1.1E-03	1.83	4.1E-07	2.53
NSR:	2 lb/hr OR 0.5 tpy	2 lb/hr OR 5 tpy	2 lb/hr OR 0.5 tpy	2 lb/hr OR 5 tpy	2 lb/hr OR 5 tpy	2 lb/hr OR 5 tpy	2 lb/hr OR 5 tpy	2 lb/hr OR 5 tpy	2 lb/hr OR 5 tpy
TVOP:	10	10	10	10	10	10	10	10	25

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

2 - HCHO is formaldehyde. Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP (p-octane), acetaldehyde, acrolein, and methanol.

Attachment N

POTENTIAL TO EMIT (PTE) - GREENHOUSE GASES (GHG) - CONTROLLED

Unit ID	Point ID	Control ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr	lb/MMscf:		lb/MMscf:		lb/MMscf:		TOTAL CO ₂ e tpy
						GWP:	CO ₂ tpy	GWP:	CH ₄ tpy	GWP:	CO ₂ e tpy	
RSV-01	1E	—	Dehydrator - Flash Tank and Still Vent	—	8,760	—	—	25	—	—	—	831
RBV-01	2E	—	Dehydrator - Reboiler	0.22	8,760	114	114	2.2E-03	0.05	2.1E-03	0.82	115
TOTAL POINT SOURCE EMISSIONS:						114	114	25	631	2.1E-03	0.82	746
FUG	3E	—	Piping and Equipment Fugitives	—	8,760	0.1	0.1	17	415	—	—	415
TOTAL FUGITIVE EMISSIONS:						0.1	0.1	17	415	—	—	415

TOTAL FACILITY-WIDE PTE:	114	OR	42	OR	2.1E-03	AND	1,161
NSR THRESHOLD:	na		na		na		na
TVOP THRESHOLD:	na		na		na		na

- Notes:
- 1 - Emissions are based on operation at 100% of rated load.
 - 2 - Fugitive CH₄ emissions are based on EPA Fugitive Emission Factors for Oil and Gas Production Operations.
 - 3 - Combustion emissions factors are based EPA AP-42 Table 1.4-2, these factors are more conservative (i.e., higher) than the default values in 40CFR98, Subpart C, Table C-1.
 - 4 - GHG NSR Thresholds and Title V Major Source Thresholds are only applicable if other regulated air pollutants exceed the corresponding Thresholds.

POTENTIAL TO EMIT (PTE) - PRE-CONTROLLED
Attachment N

Unit ID	Point ID	Control ID	Description	NOX lb/hr	tpy	CO lb/hr	tpy	VOC lb/hr	tpy	Xylenes lb/hr	tpy	TOTAL HAP lb/hr	tpy	CO2E lb/hr	tpy
RSV-01	1E	---	Dehydrator - Flash Tank and Still Vent	---	---	---	---	5.08	22.25	1.83	8.01	2.50	10.97	144	631
RBV-01	2E	---	Dehydrator - Reboiler	0.02	0.10	0.02	0.08	1.2E-03	0.01	---	---	4.1E-04	1.8E-03	26	115
TOTAL PRE-CONTROLLED POINT SOURCE EMISSIONS:				0.02	0.10	0.02	0.08	5.98	22.26	1.83	8.01	2.51	10.97	170	746
FUG	3E	---	Piping and Equipment Fugitives	---	---	---	---	1.11	4.84	2.7E-03	0.01	0.02	0.09	95	415
TOTAL PRE-CONTROLLED FUGITIVE EMISSIONS:				---	---	---	---	1.11	4.84	2.7E-03	0.01	0.02	0.09	95	415
TOTAL PRE-CONTROLLED EMISSIONS:				0.02	0.10	0.02	0.08	6.19	27.10	1.83	8.02	2.53	11.06	266	1,161
NSR THRESHOLD:				6 lb/hr AND 10 tpy	2 lb/hr OR 5 tpy	na	na								
TVOP THRESHOLD:				---	100	---	100	---	100	---	10	---	25	---	100,000

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

Dehydrator Flash Tank and Still Vent - 6.0 MMiscfd (RSV-01 (1E))

Unit ID	Description	Reference	Pollutant	Emission Factor lb/MMscf	Emission Factor lb/MMBtu	Pre-Recycle Emissions lb/hr	Net Recycle %	Post-Recycle Emissions lb/hr	tpy
RSV-01 (1E)	Dehydrator 01 (No Combustion Emissions Shown) (See RBV-01)	See BLR-01 See BLR-01 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 See BLR-01 See BLR-01 See BLR-01 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 See BLR-01 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 GRI-GLYCalc 4.0 See BLR-01 GRI-GLYCalc 4.0 See BLR-01 40CFR98 - Table A-1	NOX	---	---	---	---	---	---
			CO	---	---	---	---	---	---
			THC	24.33	106.57	46.9%	12.83	56.64	
			NMHC	13.48	59.09	46.9%	7.17	31.41	
			NMNEHC	6.97	30.52	27.1%	5.08	22.25	
			VOC	6.97	30.52	27.1%	5.08	22.25	
			SO2	---	---	---	---	---	
			PM10/2.5	---	---	---	---	---	
			Benzene	0.09	0.40	5.3%	0.08	0.38	
			Ethylbenzene	0.10	0.45	2.0%	0.10	0.44	
			HCHO	---	---	---	---	---	
			n-Hexane	0.11	0.47	38.8%	0.07	0.29	
			Toluene	0.44	1.82	3.4%	0.42	1.85	
			2,2,4-TMP	2.2E-04	9.7E-04	38.4%	1.4E-04	6.0E-04	
			Xylenes	1.85	8.12	1.4%	1.83	8.01	
			Other HAP	---	---	---	---	---	
			Total HAP	2.60	11.37	3.5%	2.50	10.97	
CO2	---	---	---	---	---				
CH4	11	50	49.7%	5	25				
N2O	---	---	---	---	---				
CO2e	286	1,254	49.7%	144	631				

Notes: 1 - Dehydrator flash tank off-gases are usually burned as fuel in the reboiler. However, to be conservative, it is estimated 50% of the flash tank off-gases are used as reboiler fuel.
 2 - To be conservative, and to account for potential future changes in gas quality, the following worst-case emissions were assumed:

Description	Worst-Case Assumption	*Dehydrator Operating Parameters (See Attachment N)	
		Flow Rate:	Gas Analysis:
8.0 MMiscfd Dehydrator 01	GRI-GLYCalc 4.0*	6.0 MMiscfd	Keaton - 07/02/13
THC	47.20 tpy	65 of	120 of
NMHC	26.17 tpy	Wet Gas Temperature: 800 psig	Flash Tank Pressure: 40 psig
NMNEHC = VOC	18.54 tpy	Wet Gas Water Content: Saturated	Flash Tank Off-Gas Control: 50% Recycle
Benzene	0.32 tpy	Dry Gas Water Content: 7.0 lb H2O/MMiscf	Stripping Gas: na
Ethylbenzene	0.37 tpy	Lean Glycol Water Content: 1.5 wt% H2O	Regen/Cond Off-Gas Control: na
HCHO	---	Glycol Pump: Gas Injection	Condenser Temperature: na
n-Hexane	0.24 tpy	Glycol Circulation Rate: 0.67 gpm	Condenser Pressure: na
Toluene	1.54 tpy	Current Glycol Circ. Rate: 0.22 gpm	
2,2,4-TMP	5.0E-04 tpy		
Xylenes	8.68 tpy		
Other HAP	---		
Total HAP	9.14 tpy		
CH4	21.03 tpy		

Williams Ohio Valley Midstream LLC
 KEATON DEHYDRATION STATION
 45CSR13 NSR Modification Permit Application
 Attachment N
 Process Piping Fugitives – Gas Service

Unit	Description	Equipment (Unit) Type	Unit Count	THC Factor	THC 100.00 Wgt%	VOC 23.26 Wgt%	CO2 0.38 Wgt%	CH4 79.77 Wgt%	N2O	CO2e		
		Gas Service	lb/hr/Unit	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr		
FUG	Equipment and Piping Fugitives	Valves	308	0.00992	3.06	13.40	0.01	2.44	10.69	61	267	
		Pump Seals	—	—	—	—	—	—	—	—	—	
		Others	36	0.01940	0.70	3.06	0.16	0.71	0.56	2.44	14	61
		Connectors	884	0.00044	0.39	1.71	0.09	0.40	0.31	1.36	8	34
FUG	8,780 hr/yr	Flanges	617	0.00066	0.83	2.32	0.12	0.54	2.05	11	46	
		Open-ended lines	17	0.00441	0.07	0.32	0.02	0.08	0.06	0.26	1	6
TOTAL FUGITIVE EMISSIONS:												
			4,775	20.82	4.75	20.82	0.02	3.79	16.60	95	416	

Unit	Description	Equipment (Unit) Type	Benzene 0.02 Wgt%	Ethylbenzene 0.02 Wgt%	n-Hexane 0.27 Wgt%	Toluene 0.04 Wgt%	2,2,4-TMP 0.02 Wgt%	Xylenes 0.06 Wgt%	Total HAP 0.42 Wgt%	
		Gas Service	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	
FUG	Equipment and Piping Fugitives	Valves	5.9E-04	2.6E-03	0.01	0.04	1.2E-03	5.9E-04	1.8E-03	0.01
		Pump Seals	—	—	—	—	—	—	—	—
		Others	1.3E-04	5.9E-04	1.9E-03	0.01	2.7E-04	1.2E-03	1.3E-04	4.0E-04
		Connectors	7.9E-05	3.3E-04	1.0E-03	0.00	1.5E-04	6.6E-04	7.5E-05	3.3E-04
		Flanges	1.0E-04	4.5E-04	1.4E-03	6.3E-03	2.0E-04	8.8E-04	1.0E-04	4.5E-04
		Open-ended lines	1.4E-05	6.2E-05	2.0E-04	8.7E-04	2.8E-05	1.2E-04	1.4E-05	6.2E-05
TOTAL FUGITIVE EMISSIONS:										
			9.1E-04	4.0E-03	0.01	1.8E-03	9.1E-04	2.7E-03	0.01	

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

Equipment Type	Service ^a	Emission Factor (lb/hr/source) ^b
Valves	Gas	4.5E-03
	Heavy Oil	9.4E-05
	Water/Oil	2.1E-03
Pump seals	Gas	9.8E-05
	Heavy Oil	2.4E-03
	Water/Oil	2.4E-05
Others ^c	Gas	8.6E-03
	Heavy Oil	3.2E-03
	Water/Oil	7.3E-03
Connectors	Gas	1.4E-02
	Heavy Oil	2.0E-04
	Water/Oil	1.1E-04
Flanges	Gas	3.9E-04
	Heavy Oil	3.9E-07
	Water/Oil	2.9E-06
Open-ended lines	Gas	2.0E-03
	Heavy Oil	1.4E-04
	Water/Oil	2.5E-04

^aWater/Oil emission factors apply to water streams in oil service with a water content greater than 50% from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate may be considered negligible. ^bFor non-hydrocarbon compounds (including non-VOC's such as methanes, ethanes, ethylenes, light ends, heavy ends, gas plant, gas production, and oil shale facilities. ^cNA's indicated that not enough data were available to develop the indicated emission factor. ^dFor compressor type was derived from compressors, pressure relief valves, polished rods, relief valves, safety valves, diaphragms, dash pots, etc. ^eOther equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

- 1 - Assumed 8,780 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 defaults for compressor stations (GR-HAP Calc model) multiplied by:
- 4 - "Other" components include compressor seals, relief valves, diaphragms, drains, meters, etc.
- 5 - THC = total hydrocarbons, including methane (CH4) and ethane (C2H6).
- 6 - VOC = non-methane/non-ethane THC (C3+).
- 7 - HAP = hazardous air pollutants as designated by EPA. In this case primarily n-hexane and BTEX.
- 8 - To be conservative, the following gas characteristics were assumed.

Pollutant	Representative Gas Analysis	Worst-Case Assumption
Carbon Dioxide	0.30 Wgt%	0.38 Wgt%
Methane	66.44 Wgt%	79.77 Wgt%
Ethane	19.31 Wgt%	23.26 Wgt%
VOC	13.42 Wgt%	16.15 Wgt%
Benzene	4.7E-03 Wgt%	0.02 Wgt%
Ethylbenzene	3.2E-03 Wgt%	0.02 Wgt%
n-Hexane	0.21 Wgt%	0.27 Wgt%
Toluene	0.02 Wgt%	0.04 Wgt%
2,2,4-TMP	2.9E-04 Wgt%	0.02 Wgt%
Xylenes	0.04 Wgt%	0.06 Wgt%
Total HAP	0.28 Wgt%	0.42 Wgt%

Potentially Applicable
AP-42 and GHG EMISSION FACTORS
(Preferentially use test data or vendor data where available)

Pollutant		GAS-FIRED ENGINES			GAS-FIRED TURBINES		
		2SLB lb/MMBtu	4SLB lb/MMBtu	4SRB lb/MMBtu	Uncontrolled lb/MMBtu	Water Injection lb/MMBtu	Lean Pre-Mix/ lb/MMBtu
CRITERIA	NOX (≥ 90% Load)	3.17E+00	4.08E+00	2.21E+00	3.20E-01	1.30E-01	9.50E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.20E-02	3.00E-02	1.50E-02
	THC (TOC)	1.64E+00	1.47E+00	3.58E-01	1.10E-02	1.10E-02	1.10E-02
	NMHC (THC less CH4)	1.90E-01	2.20E-01	1.28E-01	2.40E-03	2.40E-03	2.40E-03
	NMNEHC (NMHC less C2H6)	1.19E-01	1.15E-01	5.76E-02	2.10E-03	2.10E-03	2.10E-03
	VOC	1.20E-01	1.18E-01	2.96E-02	2.10E-03	2.10E-03	2.10E-03
	SO2*** (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPs	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Ethylbenzene	1.08E-04	3.97E-05	2.48E-05	3.20E-05	3.20E-05	3.20E-05
	Formaldehyde (HCHO)	5.52E-02	5.28E-02	2.05E-02	7.10E-04	7.10E-04	2.00E-05
	n-Hexane	4.45E-04	1.11E-03	---	---	---	---
	Toluene	9.63E-04	4.08E-04	5.58E-04	1.30E-04	1.30E-04	1.30E-04
	TMP, 2,2,4- (i-Octane)	8.46E-04	2.50E-04	---	---	---	---
	Xylenes	2.68E-04	1.84E-04	1.95E-04	6.40E-05	6.40E-05	6.40E-05
	Other HAPs	1.96E-02	1.69E-02	9.42E-03	1.06E-04	1.06E-04	1.06E-04
GHG	CO2**** (GWP=1)	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02
	CH4 (GWP=25)	1.45E+00	1.25E+00	2.30E-01	8.60E-03	8.60E-03	8.60E-03
	N2O (GWP=298)	2.20E-04	2.20E-04	2.20E-04	3.00E-03	3.00E-03	3.00E-03
	CO2e	1.53E+02	1.48E+02	1.23E+02	1.18E+02	1.18E+02	1.18E+02

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

Pollutant		GAS-FIRED EXTERNAL COMBUSTION			FLARES	DIESEL ENGINES
		Uncontrolled lb/MMBtu	LoNOX Burners lb/MMBtu	Flue Gas Recirc lb/MMBtu	(Combustion) lb/MMBtu	Uncontrolled lb/MMBtu
CRITERIA	NOX	5.80E-02	4.90E-02	3.14E-02	6.60E-02	4.41E+00
	CO	8.24E-02	8.24E-02	8.24E-02	3.70E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	1.40E-01	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03	1.38E-01	3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03	5.49E-03	3.50E-01
	VOC	5.56E-03	5.56E-03	5.56E-03	5.56E-03	3.60E-01
	SO2 (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	7.45E-03	3.10E-01
HAPs	Benzene	2.06E-06	2.06E-06	2.06E-06	2.06E-06	9.33E-04
	Ethylbenzene	---	---	---	---	---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05	7.35E-05	1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03	1.76E-03	---
	Toluene	3.33E-06	3.33E-06	3.33E-06	3.33E-06	4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---	---	---
	Xylenes	---	---	---	---	2.85E-04
	Other HAPs	1.86E-06	1.86E-06	1.86E-06	1.86E-06	1.05E-03
GHG	CO2 (GWP=1)	1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.84E+02
	CH4 (GWP=25)	2.25E-03	2.25E-03	2.25E-03	2.25E-03	6.61E-03
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04	2.16E-03	1.32E-03
	CO2e	1.18E+02	1.18E+02	1.18E+02	1.18E+02	1.65E+02

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

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

1.0 lb =	453.592 g
1.0 kg =	2.205 lb
1.0 hp =	2,544.433 Btu/hr
1.0 hp =	745.700 Watt
1.0 kW =	3,412.142 Btu/hr
1.0 kW-hr =	1,340 hp-hr
1.0 cf =	7.481 gal
1.0 gal H2O =	8.338 gal
1.0 cf H2O =	62.371 gal
1.0 m =	3.281 gal
1.0 km =	0.621 gal
1.0 acre =	43560.174 gal
1.0 °F =	(°C*9/5)+32
1.0 °R =	°F+459.67
1.0 % =	10,000 ppm
UGC (stp) =	379.48 scf/lb-mol

Global Warming Potential (100 Yr) (GWP)		
CO2	CH4	N2O#
1	25	298

#Revised by EPA on 11/29/13

Notes:

- Italic numbers* indicate the values are from related sources, not the referenced source.
- Converted Ext Comb Emission Factors to lb/MMBtu by dividing lb/MMscf by AP-42 default HHV of 1,020 Btu/scf.
- Assume natural gas heating value (HHV) of 1,020 Btu/scf and diesel HHV of 19,300 Btu/lb.
- Assume 100% conversion of fuel sulfur to SO2 (2,000 gr/MMscf).
- Assume 99.5% conversion of fuel carbon to CO2 for natural gas.

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: OVM - Keaton DS - 6.0 MMscfd

File Name: C:\projects2\wfs\OVM\Keaton\R13 Application\Keaton GRIGLYCalc - 12.09.14.ddf

Date: December 09, 2014

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0600	1.440	0.2629
Ethane	0.0777	1.864	0.3403
Propane	0.0731	1.754	0.3200
Isobutane	0.0216	0.519	0.0947
n-Butane	0.0525	1.259	0.2299
Isopentane	0.0205	0.492	0.0898
n-Pentane	0.0224	0.538	0.0982
Cyclopentane	0.0170	0.408	0.0744
n-Hexane	0.0201	0.481	0.0878
Cyclohexane	0.0463	1.112	0.2029
Other Hexanes	0.0258	0.619	0.1129
Heptanes	0.0885	2.123	0.3875
Methylcyclohexane	0.0692	1.661	0.3032
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.0685	1.643	0.2999
Toluene	0.3396	8.150	1.4873
Ethylbenzene	0.0817	1.961	0.3578
Xylenes	1.5028	36.067	6.5823
C8+ Heavies	0.2338	5.610	1.0239
Total Emissions	2.8209	67.703	12.3558
Total Hydrocarbon Emissions	2.8209	67.703	12.3558
Total VOC Emissions	2.6832	64.398	11.7526
Total HAP Emissions	2.0126	48.303	8.8153
Total BTEX Emissions	1.9925	47.820	8.7272

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.7417	113.800	20.7684
Ethane	1.6636	39.926	7.2865
Propane	0.7221	17.330	3.1628
Isobutane	0.1374	3.297	0.6017
n-Butane	0.2521	6.052	1.1044
Isopentane	0.0849	2.037	0.3718
n-Pentane	0.0737	1.768	0.3226
Cyclopentane	0.0137	0.328	0.0599
n-Hexane	0.0351	0.842	0.1536
Cyclohexane	0.0201	0.484	0.0882
Other Hexanes	0.0607	1.457	0.2659
Heptanes	0.0727	1.744	0.3184
Methylcyclohexane	0.0229	0.551	0.1005
2,2,4-Trimethylpentane	0.0001	0.002	0.0003
Benzene	0.0041	0.098	0.0178
Toluene	0.0125	0.301	0.0549
Ethylbenzene	0.0017	0.040	0.0074
Xylenes	0.0214	0.513	0.0936
C8+ Heavies	0.0155	0.371	0.0678

Total Emissions	7.9558	190.940	34.8466
Total Hydrocarbon Emissions	7.9558	190.940	34.8466
Total VOC Emissions	1.5506	37.214	6.7916
Total HAP Emissions	0.0748	1.795	0.3276
Total BTEX Emissions	0.0396	0.952	0.1737

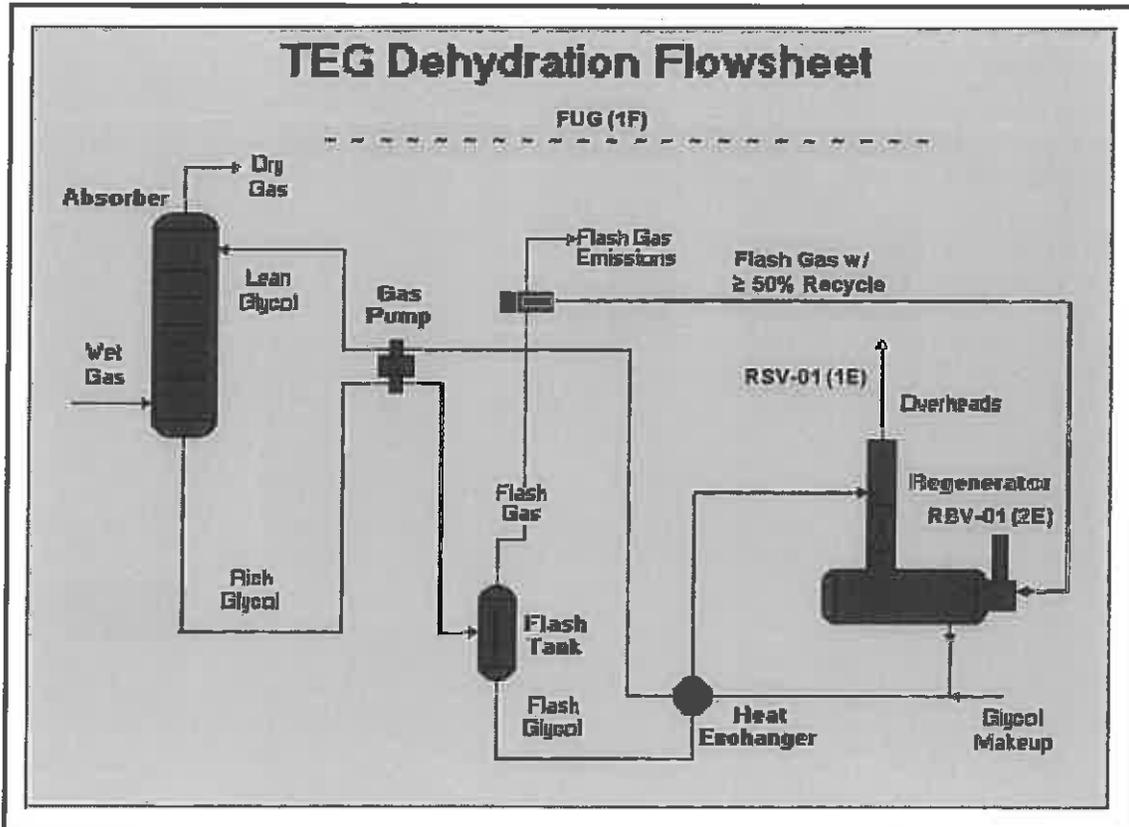
FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.4833	227.599	41.5369
Ethane	3.3272	79.852	14.5730
Propane	1.4442	34.661	6.3256
Isobutane	0.2748	6.594	1.2034
n-Butane	0.5043	12.103	2.2088
Isopentane	0.1698	4.074	0.7435
n-Pentane	0.1473	3.535	0.6452
Cyclopentane	0.0274	0.657	0.1199
n-Hexane	0.0702	1.684	0.3073
Cyclohexane	0.0403	0.967	0.1765
Other Hexanes	0.1214	2.914	0.5317
Heptanes	0.1454	3.489	0.6367
Methylcyclohexane	0.0459	1.101	0.2010
2,2,4-Trimethylpentane	0.0002	0.004	0.0007
Benzene	0.0081	0.196	0.0357
Toluene	0.0251	0.601	0.1097
Ethylbenzene	0.0034	0.081	0.0147
Xylenes	0.0427	1.026	0.1872
C8+ Heavies	0.0310	0.743	0.1356
Total Emissions	15.9117	381.880	69.6932
Total Hydrocarbon Emissions	15.9117	381.880	69.6932
Total VOC Emissions	3.1012	74.429	13.5833
Total HAP Emissions	0.1496	3.591	0.6553
Total BTEX Emissions	0.0793	1.903	0.3473

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.8017	115.240	21.0313
Ethane	1.7413	41.791	7.6268
Propane	0.7952	19.084	3.4828
Isobutane	0.1590	3.816	0.6964
n-Butane	0.3046	7.311	1.3343
Isopentane	0.1054	2.529	0.4615
n-Pentane	0.0961	2.306	0.4208
Cyclopentane	0.0307	0.736	0.1343
n-Hexane	0.0551	1.323	0.2415
Cyclohexane	0.0665	1.595	0.2911
Other Hexanes	0.0865	2.076	0.3788
Heptanes	0.1612	3.868	0.7059
Methylcyclohexane	0.0922	2.212	0.4037
2,2,4-Trimethylpentane	0.0001	0.003	0.0005
Benzene	0.0725	1.741	0.3177
Toluene	0.3521	8.450	1.5422
Ethylbenzene	0.0834	2.001	0.3652

	Xylenes	1.5242	36.580	6.6758
	C8+ Heavies	0.2492	5.982	1.0917
<hr/>				
	Total Emissions	10.7768	258.643	47.2024
Total Hydrocarbon Emissions		10.7768	258.643	47.2024
Total VOC Emissions		4.2338	101.612	18.5442
Total HAP Emissions		2.0874	50.098	9.1429
Total BTEX Emissions		2.0322	48.772	8.9009



GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: OVM - Keaton DS - 6.0 MMscfd

File Name: C:\projects2\wfs\OVM\Keaton\R13 Application\Keaton GRIGLYCalc - 12.09.14.ddf

Date: December 09, 2014

DESCRIPTION:

Description: 6.0 MMscfd, 65 oF, 900 psig;
 Kimray 4020, Gas Inj, 0.67 gpm;
 Flash Tank, 120 oF, 40 psig, 50% Recycle.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 65.00 deg. F
 Pressure: 900.00 psig
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1345
Nitrogen	0.3313
Methane	81.7627
Ethane	12.6780
Propane	3.3289
Isobutane	0.4304
n-Butane	0.6998
Isopentane	0.1945
n-Pentane	0.1485
Cyclopentane	0.0131
n-Hexane	0.0482
Cyclohexane	0.0131
Other Hexanes	0.0951
Heptanes	0.0678
Methylcyclohexane	0.0141
2,2,4-Trimethylpentane	0.0001
Benzene	0.0013
Toluene	0.0037
Ethylbenzene	0.0006
Xylenes	0.0080
C8+ Heavies	0.0415

DRY GAS:

Flow Rate: 6.0 MMSCF/day
 Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

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

PUMP:

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

FLASH TANK:

Flash Control: Combustion device
Flash Control Efficiency: 50.00 %
Temperature: 120.0 deg. F
Pressure: 40.0 psig

Minimum 50% Recycle

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: OVM - Keaton DS - 6.0 MMscfd

File Name: C:\projects2\wfs\OVM\Keaton\R13 Application\Keaton GRIGLYCalc - 12.09.14.ddf

Date: December 09, 2014

DESCRIPTION:

Description: 6.0 MMscfd, 65 oF, 900 psig;
 Kimray 4020, Gas Inj, 0.67 gpm;
 Flash Tank, 120 oF, 40 psig, 50% Recycle.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0600	1.440	0.2629
Ethane	0.0777	1.864	0.3403
Propane	0.0731	1.754	0.3200
Isobutane	0.0216	0.519	0.0947
n-Butane	0.0525	1.259	0.2299
Isopentane	0.0205	0.492	0.0898
n-Pentane	0.0224	0.538	0.0982
Cyclopentane	0.0170	0.408	0.0744
n-Hexane	0.0201	0.481	0.0878
Cyclohexane	0.0463	1.112	0.2029
Other Hexanes	0.0258	0.619	0.1129
Heptanes	0.0885	2.123	0.3875
Methylcyclohexane	0.0692	1.661	0.3032
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.0685	1.643	0.2999
Toluene	0.3396	8.150	1.4873
Ethylbenzene	0.0817	1.961	0.3578
Xylenes	1.5028	36.067	6.5823
C8+ Heavies	0.2338	5.610	1.0239
Total Emissions	2.8209	67.703	12.3558
Total Hydrocarbon Emissions	2.8209	67.703	12.3558
Total VOC Emissions	2.6832	64.398	11.7526
Total HAP Emissions	2.0126	48.303	8.8153
Total BTEX Emissions	1.9925	47.820	8.7272

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.7417	113.800	20.7684
Ethane	1.6636	39.926	7.2865
Propane	0.7221	17.330	3.1628
Isobutane	0.1374	3.297	0.6017
n-Butane	0.2521	6.052	1.1044
Isopentane	0.0849	2.037	0.3718
n-Pentane	0.0737	1.768	0.3226
Cyclopentane	0.0137	0.328	0.0599

n-Hexane	0.0351	0.842	0.1536
Cyclohexane	0.0201	0.484	0.0882
Other Hexanes	0.0607	1.457	0.2659
Heptanes	0.0727	1.744	0.3184
Methylcyclohexane	0.0229	0.551	0.1005
2,2,4-Trimethylpentane	0.0001	0.002	0.0003
Benzene	0.0041	0.098	0.0178
Toluene	0.0125	0.301	0.0549
Ethylbenzene	0.0017	0.040	0.0074
Xylenes	0.0214	0.513	0.0936
C8+ Heavies	0.0155	0.371	0.0678

Total Emissions	7.9558	190.940	34.8466
Total Hydrocarbon Emissions	7.9558	190.940	34.8466
Total VOC Emissions	1.5506	37.214	6.7916
Total HAP Emissions	0.0748	1.795	0.3276
Total BTEX Emissions	0.0396	0.952	0.1737

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.4833	227.599	41.5369
Ethane	3.3272	79.852	14.5730
Propane	1.4442	34.661	6.3256
Isobutane	0.2748	6.594	1.2034
n-Butane	0.5043	12.103	2.2088
Isopentane	0.1698	4.074	0.7435
n-Pentane	0.1473	3.535	0.6452
Cyclopentane	0.0274	0.657	0.1199
n-Hexane	0.0702	1.684	0.3073
Cyclohexane	0.0403	0.967	0.1765
Other Hexanes	0.1214	2.914	0.5317
Heptanes	0.1454	3.489	0.6367
Methylcyclohexane	0.0459	1.101	0.2010
2,2,4-Trimethylpentane	0.0002	0.004	0.0007
Benzene	0.0081	0.196	0.0357
Toluene	0.0251	0.601	0.1097
Ethylbenzene	0.0034	0.081	0.0147
Xylenes	0.0427	1.026	0.1872
C8+ Heavies	0.0310	0.743	0.1356

Total Emissions	15.9117	381.880	69.6932
Total Hydrocarbon Emissions	15.9117	381.880	69.6932
Total VOC Emissions	3.1012	74.429	13.5833
Total HAP Emissions	0.1496	3.591	0.6553
Total BTEX Emissions	0.0793	1.903	0.3473

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.8017	115.240	21.0313
Ethane	1.7413	41.791	7.6268
Propane	0.7952	19.084	3.4828
Isobutane	0.1590	3.816	0.6964
n-Butane	0.3046	7.311	1.3343
Isopentane	0.1054	2.529	0.4615

n-Pentane	0.0961	2.306	0.4208
Cyclopentane	0.0307	0.736	0.1343
n-Hexane	0.0551	1.323	0.2415
Cyclohexane	0.0665	1.595	0.2911
Other Hexanes	0.0865	2.076	0.3788
Heptanes	0.1612	3.868	0.7059
Methylcyclohexane	0.0922	2.212	0.4037
2,2,4-Trimethylpentane	0.0001	0.003	0.0005
Benzene	0.0725	1.741	0.3177
Toluene	0.3521	8.450	1.5422
Ethylbenzene	0.0834	2.001	0.3652
Xylenes	1.5242	36.580	6.6758
C8+ Heavies	0.2492	5.982	1.0917

Total Emissions	10.7768	258.643	47.2024
Total Hydrocarbon Emissions	10.7768	258.643	47.2024
Total VOC Emissions	4.2338	101.612	18.5442
Total HAP Emissions	2.0874	50.098	9.1429
Total BTEX Emissions	2.0322	48.772	8.9009

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	41.7998	21.0313	49.69
Ethane	14.9133	7.6268	48.86
Propane	6.6457	3.4828	47.59
Isobutane	1.2981	0.6964	46.35
n-Butane	2.4387	1.3343	45.29
Isopentane	0.8333	0.4615	44.61
n-Pentane	0.7434	0.4208	43.40
Cyclopentane	0.1943	0.1343	30.85
n-Hexane	0.3951	0.2415	38.89
Cyclohexane	0.3794	0.2911	23.26
Other Hexanes	0.6447	0.3788	41.24
Heptanes	1.0242	0.7059	31.08
Methylcyclohexane	0.5042	0.4037	19.93
2,2,4-Trimethylpentane	0.0009	0.0005	38.47
Benzene	0.3356	0.3177	5.32
Toluene	1.5971	1.5422	3.44
Ethylbenzene	0.3725	0.3652	1.98
Xylenes	6.7694	6.6758	1.38
C8+ Heavies	1.1595	1.0917	5.85

Total Emissions	82.0489	47.2024	42.47
Total Hydrocarbon Emissions	82.0489	47.2024	42.47
Total VOC Emissions	25.3359	18.5442	26.81
Total HAP Emissions	9.4706	9.1429	3.46
Total BTEX Emissions	9.0746	8.9009	1.91

EQUIPMENT REPORTS:

ABSORBER

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

Calculated Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 0.89 lbs. H2O/MMSCF

Temperature: 65.0 deg. F
 Pressure: 900.0 psig
 Dry Gas Flow Rate: 6.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.0241 lb/hr
 Wet Gas Water Content: Saturated

Calculated Wet Gas Water Content: 21.47 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 7.81 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.14%	95.86%
Carbon Dioxide	99.81%	0.19%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.96%	0.04%
Propane	99.94%	0.06%
Isobutane	99.92%	0.08%
n-Butane	99.89%	0.11%
Isopentane	99.89%	0.11%
n-Pentane	99.86%	0.14%
Cyclopentane	99.37%	0.63%
n-Hexane	99.77%	0.23%
Cyclohexane	98.91%	1.09%
Other Hexanes	99.83%	0.17%
Heptanes	99.58%	0.42%
Methylcyclohexane	98.84%	1.16%
2,2,4-Trimethylpentane	99.83%	0.17%
Benzene	88.65%	11.35%
Toluene	83.87%	16.13%
Ethylbenzene	79.83%	20.17%
Xylenes	72.48%	27.52%
C8+ Heavies	99.53%	0.47%

FLASH TANK

Flash Control: Combustion device
 Flash Control Efficiency: 50.00 %
 Flash Temperature: 120.0 deg. F
 Flash Pressure: 40.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.74%	0.26%
Carbon Dioxide	7.30%	92.70%
Nitrogen	0.61%	99.39%
Methane	0.63%	99.37%
Ethane	2.28%	97.72%
Propane	4.82%	95.18%
Isobutane	7.29%	92.71%

n-Butane	9.43%	90.57%
Isopentane	11.01%	88.99%
n-Pentane	13.47%	86.53%
Cyclopentane	38.57%	61.43%
n-Hexane	22.50%	77.50%
Cyclohexane	54.85%	45.15%
Other Hexanes	18.05%	81.95%
Heptanes	38.08%	61.92%
Methylcyclohexane	61.61%	38.39%
2,2,4-Trimethylpentane	23.79%	76.21%
Benzene	89.89%	10.11%
Toluene	93.67%	6.33%
Ethylbenzene	96.45%	3.55%
Xylenes	97.59%	2.41%
C8+ Heavies	89.49%	10.51%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	52.45%	47.55%
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	2.37%	97.63%
n-Pentane	2.19%	97.81%
Cyclopentane	1.12%	98.88%
n-Hexane	1.56%	98.44%
Cyclohexane	5.36%	94.64%
Other Hexanes	3.54%	96.46%
Heptanes	1.07%	98.93%
Methylcyclohexane	6.00%	94.00%
2,2,4-Trimethylpentane	3.97%	96.03%
Benzene	5.52%	94.48%
Toluene	8.39%	91.61%
Ethylbenzene	10.75%	89.25%
Xylenes	13.20%	86.80%
C8+ Heavies	11.33%	88.67%

STREAM REPORTS:

WET GAS STREAM

Temperature: 65.00 deg. F
 Pressure: 914.70 psia
 Flow Rate: 2.50e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.52e-002	5.37e+000
Carbon Dioxide	1.34e-001	3.90e+001
Nitrogen	3.31e-001	6.11e+001
Methane	8.17e+001	8.64e+003
Ethane	1.27e+001	2.51e+003
Propane	3.33e+000	9.67e+002
Isobutane	4.30e-001	1.65e+002
n-Butane	6.99e-001	2.68e+002
Isopentane	1.94e-001	9.25e+001
n-Pentane	1.48e-001	7.06e+001
Cyclopentane	1.31e-002	6.05e+000
n-Hexane	4.82e-002	2.74e+001
Cyclohexane	1.31e-002	7.26e+000
Other Hexanes	9.50e-002	5.40e+001
Heptanes	6.78e-002	4.48e+001
Methylcyclohexane	1.41e-002	9.12e+000
2,2,4-Trimethylpentane	9.99e-005	7.53e-002
Benzene	1.30e-003	6.69e-001
Toluene	3.70e-003	2.25e+000
Ethylbenzene	6.00e-004	4.20e-001
Xylenes	8.00e-003	5.60e+000
C8+ Heavies	4.15e-002	4.66e+001
Total Components	100.00	1.30e+004

DRY GAS STREAM

Temperature: 65.00 deg. F
 Pressure: 914.70 psia
 Flow Rate: 2.50e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.87e-003	2.22e-001
Carbon Dioxide	1.34e-001	3.89e+001
Nitrogen	3.31e-001	6.11e+001
Methane	8.18e+001	8.64e+003
Ethane	1.27e+001	2.51e+003
Propane	3.33e+000	9.67e+002
Isobutane	4.30e-001	1.65e+002
n-Butane	6.99e-001	2.68e+002
Isopentane	1.94e-001	9.24e+001
n-Pentane	1.48e-001	7.05e+001
Cyclopentane	1.30e-002	6.02e+000
n-Hexane	4.81e-002	2.73e+001
Cyclohexane	1.30e-002	7.19e+000
Other Hexanes	9.49e-002	5.39e+001
Heptanes	6.75e-002	4.46e+001
Methylcyclohexane	1.39e-002	9.02e+000
2,2,4-Trimethylpentane	9.98e-005	7.51e-002
Benzene	1.15e-003	5.93e-001
Toluene	3.10e-003	1.88e+000
Ethylbenzene	4.79e-004	3.35e-001
Xylenes	5.80e-003	4.06e+000
C8+ Heavies	4.13e-002	4.64e+001

Total Components 100.00 1.30e+004

LEAN GLYCOL STREAM

Temperature: 65.00 deg. F
Flow Rate: 6.69e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.84e+001	3.71e+002
Water	1.50e+000	5.65e+000
Carbon Dioxide	1.96e-012	7.40e-012
Nitrogen	2.22e-013	8.37e-013
Methane	8.91e-018	3.36e-017
Ethane	1.15e-007	4.35e-007
Propane	6.06e-009	2.28e-008
Isobutane	1.06e-009	4.00e-009
n-Butane	1.92e-009	7.24e-009
Isopentane	1.32e-004	4.97e-004
n-Pentane	1.33e-004	5.02e-004
Cyclopentane	5.12e-005	1.93e-004
n-Hexane	8.42e-005	3.17e-004
Cyclohexane	6.97e-004	2.63e-003
Other Hexanes	2.51e-004	9.47e-004
Heptanes	2.53e-004	9.53e-004
Methylcyclohexane	1.17e-003	4.42e-003
2,2,4-Trimethylpentane	5.06e-007	1.90e-006
Benzene	1.06e-003	4.00e-003
Toluene	8.25e-003	3.11e-002
Ethylbenzene	2.61e-003	9.83e-003
Xylenes	6.07e-002	2.29e-001
C8+ Heavies	7.93e-003	2.99e-002
Total Components	100.00	3.77e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 65.00 deg. F
Pressure: 914.70 psia
Flow Rate: 7.21e-001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.25e+001	3.71e+002
Water	2.70e+000	1.08e+001
Carbon Dioxide	2.81e-002	1.13e-001
Nitrogen	1.72e-002	6.88e-002
Methane	2.38e+000	9.54e+000
Ethane	8.50e-001	3.40e+000
Propane	3.79e-001	1.52e+000
Isobutane	7.39e-002	2.96e-001
n-Butane	1.39e-001	5.57e-001
Isopentane	4.76e-002	1.91e-001
n-Pentane	4.25e-002	1.70e-001
Cyclopentane	1.11e-002	4.45e-002
n-Hexane	2.26e-002	9.05e-002
Cyclohexane	2.23e-002	8.92e-002

Other Hexanes	3.70e-002	1.48e-001
Heptanes	5.86e-002	2.35e-001
Methylcyclohexane	2.98e-002	1.20e-001
2,2,4-Trimethylpentane	5.03e-005	2.01e-004
Benzene	2.01e-002	8.06e-002
Toluene	9.87e-002	3.96e-001
Ethylbenzene	2.37e-002	9.49e-002
Xylenes	4.43e-001	1.77e+000
C8+ Heavies	7.35e-002	2.95e-001

Total Components	100.00	4.01e+002

FLASH TANK OFF GAS STREAM

 Temperature: 120.00 deg. F
 Pressure: 54.70 psia
 Flow Rate: 2.90e+002 scfh

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

Water	2.06e-001	2.83e-002
Carbon Dioxide	3.10e-001	1.04e-001
Nitrogen	3.19e-001	6.84e-002
Methane	7.73e+001	9.48e+000
Ethane	1.45e+001	3.33e+000
Propane	4.28e+000	1.44e+000
Isobutane	6.18e-001	2.75e-001
n-Butane	1.13e+000	5.04e-001
Isopentane	3.08e-001	1.70e-001
n-Pentane	2.67e-001	1.47e-001
Cyclopentane	5.10e-002	2.74e-002
n-Hexane	1.06e-001	7.02e-002
Cyclohexane	6.26e-002	4.03e-002
Other Hexanes	1.84e-001	1.21e-001
Heptanes	1.90e-001	1.45e-001
Methylcyclohexane	6.11e-002	4.59e-002
2,2,4-Trimethylpentane	1.76e-004	1.54e-004
Benzene	1.36e-002	8.15e-003
Toluene	3.56e-002	2.51e-002
Ethylbenzene	4.14e-003	3.36e-003
Xylenes	5.26e-002	4.27e-002
C8+ Heavies	2.38e-002	3.10e-002

Total Components	100.00	1.61e+001

FLASH TANK GLYCOL STREAM

 Temperature: 120.00 deg. F
 Flow Rate: 6.86e-001 gpm

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

TEG	9.64e+001	3.71e+002
Water	2.80e+000	1.08e+001
Carbon Dioxide	2.14e-003	8.22e-003
Nitrogen	1.10e-004	4.23e-004
Methane	1.56e-002	6.00e-002

Ethane	2.02e-002	7.77e-002
Propane	1.90e-002	7.31e-002
Isobutane	5.62e-003	2.16e-002
n-Butane	1.36e-002	5.25e-002
Isopentane	5.46e-003	2.10e-002
n-Pentane	5.96e-003	2.29e-002
Cyclopentane	4.47e-003	1.72e-002
n-Hexane	5.30e-003	2.04e-002
Cyclohexane	1.27e-002	4.89e-002
Other Hexanes	6.95e-003	2.67e-002
Heptanes	2.32e-002	8.94e-002
Methylcyclohexane	1.91e-002	7.36e-002
2,2,4-Trimethylpentane	1.25e-005	4.79e-005
Benzene	1.88e-002	7.25e-002
Toluene	9.64e-002	3.71e-001
Ethylbenzene	2.38e-002	9.15e-002
Xylenes	4.50e-001	1.73e+000
C8+ Heavies	6.85e-002	2.64e-001

Total Components	100.00	3.85e+002

FLASH GAS EMISSIONS

Flow Rate: 6.79e+002 scfh
Control Method: Combustion Device
Control Efficiency: 50.00

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

Water	4.98e+001	1.61e+001
Carbon Dioxide	2.88e+001	2.27e+001
Nitrogen	1.37e-001	6.84e-002
Methane	1.65e+001	4.74e+000
Ethane	3.09e+000	1.66e+000
Propane	9.15e-001	7.22e-001
Isobutane	1.32e-001	1.37e-001
n-Butane	2.43e-001	2.52e-001
Isopentane	6.58e-002	8.49e-002
n-Pentane	5.71e-002	7.37e-002
Cyclopentane	1.09e-002	1.37e-002
n-Hexane	2.28e-002	3.51e-002
Cyclohexane	1.34e-002	2.01e-002
Other Hexanes	3.94e-002	6.07e-002
Heptanes	4.06e-002	7.27e-002
Methylcyclohexane	1.31e-002	2.29e-002
2,2,4-Trimethylpentane	3.76e-005	7.68e-005
Benzene	2.92e-003	4.07e-003
Toluene	7.60e-003	1.25e-002
Ethylbenzene	8.86e-004	1.68e-003
Xylenes	1.13e-002	2.14e-002
C8+ Heavies	5.08e-003	1.55e-002

Total Components	100.00	4.68e+001

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia

Flow Rate: 1.21e+002 scfh

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

Water	8.94e+001	5.12e+000
Carbon Dioxide	5.87e-002	8.22e-003
Nitrogen	4.74e-003	4.23e-004
Methane	1.18e+000	6.00e-002
Ethane	8.11e-001	7.77e-002
Propane	5.20e-001	7.31e-002
Isobutane	1.17e-001	2.16e-002
n-Butane	2.84e-001	5.25e-002
Isopentane	8.92e-002	2.05e-002
n-Pentane	9.76e-002	2.24e-002
Cyclopentane	7.61e-002	1.70e-002
n-Hexane	7.31e-002	2.01e-002
Cyclohexane	1.73e-001	4.63e-002
Other Hexanes	9.40e-002	2.58e-002
Heptanes	2.77e-001	8.85e-002
Methylcyclohexane	2.21e-001	6.92e-002
2,2,4-Trimethylpentane	1.27e-004	4.60e-005
Benzene	2.75e-001	6.85e-002
Toluene	1.16e+000	3.40e-001
Ethylbenzene	2.42e-001	8.17e-002
Xylenes	4.45e+000	1.50e+000
C8+ Heavies	4.31e-001	2.34e-001

Total Components	100.00	7.95e+000

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."

- **Monitoring/Recordkeeping/Reporting/Testing Plans**
 - A. Monitoring
 - B. Recordkeeping
 - C. Reporting
 - D. Testing
-

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
45CSR13 NSR Modification Permit Application

Attachment O
MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

Williams Ohio Valley Midstream LLC proposes the following monitoring, recordkeeping, testing and reporting requirements at the subject facility:

A. Monitoring

1. To demonstrate compliance with the area source status, as well as the benzene limitation, the following parameters shall be monitored for the dehydrator:
 - a. Operating hours per quarter;
 - b. Quarterly thru-put (MMscf/quarter);
 - c. Annual daily average (MMscfd);
 - d. Absorber temperature and pressure (°F and psig) (Quarterly);
 - e. Lean glycol circulation rate (gpm) (Quarterly or default to maximum);
 - f. Flash tank temperature and pressure (°F and psig) (Quarterly);
 - g. Wet gas composition (e.g., extended gas analysis) (Annually).
2. Use data collected above as input into GRI-GLYCalc Model to determine actual and potential VOC and HAP emissions on a rolling 12-month basis (Annually).

B. Recordkeeping

Results of required monitoring shall be in a readily available off-site location for a period of five (5) years.

C. Reporting

1. Any deviations from the allowable emissions limitations, including visible emissions.
2. Any and all application forms, reports, or compliance certifications required by this Permit shall be certified by a responsible official.

D. Testing

Not Applicable (except for annual extended gas analysis describe above).

ATTACHMENT P

Public Notice

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

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

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

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

Williams Ohio Valley Midstream LLC
KEATON DEHYDRATION STATION
45CSR13 NSR Modification Permit Application

Attachment P
PUBLIC NOTICE

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Williams Ohio Valley Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 New Source Source Review (NSR) Construction Permit for the modification of the existing Keaton Dehydration Station (DS), located West of Adams Hill Rd (Co Hwy 250/4), ~2.2 Miles N-NW of Cameron, in Marshall County, West Virginia 26033.

The latitude and longitude coordinates are 39.8573 degrees North and -80.5796 degrees West.

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

- 0.10 tons of nitrogen oxides per year
- 0.08 tons of carbon monoxide per year
- 27.10 tons of volatile organic compounds per year
- <0.01 tons of sulfur dioxide per year
- 0.01 tons of particulate matter per year
- 0.39 tons of benzene per year
- 0.44 tons of ethylbenzene per year
- <0.01 tons of formaldehyde per year
- 0.35 tons of n-hexane per year
- 1.86 tons of toluene per year
- 8.02 tons of xylenes per year
- 11.06 tons of total hazardous air pollutants per year
- 1,161 tons of carbon dioxide equivalent per year

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

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

Dated this the _____ day of _____ 2014.

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

ATTACHMENT Q
Business Confidential Claims
(NOT APPLICABLE)

also

ATTACHMENT R
Authority Forms
(NOT APPLICABLE)

also

ATTACHMENT S
Title V Permit Revision Information
(NOT APPLICABLE)

APPLICATION FEE

NSR Construction Permit

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

- As per WV Rule 22 (45CSR22) filed on May 6, 1991, a **minimum fee of \$1,000** must be submitted for each 45CSR13 permit application filed with the WVDEP-DAQ.
- Additional fees may apply, depending on the nature of the application as outlined in Section 3.4.b. of Regulation 22, and shown below:

NSPS Requirements (40CFR60)	\$1,000
NESHAPS or Toxic Air Pollutant Requirements (40CFR 61, 63 and 45CSR27)	\$2,500
PSD or Nonattainment Review (45CSR14 and 45CSR19):	
(1) New Major Sources or	\$10,000
(2) Major Modifications	\$ 5,000

Total application fee is **\$3,500** [= \$1,000 minimum fee + \$2,500 additional fees for NESHAP]

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

From: (304) 943-3125
Shanda Durham
WILLIAMS
100 Teletech Dr.
Suite 2
Moundsville, WV 26041

Origin ID: H.LGA



Ship Date: 07 JAN 15
Act Wgt: 1.0 LB
CAD: 1048822077/NET3250

Delivery Address Bar Code



SHIP TO: (304) 926-0475
Beverly D McKeone
WVDEP-DAQ
New Source Review Program Manager
801 57th Street SE
CHARLESTON, WV 25304

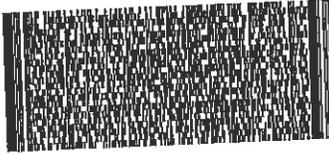
BILL SENDER

Ref # 46820004468241412.8228.8325
Invoice #
PO #
Dept #

FRI - 09 JAN AA
** 2DAY **

TRK# 7724 9259 3240
8201

25304
WV-US
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