

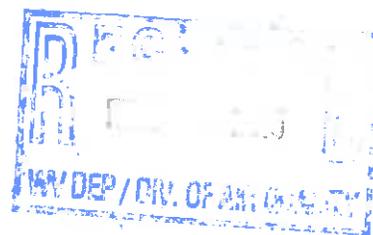
Williams
13-3074A
051-00161



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

February 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
ZIEN COMPRESSOR 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 Zien Compressor Station, located approximately 0.7 miles South-Southeast of Irish Ridge Road, approximately 8.0 miles East-Southeast of Moundsville, Marshall County, West Virginia.

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

- Updated the site's address, location, and directions data;
- Reduced Flash Tank off-gas recycle from 85% to 50%;
- Used more conservative Dehydrator Operation parameters (temp and pressure);
- Corrected to show no Still Vent Condenser on the Dehydration Unit;
- Included Rod Packing and Crankcase Emissions;
- Included Water/Oil Fugitive Emissions;
- Updated Extended Gas Analysis; and
- Updated emission factors and other emission estimating protocols.

Proposed edits to the current permit are provided in Attachment T – Current Permit.

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
February 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 above the printed name and title.

Shanda R. Durham
Environmental Specialist

Enclosures:

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

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

For the:

**Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
Marshall County, West Virginia**

Submitted to:



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



Submitted by:



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

Prepared by:



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

February 2015

**APPLICATION FOR
45CSR13 NSR MODIFICATION PERMIT**

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
Marshall County, West Virginia

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- ATTACHMENT B Location/Topographic Map
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- ATTACHMENT D Regulatory Discussion
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APPLICATION FEE

**APPLICATION FOR
45CSR13 NSR
MODIFICATION PERMIT**

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



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

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

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

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

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

- ADMINISTRATIVE AMENDMENT MINOR MODIFICATION
 SIGNIFICANT MODIFICATION NOT APPLICABLE

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

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

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office): WILLIAMS OHIO VALLEY MIDSTREAM LLC (OVM)		2. Federal Employer ID No. (FEIN): 27-0856707	
3. Name of facility (if different from above): ZIEN COMPRESSOR 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: ~0.7 MILES S-SE OF IRISH RIDGE RD ~8.0 MILES E-SE OF MOUNDSVILLE	
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 proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO - If YES, please explain: APPLICANT OWNS THE PROPERTY - If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): 1389 - OIL AND GAS FIELD SERVICES, N.E.C.		10. North American Industry Classification System (NAICS) code for the facility: 213112 - SUPPORT ACTIVITIES FOR OIL AND GAS OPERATIONS	
11A. DAQ Plant ID No. (existing facilities): 051-00161		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities): R13-3074 - ISSUED 10/31/13	
12A. Directions to the facility: - For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the present location of the facility from the nearest state road; - For Construction or Relocation permits , please provide directions to the proposed new site location from the nearest state road. Include a MAP as Attachment B . FROM MOUNDSVILLE, HEAD NORTH ON JEFFERSON AVE TOWARD 3RD ST FOR 0.3 MILES, TURN RIGHT ONTO 1ST ST AND TRAVEL 0.8 MILES, TURN LEFT ONTO US-250 S/WAYNESBURG PIKE AND TRAVEL 10.3 MILES, TURN LEFT ONTO IRISH RIDGE RD AND TRAVEL 1.0 MILES, TURN RIGHT ON UNKNOWN ROAD AND TRAVEL 0.5 MILES UNTIL YOU ARRIVE AT COMPRESSOR STATION.			
All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.			

12.B. New site address (if applicable): NA	12C. Nearest city or town: MOUNDSVILLE	12D. County: MARSHALL
12.E. UTM Northing (KM): 4,416.5 km Northing	12F. UTM Easting (KM): 535.9 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"> • UPDATE THE SITE'S ADDRESS, LOCATION, AND DIRECTIONS DATA; • REDUCE FLASH TANK OFF-GAS RECYCLE FROM 85% TO 50%; • USE MORE CONSERVATIVE DEHYDRATOR OPERATION PARAMETERS (TEMP AND PRESSURE); • CORRECTED TO SHOW NO STILL VENT CONDENSER ON THE DEHYDRATION UNIT; • INCLUDE ROD PACKING AND CRANKCASE EMISSIONS; • INCLUDE WATER/OIL FUGITIVE EMISSIONS; • UPDATE EXTENDED GAS ANALYSIS; AND • UPDATE EMISSION FACTORS AND OTHER EMISSION ESTIMATING PROTOCOLS 		
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 checked="" type="checkbox"/> Bulk Liquid Transfer Operations (TLO) | <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 (T01) |
| <input type="checkbox"/> Grey Iron and Steel Foundry | <input type="checkbox"/> Indirect Heat Exchanger | |
- General Emission Unit, specify:
- NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET (CE-1)
 - NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET (RSV-1, RBV-1)
 - FUGITIVE LEAK SOURCES (FUG-G AND FUG-W)

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 (FL-1) |
| <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: 
(Please use blue ink)

DATE: 2/5/2015
(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	36B. Title: ENVIRONMENTAL SPECIALIST
36C. E-mail: SHANDA.DURHAM @WILLIAMS.COM	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) |
| <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

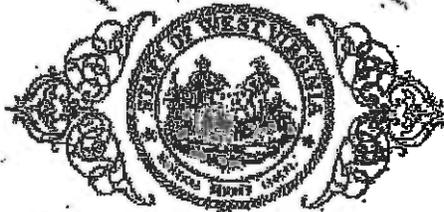


*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
May 15, 2012*

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:**
 - ~0.7 Miles South-Southeast of Irish Ridge Rd
 - ~8.0 Miles East-Southeast of Moundsville
 - Moundsville, Marshall County, WV 26033

 - **Latitude and Longitude:**
 - 39°53'53.5" North x -80°34'47.2" West
 - (39.8982° North x -80.5798° West)

 - **UTM:**
 - 535.923 km Easting x 4,416.543 km Northing x Zone 17S

 - **Elevation:**
 - ~1,285'

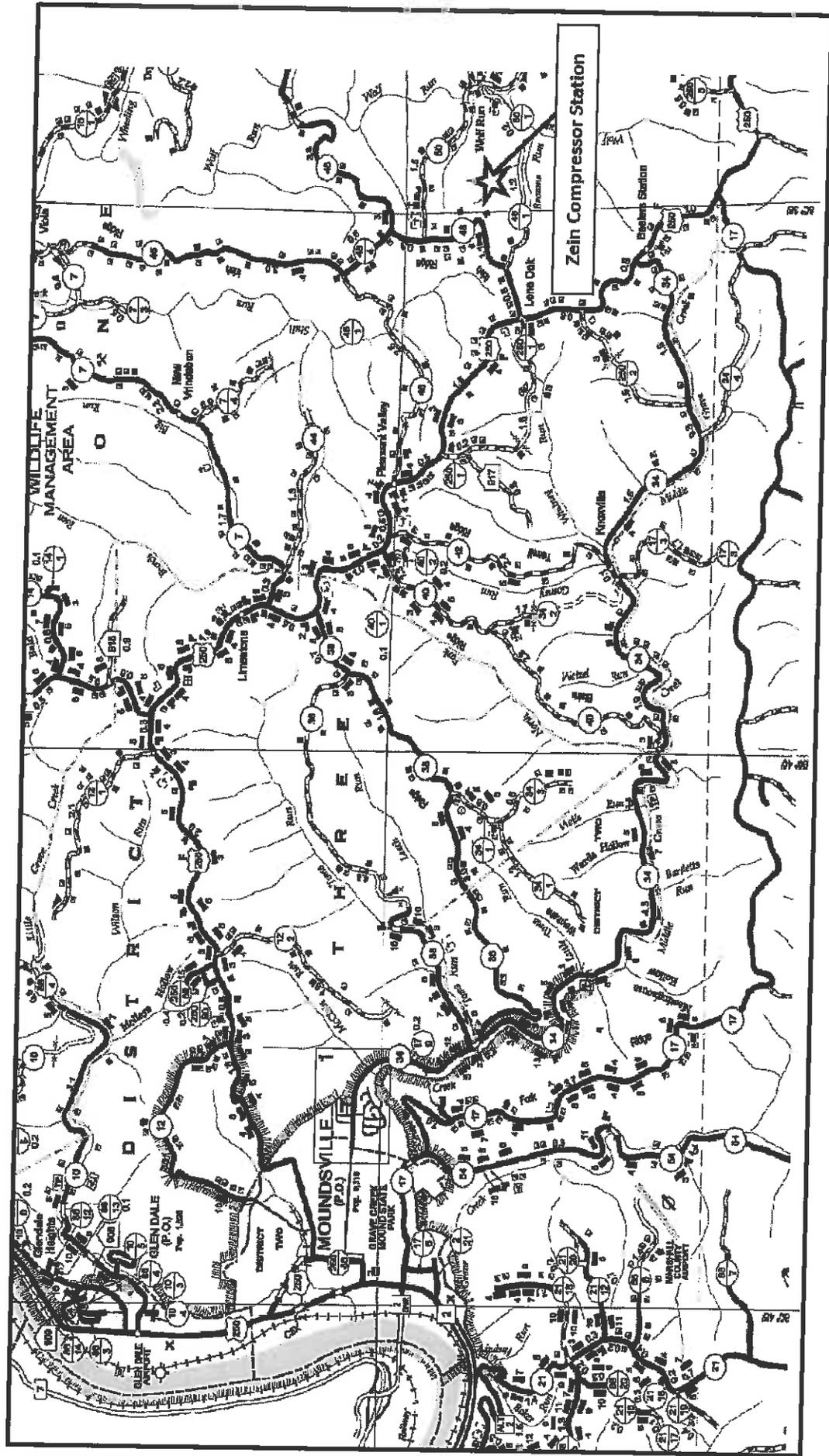
 - **Directions:**
 - From Lafayette Ave/WV-2 in **Moundsville:**
 - a. Head east onto 7th St (250/88) ~0.2 Mi;
 - b. Turn left onto Jefferson Ave ~0.5 Mi;
 - c. Turn right onto 1st St ~0.9 Mi;
 - d. 1st St turns left and becomes
 - US-250/Waynesburg Pike ~10.3 Mi;
 - e. Turn left onto Irish Ridge Rd ~1.0 Mi;
 - f. Turn right onto gravel road ~0.5 Mi;
 - g. Site is on the right.

 - **USGS:**
 - 7.5" Topographic – Majorsville WV – 1997
-

Williams Ohio Valley Midstream LLC (OVM)
ZIEN COMPRESSOR STATION

Application for 45CSR13 NSR Modification Permit

Attachment B - Location Map



EXTERRAN™

Williams

UTM with NAD83 datum, Zone 17
US Foot; Central Meridian 81d W
N: 14489923.0395 E: 1758213.5939

Lone Oak

Upper Wolf Run

Wolf Run

Beckers

Blacks

Waterhouse Hollow

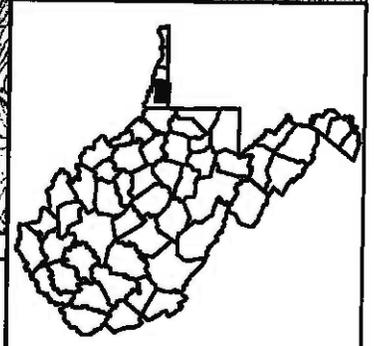
DAD FILE: R:\0318-2172_Baren_Ridge_Compressor_Plan\Drawings\BarenRidge-usgs.dwg PLOT DATE/TIME: 1/9/2013 8:45 AM LAYOUT: USGS_ZEIN

THIS MAP AND ANY INFORMATION CONTAINED HEREIN ARE UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. REPRODUCTION OF THESE DOCUMENTS IN WHOLE OR IN PART, FOR ANY REASON, WITHOUT PRIOR WRITTEN PERMISSION, IS STRICTLY PROHIBITED. COPYRIGHT © 2013 THRASHER ENGINEERING, INC.

REFERENCE: USGS 7.5' QUADRANGLE MAPS OF: MAJORSVILLE AND CAMERON, WV; DATED 1960 - SCALE: 1"=2000'

THRASHER
ENGINEERING
PHONE (304) 624-4108 (FAX) (304) 624-7631
CIVIL, ENVIRONMENTAL, AND CONSULTING
30 COLUMBIA BOULEVARD - CLARKSBURG, WV 26301

OHIO VALLEY MIDSTREAM LLC
ZEIN CRP
MARSHALL COUNTY, WEST VIRGINIA
SITE LOCATION MAP



ATTACHMENT C

Installation and Start-Up Schedule

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

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

- Updated the site's address, location, and directions data;
 - Reduced Flash Tank off-gas recycle from 85% to 50%;
 - Used more conservative Dehydrator Operation parameters (temp and pressure);
 - Corrected to show no Still Vent Condenser on the Dehydration Unit;
 - Included Rod Packing and Crankcase Emissions;
 - Included Water/Oil Fugitive Emissions;
 - Updated Extended Gas Analysis; and
 - Updated emission factors and other emission estimating protocols
-

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
ZIEN COMPRESSOR STATION
Application for 45CSR13 Modification Permit

Attachment D
REGULATORY DISCUSSION

A. Applicability of New Source Review (NSR) Regulations

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

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

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

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

2. 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 Natural Minor Source with Pre-Controlled PTE < 10 tpy
- Total HAPs: Title V Natural Minor 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 to any sources at the subject facility.

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 used to store volatile organic liquids (VOL) with a design capacity ≥ 75 m³ (19,815 gal, 471.79 bbl) (§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 to the 384 bhp Ajax 2802LE compressor engine (CE-1) because it's maximum engine power is less than 500 HP and it was manufactured before 07/01/08. (Note: The gas compressor was operated at another location, and as provided in the NSPS General Provisions at 40 CFR 60.14(e)(6), relocation of an existing facility is not a modification.)

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 (§60.4300).

10. NSPS OOOO, Crude Oil and Natural Gas Production

40CFR§60.5360-§60.5430

[Not Applicable]

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

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

This rule does not apply to the storage vessels because they each have a VOC PTE < 6 tpy (§60.5395). However, records of VOC emissions must be retained to demonstrate continuing exemption status (§60.5420(b)(6)(ii) and (§60.5420 (c)(5)(ii)).

11. NESHAP A, General Provisions

40CFR§63.1-§63.16

[Applicable]

This rule does apply to the 384 bhp Ajax DPC-2802LE compressor Engine (CE-1) and the 7.0 MMscfd TEG Dehydrator (RSV-1) because they are subject to NESHAP Subparts ZZZZ and HH. Requirements include notification, monitoring and recordkeeping.

12. NESHAP HH, Oil and Natural Gas Production Facilities

40CFR§63.760-§63.779

[Applicable]

This rule does apply to the 7.0 MMscfd TEG Dehydrator (RSV-1). However, because the TEG dehydrator has a benzene PTE < 0.9 megagrams per year, it is exempt from all requirements except to maintain records of actual annual average benzene emissions to demonstrate continuing exemption status (§63.764(e)(1)).

This rule does not apply to storage vessels (tanks), compressors, or ancillary equipment because the facility is an area source of HAP emissions (§63.760(b)(2)). In no case does this rule apply to engines or turbines.

13. NESHAP HHH, Natural Gas Transmission and Storage Facilities

40CFR§63.1270-§63.1289

[Not Applicable]

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

14. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175

[Not Applicable]

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

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

40CFR§63.6580-§63.6675

[Applicable]

This rule does apply to the 384 bhp Ajax DPC-2802LE (2SLB) engine because it is an "existing" RICE; i.e., commenced construction before 06/12/06 (§63.6590(a)(1)(iii)). Requirements include work practice standards and recordkeeping.

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

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 Zien Compressor Station is the Carmichael Compression Station, which is located 0.6 miles away. The Carmichael Compressor Station does not meet the common sense definition of being "contiguous" with or "adjacent" to the Zien Compressor Station.

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

The location of the subject facility was chosen because of suitable characteristics for construction and operation, such as the availability of a reasonably flat grade and accessibility for large trucks and equipment. Williams' business model is to construct scalable capacity that contemplates additional production from multiple operators and the initial configuration is merely a foundation for additional opportunities in the area. The subject facility does not need to be located in the immediate vicinity of the upstream wells in order to operate properly. Had suitable

land been available elsewhere, the subject facility could have been located farther from the upstream wells and could theoretically be moved farther from the wells without affecting operations. Therefore, despite the fact that the subject facility is located in close proximity to one or many upstream production sources, aggregation of the subject facility with upstream wells does not meet the common sense notion of a plant.

iii) Common Control

Williams OVM operates under its parent company The Williams Companies, Inc. (Williams) and is the sole operator of the subject facility. The closest Williams-operated facility to the subject facility is the Carmichael Compressor Station, located approximately 0.6 miles away. This facility is the closest to Zien to have common ownership but it is not “contiguous” with or “adjacent” to the Zien facility.

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

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

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

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

Summary

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

D. Applicability of State Regulations

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

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

45CSR2

[Applicable]

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

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

45CSR4

[Applicable]

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

3. Control of Air Pollution from Combustion of Refuse

45CSR6

[Not Applicable]

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

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

45CSR10

[Not Applicable]

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

5. Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

45CSR13

[Applicable]

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

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 a minor (or "deferred") source of all regulated pollutants.

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

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

- 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.

15. Emission Standards for Hazardous Air Pollutants (HAP)

45CSR34

[Not Applicable]

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

ATTACHMENT E

Plot Plan

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

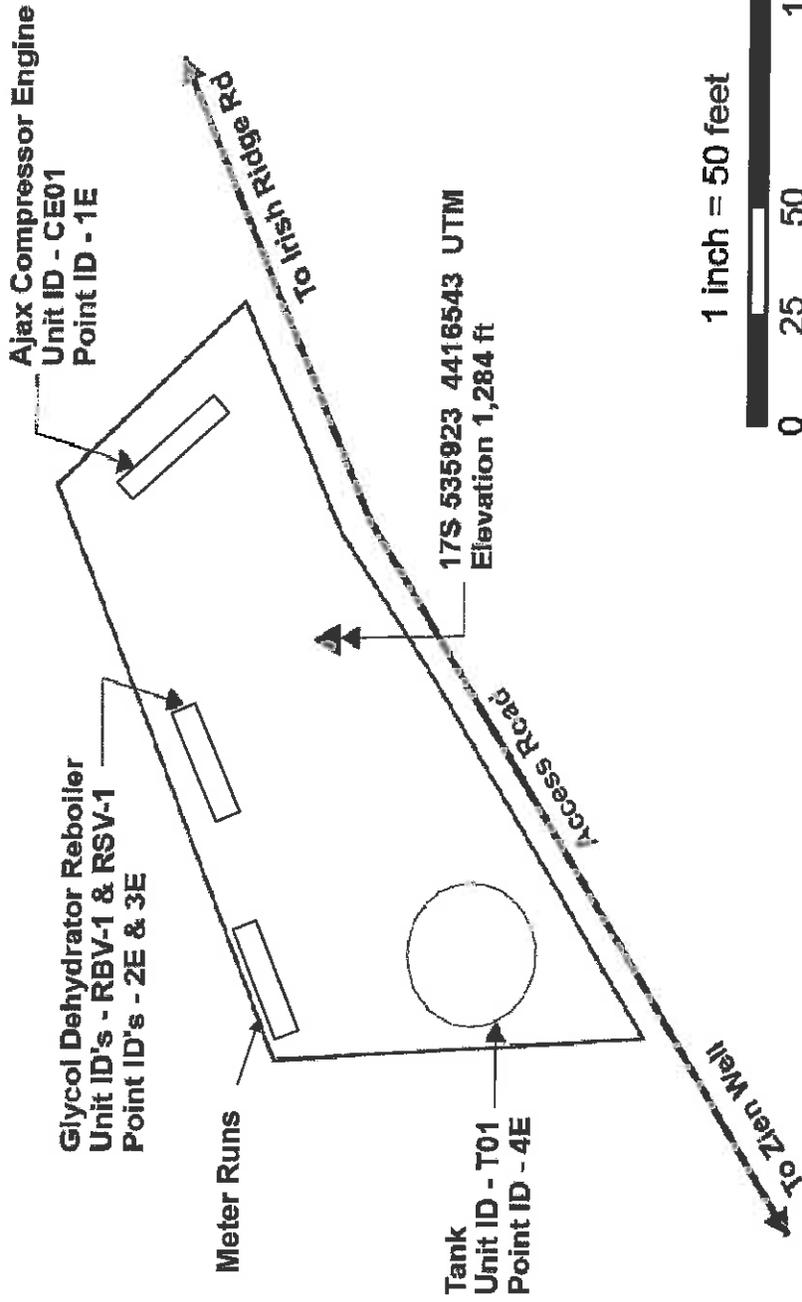
- **Plot Plan**
-

Williams Ohio Valley Midstream LLC (OVM)

ZIEN COMPRESSOR STATION

Application for 45CSR13 NSR Modification Permit

Attachment E - Plot Plan

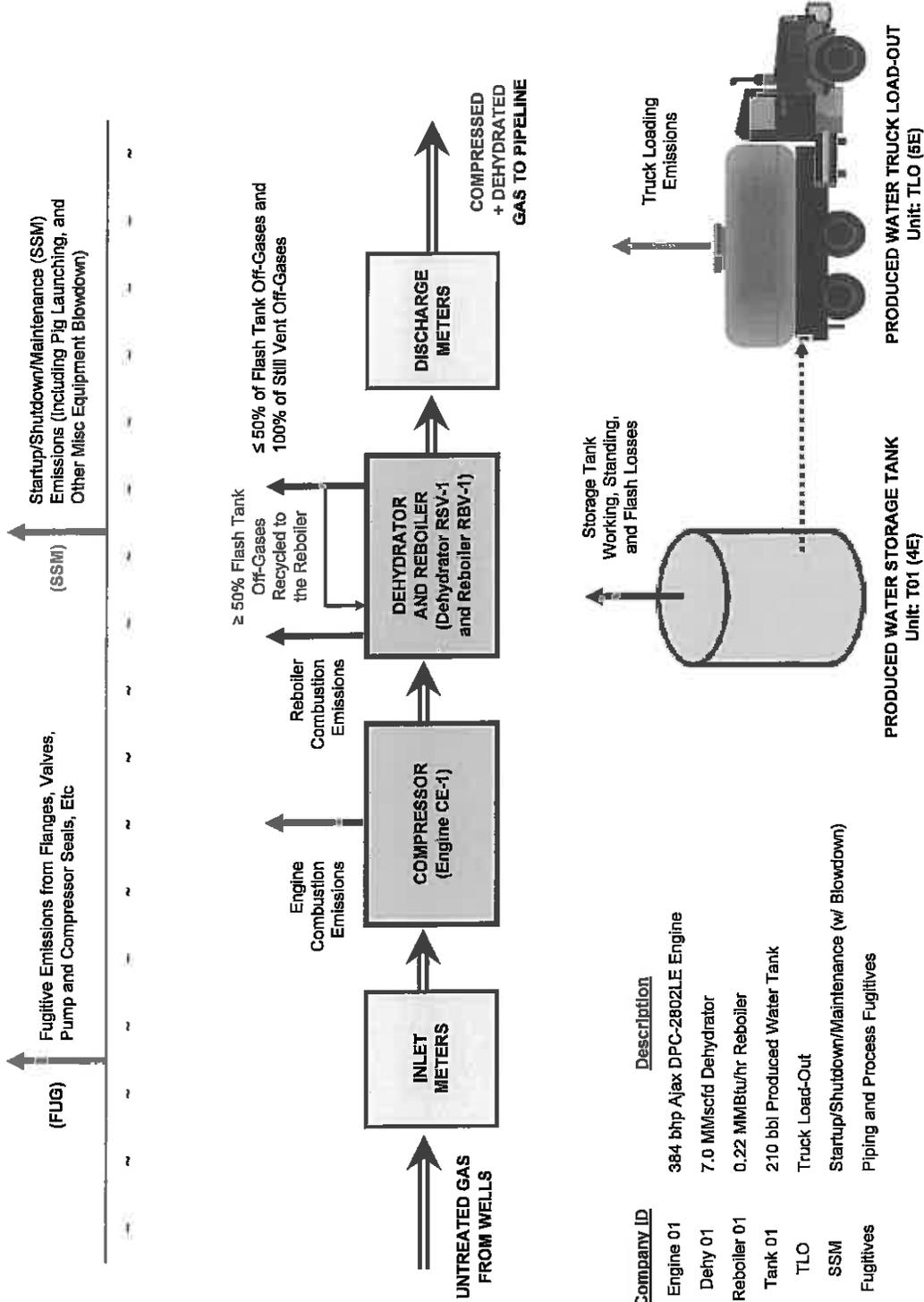


ATTACHMENT F
Detailed Process Flow Diagram

"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)**
-

Attachment F - Process Flow Diagram (PFD)



ID No.	Company ID	Description
CE-1 (1E)	Engine 01	384 bhp Ajax DPC-2802LE Engine
RSV-1 (2E)	Dehy 01	7.0 MMscfd Dehydrator
RBV-1 (3E)	Reboiler 01	0.22 MMBtu/hr Reboiler
T01 (4E)	Tank 01	210 bbl Produced Water Tank
TLO (5E)	TLO	Truck Load-Out
SSM (6E)	SSM	Startup/Shutdown/Maintenance (w/ Blowdown)
FUG (1F)	Fugitives	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. Project Overview
 - B. Compressor Engine
 - C. Triethylene Glycol (TEG) Dehydrator
 - D. Triethylene Glycol (TEG) Reboiler
 - E. Storage Tanks
 - F. Truck Load-Out
 - G. Startup/Shutdown/Maintenance
 - H. Compressor Rod Packing and Crankcase Emission
 - I. Piping and Equipment Fugitive Emissions
-

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

Attachment G
PROCESS DESCRIPTION

A. Project Overview

Williams Ohio Valley Midstream LLC owns and operates the existing Zien Compressor Station located off Irish Ridge Road approximately 8 miles ESE of Moundsville in Marshall County (See Appendix B – Site Location Maps). The facility receives natural gas from local production wells then compresses and dehydrates the gas for delivery to a gathering pipeline.

This application is prepared and submitted to update the existing permit to reflect actual construction and operations, as follows:

- Updated the site's address, location, and directions data;
- Reduced Flash Tank off-gas recycle from 85% to 50%;
- Used more conservative Dehydrator Operation parameters (temp and pressure);
- Corrected to show no Still Vent Condenser on the Dehydration Unit;
- Included Rod Packing and Crankcase Emissions;
- Included Water/Oil Fugitive Emissions;
- Updated Extended Gas Analysis; and
- Updated emission factors and other emission estimating protocols

B. Compressor Engine

One (1) natural gas-fueled compressor engine is utilized at the facility. The lean-burn engine (CE-01) drives a natural gas compressor to increase the pressure of the natural gas. Emissions result from the combustion of natural gas fuel.

C. Tri-Ethylene Glycol (TEG) Dehydrator

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

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

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

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.

D. Tri-Ethylene Glycol (TEG) Reboiler

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

E. Storage Tanks

There are tanks at the facility used to store various materials, including produced water, lube oil, fresh and spent TEG, etc. All of these tanks, except for the produced water storage tanks, generate de-minimis (insignificant) emissions.

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

A HYSYS simulation of the Zien Compressor Station was completed to determine the presence of flash emissions from the storage tanks. The HYSYS process simulation showed minimal tank flash emissions and these losses are included in the emission estimates. Additionally, blanket gas may be used on the produced water tank to prevent air from entering the tank and potentially causing an explosion.

F. Truck Load-Out

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

G. Startup/Shutdown/Maintenance

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

H. Compressor Rod Packing and Crankcase Emissions

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

I. Piping and Equipment Fugitive Emissions

Piping and process equipment generate from leaks from different component types (connectors, valves, pumps, etc.) in gas-vapor service and water/oil service.

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

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

- **NATURAL GAS**
 - Natural Gas Composition
 - Extended Gas Analysis

 - **MATERIAL SAFETY DATA SHEETS (MSDS):**
 - Natural Gas
 - Triethylene Glycol (TEG)
 - Produced Water/Condensate
-

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
 Attachment H

INLET GAS COMPOSITION - SUMMARY

Representative Inlet Gas Composition (Composite - 10/29/09, 01/16/14, and 06/26/14)

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/JGC#)
Nitrogen	7727-37-9	N2	28.013	2.1145	0.021145	0.5923	2.9914	1,560.93
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1940	0.001940	0.0854	0.4312	224.99
Methane*	75-82-8	CH4	16.042	81.8095	0.818095	13.1243	66.2783	34,584.66
Ethane*, *	74-84-0	C2H6	30.069	10.4975	0.104975	3.1565	15.9405	8,317.88
Propane**	74-98-6	C3H8	44.096	3.4380	0.034380	1.5160	7.6559	3,994.94
i-Butane**	75-28-5	C4H10	58.122	0.4534	0.004534	0.2635	1.3308	694.44
n-Butane**	106-97-8	C4H10	58.122	0.7477	0.007477	0.4346	2.1947	1,145.19
Cyclopentane**	287-92-3	C5H10	70.100	0.0005	0.000005	0.0004	0.0018	0.92
i-Pentane**	78-78-4	C5H12	72.149	0.2026	0.002026	0.1462	0.7382	385.19
n-Pentane**	109-66-0	C5H12	72.149	0.1577	0.001577	0.1138	0.5746	299.83
Cyclohexane**	110-82-7	C6H12	84.159	0.0122	0.000122	0.0103	0.0519	27.06
Other Hexanes**	varies	C6H14	86.175	0.1319	0.001319	0.1137	0.5740	299.53
Methylcyclohexane**	varies	C7H14	98.186	0.0125	0.000125	0.0123	0.0620	32.34
Heptanes**	varies	C7H16	100.202	0.0883	0.000883	0.0885	0.4468	233.16
C8+ Heavies**	varies	C8+	114.229	0.0614	0.000614	0.0701	0.3542	184.82
Benzene***	71-43-2	C6H6	78.112	0.0010	0.000010	0.0008	0.0039	2.06
Ethylbenzene***	100-41-4	C8H10	106.165	0.0005	0.000005	0.0005	0.0027	1.40
n-Hexane***	110-54-3	C6H14	86.175	0.0513	0.000513	0.0442	0.2233	116.50
Toluene***	108-88-3	C7H8	92.138	0.0021	0.000021	0.0019	0.0098	5.10
2,2,4-TMP (i-octane)***	540-84-1	C8H18	114.229	0.0210	0.000210	0.0240	0.1211	63.21
Xylenes***	1330-20-7	C8H10	106.165	0.0024	0.000024	0.0026	0.0130	6.81

+ "Balanced" Totals by adjusting Methane M%	Totals:	100.00	1.0000	19.8017	100.00	52,180.94
	THC:	97.69	0.9769	19.1240	96.58	50,395.03
	Total VOC:	5.38	0.0538	2.8433	14.36	7,492.48
	Total HAP:	0.08	0.0008	0.0740	0.37	195.07

* = Hydrocarbon (HC) ** = also Volatile Organic Compound (EPA-VOC) *** = also Hazardous Air Pollutant (EPA-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, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.194	0.431	224.99	0.259	0.575	300.00
Methane	75-82-8	CH4	81.810	66.278	34,584.66	99.350	75.000	42,000.00
Ethane	74-84-0	C2H6	10.497	15.940	8,317.88	12.620	25.000	10,000.00
VOC (Propane)	74-98-6	C3H8	5.385	14.359	7,492.48	6.468	17.248	9,000.00
Benzene	71-43-2	C6H6	0.0010	0.0039	2.06	0.0049	0.0192	10.00
Ethylbenzene	100-41-4	C8H10	0.0005	0.0027	1.40	0.0300	0.1500	10.00
n-Hexane	110-54-3	C6H14	0.0513	0.2233	116.50	0.0617	0.2683	140.00
Toluene	108-88-3	C7H8	0.0021	0.0098	5.10	0.0041	0.0192	10.00
2,2,4-TMP (i-octane)	540-84-1	C8H18	0.0210	0.1211	63.21	0.0266	0.1533	80.00
Xylenes	1330-20-7	C8H10	0.0024	0.0130	6.81	0.0300	0.1500	10.00
Total HAP	Various	C6 thru C8	0.0783	0.3738	195.07	0.0964	0.4599	240.00

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
 Attachment H

INLET GAS COMPOSITION - SAMPLE 1

Representative Gas Composition (Carmaichael - 10/29/09)

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.3570	0.003570	0.1000	0.5030	263.54
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1940	0.001940	0.0854	0.4294	224.99
Methane*	75-82-8	CH4	16.042	80.9800	0.809800	12.9912	65.3347	34,233.99
Ethane*	74-84-0	C2H6	30.069	13.2115	0.132115	3.9726	19.9787	10,468.40
Propane**	74-98-6	C3H8	44.096	3.4380	0.034380	1.5160	7.6242	3,994.94
i-Butane**	75-28-5	C4H10	58.122	0.4310	0.004310	0.2505	1.2598	660.13
n-Butane**	106-97-8	C4H10	58.122	0.7420	0.007420	0.4313	2.1689	1,136.46
Cyclopentane**	287-92-3	C5H10	70.100	0.0005	0.000005	0.0004	0.0018	0.92
i-Pentane**	78-78-4	C5H12	72.149	0.1990	0.001990	0.1436	0.7221	378.35
n-Pentane**	109-66-0	C5H12	72.149	0.1560	0.001560	0.1126	0.5660	296.59
Cyclohexane**	110-82-7	C6H12	84.159	0.0055	0.000055	0.0046	0.0233	12.20
Other Hexanes**	varies	C6H14	86.175	0.0885	0.000885	0.0763	0.3835	200.97
Methylcyclohexane**	varies	C7H14	98.186	0.0122	0.000122	0.0120	0.0602	31.57
Heptanes**	varies	C7H16	100.202	0.0565	0.000565	0.0566	0.2847	149.19
C8+ Heavies**	varies	C8+	114.229	0.0505	0.000505	0.0577	0.2901	152.01
Benzene***	71-43-2	C6H6	78.112	0.0010	0.000010	0.0008	0.0039	2.06
Ethylbenzene***	100-41-4	C8H10	106.165	0.0005	0.000005	0.0005	0.0027	1.40
n-Hexane***	110-54-3	C6H14	86.175	0.0513	0.000513	0.0442	0.2223	116.50
Toluene***	108-88-3	C7H8	92.138	0.0020	0.000020	0.0018	0.0093	4.86
2,2,4-TMP (i-octane)***	540-84-1	C8H18	114.229	0.0210	0.000210	0.0240	0.1206	63.21
Xylenes***	1330-20-7	C8H10	106.165	0.0020	0.000020	0.0021	0.0107	5.60

Totals:	100.00	1.0000	19.8840	100.00	52,397.87
THC:	99.45	0.9945	19.6987	99.07	51,909.34
Total VOC:	5.26	0.0526	2.7349	13.75	7,206.94
Total HAP:	0.08	0.0008	0.0735	0.37	193.62

* = Hydrocarbon (HC) ** = also Volatile Organic Compound (EPA-VOC) *** = also Hazardous Air Pollutant (EPA-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, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.194	0.429	224.99	0.259	0.573	300.00
Methane	75-82-8	CH4	80.980	65.335	34,233.99	99.350	75.000	42,000.00
Ethane	74-84-0	CH5	13.212	19.979	10,468.40	15.902	25.000	12,600.00
VOC (Propane)	74-98-6	C3H8	5.258	13.754	7,206.94	6.347	16.604	8,700.00
Benzene	71-43-2	C6H6	0.0010	0.0039	2.06	0.0049	0.0191	10.00
Ethylbenzene	100-41-4	C8H10	0.0005	0.0027	1.40	0.0300	0.1500	10.00
n-Hexane	110-54-3	C6H14	0.0513	0.2223	116.50	0.0617	0.2672	140.00
Toluene	108-88-3	C7H8	0.0020	0.0093	4.86	0.0041	0.0191	10.00
2,2,4-TMP (i-octane)	540-84-1	C8H18	0.0210	0.1206	63.21	0.0266	0.1527	80.00
Xylenes	1330-20-7	C8H10	0.0020	0.0107	5.60	0.0300	0.1500	10.00
Total HAP	Various	C6 thru C8	0.0778	0.3695	193.62	0.0964	0.4580	240.00

EXTENDED GAS ANALYSIS - SAMPLE 1



CERTIFICATE OF ANALYSIS

Number : 2009110036-001A

LAFAYETTE LABORATORY
 500 AMBASSADOR CAFFERY PIKE
 SCOTT, LOUISIANA 70583-1791
 PHONE (337) 237-4775
 FAX (337) 237-8005

Gas Analytical Services
Chuck Honaker
PO Box 1028

Bridgeport, WV 26330

Field:	Chief Oil & Gas	Report Date:	11/06/09
Station:	Carmichael # 1H	Sample Of:	- Gas
Location:		Sample Date:	10/29/2009 11:00
Sample Point:	2 Phase Separator	Sample Conditions:	269 psi ,N.G. ° F
Cylinder # :	GAS	PO / Ref. No.:	
Comments:			

Analytical Data

Components	Mol %	Wt%	GPM at 15.025 psia	Method	Lab Tech.	Date Analyzer
				GPA-2286 (MC14)		11/06/09
N2	0.357	0.503	0.04005			
CO2	0.194	0.427	0.03376			
METHANE	80.98	65.332	13.9999			
ETHANE	13.238	20.02	3.61			
PROPANE	3.438	7.624	0.966			
I-BUTANE	0.431	1.262	0.144			
N-BUTANE	0.742	2.167	0.239			
I-PENTANE	0.199	0.724	0.074			
N-PENTANE	0.156	0.568	0.058			
I-HEXANES	0.087	0.373	0.036			
N-HEXANE	0.0513	0.189	0.018			
BENZENE	0.001	0.005	NIL			
CYCLOHEXANE	0.005	0.021	0.002			
I-HEPTANES	0.041	0.21	0.019			
N-HEPTANE	0.013	0.068	0.006			
TOLUENE	0.002	0.012	0.001			
I-OCTANES	0.021	0.137	0.012			
N-OCTANE	0.003	0.02	0.002			
*E-BENZENE	NIL	0.001	NIL			
*m,o,&p-XYLENE	0.002	0.007	0.001			
I-NONANES	0.004	0.033	0.003			
N-NONANE	0.001	0.005	NIL			
I-DECANES	NIL	0.005	0.001			
N-DECANE	NIL	0.002	NIL			
UNDECANES	0.019	0.154	0.013			
DODECANES	0.014	0.124	0.010			
TRIDECANES	NIL	NIL	NIL			
TETRADECANES +	0.001	0.007	0.001			
TOTALS	100.000	100.000	19.289			

Brian Gaspard

 Data Reviewer

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
Attachment H

INLET GAS COMPOSITION - SAMPLE 2

Representative Dehydrator Inlet Gas Composition (Zien Master - 01/16/14)

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	0.3671	0.003671	0.1028	0.5235	270.99
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1484	0.001484	0.0653	0.3324	172.10
Methane*	75-82-8	CH4	16.042	81.8095	0.818095	13.1243	66.8061	34,584.66
Ethane*	74-84-0	C2H6	30.069	12.8238	0.128238	3.8560	19.6281	10,161.20
Propane**	74-98-6	C3H8	44.096	3.2004	0.032004	1.4112	7.1836	3,718.85
i-Butane**	75-28-5	C4H10	58.122	0.4260	0.004260	0.2476	1.2604	652.47
n-Butane**	106-97-8	C4H10	58.122	0.6738	0.006738	0.3916	1.9935	1,032.01
Cyclopentane**	287-92-3	C5H10	70.100	0.0005	0.000005	0.0004	0.0018	0.92
i-Pentane**	78-78-4	C5H12	72.149	0.1779	0.001779	0.1284	0.6534	338.23
n-Pentane**	109-66-0	C5H12	72.149	0.1360	0.001360	0.0981	0.4995	258.57
Cyclohexane**	110-82-7	C6H12	84.159	0.0120	0.000120	0.0101	0.0514	26.61
Other Hexanes**	varies	C6H14	86.175	0.0869	0.000869	0.0749	0.3812	197.34
Methylcyclohexane**	varies	C7H14	98.186	0.0122	0.000122	0.0120	0.0610	31.57
Heptanes**	varies	C7H16	100.202	0.0478	0.000478	0.0479	0.2438	126.22
C8+ Heavies**	varies	C8+	114.229	0.0254	0.000254	0.0290	0.1477	76.46
Benzene***	71-43-2	C6H6	78.112	0.0008	0.000008	0.0006	0.0032	1.65
Ethylbenzene***	100-41-4	C8H10	106.165	0.0005	0.000005	0.0005	0.0027	1.40
n-Hexane***	110-54-3	C6H14	86.175	0.0468	0.000468	0.0403	0.2053	106.28
Toluene***	108-88-3	C7H8	92.138	0.0018	0.000018	0.0017	0.0084	4.37
2,2,4-TMP (i-octane)***	540-84-1	C8H18	114.229	0.0005	0.000005	0.0006	0.0029	1.51
Xylenes***	1330-20-7	C8H10	106.165	0.0019	0.000019	0.0020	0.0103	5.32

Totals:	100.00	1.0000	19.6453	100.00	51,768.71
THC:	99.48	0.9948	19.4771	99.14	51,325.61
Total VOC:	4.85	0.0485	2.4969	12.71	6,579.75
Total HAP:	0.05	0.0005	0.0457	0.23	120.51

* = Hydrocarbon (HC) ** = also Volatile Organic Compound (EPA-VOC) *** = also Hazardous Air Pollutant (EPA-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, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.148	0.332	172.10	0.259	0.580	300.00
Methane	75-82-8	CH4	81.810	66.806	34,584.66	99.350	75.000	42,000.00
Ethane	74-84-0	C2H6	12.824	19.628	10,161.20	15.397	25.000	12,200.00
VOC (Propane)	74-98-6	C3H8	4.851	12.710	6,579.75	5.825	15.260	7,900.00
Benzene	71-43-2	C6H6	0.0008	0.0032	1.65	0.0049	0.0193	10.00
Ethylbenzene	100-41-4	C8H10	0.0005	0.0027	1.40	0.0300	0.1500	10.00
n-Hexane	110-54-3	C6H14	0.0468	0.2053	106.28	0.0572	0.2511	130.00
Toluene	108-88-3	C7H8	0.0018	0.0084	4.37	0.0041	0.0193	10.00
2,2,4-TMP (i-octane)	540-84-1	C8H18	0.0005	0.0029	1.51	0.0033	0.0193	10.00
Xylenes	1330-20-7	C8H10	0.0019	0.0103	5.32	0.0300	0.1500	10.00
Total HAP	Various	C6 thru C8	0.0523	0.2328	120.51	0.0694	0.3091	160.00

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
Attachment H

EXTENDED GAS ANALYSIS - SAMPLE 2

Legacy Measurement Solutions
 Shreveport, LA
 318-226-7237

Customer	: 2259 - WILLIAMS	Date Sampled	: 01/16/2014
Station ID	: 52074-50	Date Analyzed	: 01/24/2014
Cylinder ID	: w4106	Effective Date	: 02/01/2014
Producer	: 001350-CHEVRON	Cyl Pressure	: 922
Lease	: ZIEN MASTER	Temp	: 56
Area	: 500 - OHIO VALLEY MID	Cylinder Type	: Spot
State	: WV	Sample By	: JR

<u>COMPONENT</u>	<u>MOL%</u>	<u>GPM@14.73(P.S.I.A)</u>
Oxygen	0.0038	0.000
Nitrogen	0.3671	0.000
Methane	81.8095	0.000
Carbon-Dioxide	0.1484	0.000
Ethane	12.8309	3.441
Propane	3.2004	0.884
Iso-Butane	0.4260	0.140
Normal-Butane	0.6738	0.213
Iso-Pentane	0.1779	0.085
Normal-Pentane	0.1360	0.049
2,2-Dimethylbutane	0.0072	0.003
2,3-Dimethylbutane/CycloC5	0.0103	0.004
2-methylpentane	0.0431	0.018
3-methylpentane	0.0263	0.011
Normal-Hexane	0.0468	0.019
2,2-Dimethylpentane	0.0009	0.000
Methylcyclopentane	0.0072	0.003
BENZENE	0.0008	0.000
3,3-Dimethylpentane	0.0014	0.001
CYCLOHEXANE	0.0048	0.002
2-Methylhexane	0.0131	0.006
2,3-Dimethylpentane	0.0036	0.001
3-Methylhexane	0.0125	0.006
1,12-DMCYC5 / 2,2,4-TMC5	0.0002	0.000
1,13-Dimethylcyclopentane	0.0003	0.000
N-Heptane	0.0158	0.007
METHYLCYCLOHEXANE	0.0108	0.005
2,5-Dimethylhexane	0.0012	0.001
2,3-Dimethylhexane	0.0015	0.001
TOLUENE	0.0018	0.001
2-Methylheptane	0.0038	0.002
4-Methylheptane	0.0015	0.001
3-Methylheptane	0.0030	0.002
1,14-Dimethylcyclohexane	0.0013	0.001
N-OCTANE / 1,12-DMCYC6	0.0044	0.002
1,13-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0000	0.000
2,4,4 TMC6	0.0000	0.000
2,6-Dimethylheptane / 1,C2-DMCYC6	0.0005	0.000
Ethylcyclohexane	0.0000	0.000
ETHYLBENZENE	0.0000	0.000
O-XYLENE	0.0000	0.000
NONANE	0.0012	0.001
N-DECANE	0.0000	0.000
N-UNDECANE	0.0000	0.000
M-Xylene/P-Xylene	0.0009	0.000
TOTAL	100.0000	4.890

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
Attachment H

INLET GAS COMPOSITION - SAMPLE 3

Representative Dehydrator Inlet Gas Composition (Zien Master - 06/26/14)

Compound	CAS	Formula	Molecular Weight (MW)	Mole % (M% = V%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	7727-37-9	N2	28.013	2.1145	0.021145	0.5923	2.9711	1,560.93
Hydrogen Sulfide	2148-87-8	H2S	34.086	---	---	---	---	---
Carbon Dioxide	124-38-9	CO2	44.010	0.1447	0.001447	0.0637	0.3194	167.81
Methane*	75-82-8	CH4	16.042	79.9014	0.799014	12.8182	64.2942	33,778.02
Ethane*	74-84-0	C2H6	30.069	12.6662	0.126662	3.8086	19.1035	10,036.33
Propane**	74-98-6	C3H8	44.096	3.3946	0.033946	1.4969	7.5081	3,944.51
i-Butane**	75-28-5	C4H10	58.122	0.4534	0.004534	0.2635	1.3218	694.44
n-Butane**	106-97-8	C4H10	58.122	0.7477	0.007477	0.4346	2.1798	1,145.19
Cyclopentane**	287-92-3	C5H10	70.100	0.0005	0.000005	0.0004	0.0018	0.92
i-Pentane**	78-78-4	C5H12	72.149	0.2026	0.002026	0.1462	0.7332	385.19
n-Pentane**	109-66-0	C5H12	72.149	0.1577	0.001577	0.1138	0.5707	299.83
Cyclohexane**	110-82-7	C6H12	84.159	0.0112	0.000112	0.0094	0.0473	24.84
Other Hexanes**	varies	C6H14	86.175	0.0887	0.000887	0.0764	0.3834	201.43
Methylcyclohexane**	varies	C7H14	98.186	0.0022	0.000022	0.0022	0.0108	5.69
Heptanes**	varies	C7H16	100.202	0.0405	0.000405	0.0406	0.2036	106.94
C8+ Heavies**	varies	C8+	114.229	0.0224	0.000224	0.0256	0.1283	67.43
Benzene***	71-43-2	C6H6	78.112	0.0010	0.000010	0.0008	0.0039	2.06
Ethylbenzene***	100-41-4	C8H10	106.165	0.0005	0.000005	0.0005	0.0027	1.40
n-Hexane***	110-54-3	C6H14	86.175	0.0455	0.000455	0.0392	0.1967	103.32
Toluene***	108-88-3	C7H8	92.138	0.0021	0.000021	0.0019	0.0097	5.10
2,2,4-TMP (i-octane)***	540-84-1	C8H18	114.229	0.0005	0.000005	0.0006	0.0029	1.51
Xylenes***	1330-20-7	C8H10	106.165	0.0021	0.000021	0.0022	0.0112	5.88

Totals:	100.00	1.0000	19.9367	100.00	52,536.69
THC:	97.74	0.9774	19.2815	96.71	50,810.01
Total VOC:	5.17	0.0517	2.6547	13.32	6,995.66
Total HAP:	0.05	0.0005	0.0453	0.23	119.26

* = Hydrocarbon (HC) ** = also Volatile Organic Compound (EPA-VOC) *** = also Hazardous Air Pollutant (EPA-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, the following "worst-case" values were assumed:

Compound	CAS	Formula	Representative Gas Analysis			Assumed "Worst-Case" Parameters		
			Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	124-38-9	CO2	0.145	0.319	167.81	0.259	0.571	300.00
Methane	75-82-8	CH4	79.901	64.294	33,778.02	96.985	75.000	41,000.00
Ethane	74-84-0	CH5	12.666	19.103	10,036.33	15.271	25.000	12,100.00
VOC (Propane)	74-98-6	C3H8	5.173	13.316	6,995.66	6.212	15.989	8,400.00
Benzene	71-43-2	C6H6	0.0010	0.0039	2.06	0.0049	0.0190	10.00
Ethylbenzene	100-41-4	C8H10	0.0005	0.0027	1.40	0.0300	0.1500	10.00
n-Hexane	110-54-3	C6H14	0.0455	0.1967	103.32	0.0572	0.2474	130.00
Toluene	108-88-3	C7H8	0.0021	0.0097	5.10	0.0041	0.0190	10.00
2,2,4-TMP (i-octane)	540-84-1	C8H18	0.0005	0.0029	1.51	0.0033	0.0190	10.00
Xylenes	1330-20-7	C8H10	0.0021	0.0112	5.88	0.0300	0.1500	10.00
Total HAP	Various	C6 thru C8	0.0517	0.2270	119.26	0.0694	0.3045	160.00

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
 Attachment H

EXTENDED GAS ANALYSIS - SAMPLE 3

Legacy Measurement Solutions
 Shreveport, LA
 318-226-7237

Customer	: 2259 - WILLIAMS	Date Sampled	: 06/27/2014
Station ID	: 52074-50	Date Analyzed	: 07/07/2014
Cylinder ID	: w7106	Effective Date	: 07/01/2014
Producer	: 001350-CHEVRON	Cyl Pressure	: 840
Lease	: ZIEN MASTER	Temp	: 64
Area	: 500 - OHIO VALLEY MID	Cylinder Type	: Spot
State	: WV	Sample By	: BT

COMPONENT	MOL%	GPM@14.73(PsIA)
Oxygen	0.0035	0.000
Nitrogen	2.1445	0.000
Methane	79.9014	0.000
Carbon-Dioxide	0.1147	0.000
Ethane	12.6752	3.400
Propane	3.3946	0.938
Iso-Butane	0.4534	0.149
Normal-Butane	0.7477	0.236
Iso-Pentane	0.2026	0.074
Normal-Pentane	0.1577	0.057
2,2-Dimethylbutane	0.0078	0.003
2,3-Dimethylbutane/CycloC5	0.0106	0.004
2-methylpentane	0.0438	0.018
3-methylpentane	0.0265	0.011
Normal-Hexane	0.0455	0.019
2,2-Dimethylpentane	0.0008	0.000
Methylcyclopentane	0.0066	0.002
BENZENE	0.0010	0.000
3,3-Dimethylpentane	0.0000	0.000
CYCLOHEXANE	0.0046	0.002
2-Methylhexane	0.0115	0.005
2,3-Dimethylpentane	0.0032	0.001
3-Methylhexane	0.0113	0.005
1,2-DMCYC5 / 2,2,4-TMCS	0.0002	0.000
1,13-Dimethylcyclopentane	0.0002	0.000
N-Heptane	0.0127	0.006
METHYLCYCLOHEXANE	0.0000	0.000
2,5-Dimethylhexane	0.0007	0.000
2,3-Dimethylhexane	0.0012	0.001
TOLUENE	0.0021	0.001
2-Methylheptane	0.0029	0.001
4-Methylheptane	0.0011	0.001
3-Methylheptane	0.0023	0.001
1,14-Dimethylcyclohexane	0.0011	0.001
N-OCTANE / 1,12-DMCYC6	0.0035	0.002
1,13-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0000	0.000
2,4,4 TMC6	0.0000	0.000
2,6-Dimethylheptane / 1,C2-DMCYC6	0.0007	0.000
Ethylcyclohexane	0.0000	0.000
O-XYLENE	0.0000	0.000
NONANE	0.0014	0.001
N-DECANE	0.0000	0.000
N-UNDECANE	0.0003	0.000
M-Xylene/P-Xylene	0.0011	0.000
TOTAL	100.0000	4.939



SAFETY DATA SHEET

1. Identification

Product Identifier Natural Gas
 Other means of Identification Not available.
 Synonyms Methane, Natural Gas Sweet, Fuel Gas, Petroleum Gas, Methyl Hydride
 Recommended use Fuel.
 Recommended restrictions None known.
 Manufacturer / Importer / Supplier / Distributor information
 Company name Williams, Inc.
 Address One Williams Center
 Tulsa, OK 74172
 US
 Telephone 800-688-7507
 E-mail enterpriseehs@williams.com
 Emergency phone number 888-677-2370

2. Hazard(s) identification

Physical hazards Flammable gases Category 1
 Gases under pressure Compressed gas
 Health hazards Not classified.
 OSHA hazard(s) Simple asphyxiant
 Label elements
 Hazard symbol 
 Signal word Danger
 Hazard statement Extremely flammable gas. Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.
 Precautionary statement
 Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
 Response Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
 Storage Protect from sunlight. Store in a well-ventilated place.
 Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.
 Hazard(s) not otherwise classified (HNOC) Not classified.

3. Composition/information on ingredients

Substance

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

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

4. First-aid measures

Inhalation Move injured person into fresh air and keep person calm under observation. If breathing is difficult, give oxygen. Get medical attention if any discomfort continues.
 Skin contact Frostbite: Do not remove clothes, but flush with copious amounts of lukewarm water. Call an ambulance and continue to flush during transportation to hospital.
 Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.

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

5. Fire-fighting measures

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

6. Accidental release measures

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

7. Handling and storage

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

Conditions for safe storage, including any incompatibilities

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

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

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

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

Biological limit values

No biological exposure limits noted for the ingredient(s).

Exposure guidelines

No exposure standards allocated.

Appropriate engineering controls

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

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear approved safety glasses as a good hygiene practice.

Skin protection

Hand protection

Wear suitable gloves as a good hygiene practice.

Other

Wear suitable protective clothing.

Respiratory protection

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

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance

Colorless gas.

Physical state

Gas Compressed.

Form

Gas.

Color

Colorless.

Odor

Odorless to slight, sweet.

Odor threshold

Not available.

pH

Not applicable.

Melting point/freezing point

Not available.

Initial boiling point and boiling range

-259.6 °F (-162 °C)

Flash point

-304.6 °F (-187 °C)

Evaporation rate

Not available.

Flammability (solid, gas)

Extremely flammable gas.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) 5 %

Flammability limit - upper (%) 15 %

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Natural Gas

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

10. Stability and reactivity

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

11. Toxicological information

Information on likely routes of exposure

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

Information on toxicological effects

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

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

12. Ecological information

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

13. Disposal considerations

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

14. Transport information

DOT

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

IATA

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

IMDG

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

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

15. Regulatory information

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

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

Not regulated.

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

Not on regulatory list.

CERCLA Hazardous Substance List (40 CFR 302.4)

Natural gas (CAS 8006-14-2) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical Yes

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

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

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Not listed.

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

Not regulated.

DEA Exempt Chemical Mixtures Code Number

Not regulated.

Food and Drug Administration (FDA) Not regulated.

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

US. Massachusetts RTK - Substance List

Natural gas (CAS 8006-14-2)

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

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Natural gas (CAS 8006-14-2)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

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

Not listed.

International Inventories

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

Natural Gas

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SDS US

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

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

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

Issue date 11-08-2012

Revision date -

Version # 01

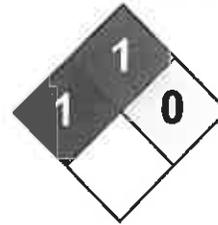
Further Information Not available.

References Registry of Toxic Effects of Chemical Substances (RTECS)

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



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Chemicals & Laboratory Equipment



Health	1
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet Triethylene glycol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Triethylene glycol

Catalog Codes: SLT2644

CAS#: 112-27-6

RTECS: YE4550000

TSCA: TSCA 8(b) inventory: Triethylene glycol

CI#: Not available.

Synonym: 2,2'-[1,2-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:

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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MATERIAL SAFETY DATA SHEET

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name: Natural Gas Condensate

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

Manufacturer Name:
Williams, Inc.
One Williams Center
Tulsa, OK 74172
USA

Emergency Telephone:
888-677-2370

Non-emergency Telephone:
800-688-7507

Intended Use: Industrial use

2 HAZARDS IDENTIFICATION

Emergency Overview

Physical State: Liquid

Color: Colorless to brownish-black

Odor: Petroleum

DANGER!

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

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

Potential Health Effects

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

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

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

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

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

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

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

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

3 COMPOSITION / INFORMATION ON INGREDIENTS

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

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

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

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

4 FIRST AID MEASURES

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

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

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

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

5 FIRE-FIGHTING MEASURES

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

Unsuitable Extinguishing Media: Not applicable.

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

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

Hazardous Combustion Products: Carbon Oxides

6 ACCIDENTAL RELEASE MEASURES

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

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

7 HANDLING AND STORAGE

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

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

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

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

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

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

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

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

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

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

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

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

9	PHYSICAL AND CHEMICAL PROPERTIES
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Color: Colorless to brownish-black
Odor: Petroleum
Odor Threshold: No data available.
Physical State: Liquid
pH: Not applicable
Melting Point: No data available.
Freezing Point: No data available.
Boiling Point: 45°C (113°F) - 404°C (759°F)
Flash Point: <-18°C (0°F) (Approximate)
Evaporation Rate: >100 [vs. n-Butyl Acetate = 1]
Flammability (Solid): No data available.
Flammability Limit - Upper (%): 10 (Approximate)
Flammability Limit - Lower (%): 1 (Approximate)
Vapor Pressure: 51 mmHg - 857 mmHg @100°F [Reid]
Vapor Density (Air=1): > 1
Specific Gravity: 0.766 - 0.87
Solubility in Water: Negligible
Solubility (Other): No data available.
Partition Coefficient (n-Octanol/water): No data available.
Autoignition Temperature: No data available.
Decomposition Temperature: No data available.
Viscosity: < 1 cst @38°C
Percent Volatile: 100 %vol
Explosive Properties: No data available

10 STABILITY AND REACTIVITY

Stability: Stable under the prescribed storage conditions.

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

Incompatible Materials: Strong oxidizing agents.

Hazardous Decomposition Products: No data available.

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

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

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

Listed Carcinogens:

Chemical Name	IARC	NTP	OSHA	ACGIH
Benzene	1	Listed	Listed	A1

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

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

Product Information**Acute Toxicity:**

Test Results: No test data available for the product.

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

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

12 ECOLOGICAL INFORMATION

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

Mobility: No data available.

Persistence and Degradability: No data available.

Bioaccumulation Potential: No data available.

13	DISPOSAL CONSIDERATIONS
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General Information: Dispose of waste and residues in accordance with local authority requirements.

Disposal Methods: No specific disposal method required.

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

14	TRANSPORT INFORMATION
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DOT

UN No.: UN1993

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

Class: 3

Packing Group: II

Label(s): 3

TDG

UN No.: UN1993

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

Class: 3

Packing Group: II

IATA

UN No.: UN1993

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

Class: 3

Packing Group: II

Label(s): 3

IMDG

UN No.: UN1993

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

Class: 3

Packing Group: II

EmS No.: F-E, S-E

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

WHMIS Classification: B2, D2A, D2B

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

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

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

Inventory Status

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

US Regulations

CERCLA Hazardous Substance List (40 CFR 302.4):

Chemical Name	RQ
Benzene	10 lbs

SARA Title III

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

Section 311/312 (40 CFR 370):

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

Section 313 Toxic Release Inventory (40 CFR 372):

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

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

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

Not regulated.

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

Drug Enforcement Act: Not regulated.

TSCA

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

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

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

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

State Regulations**California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):** Benzene**Massachusetts Right-To-Know List:** Benzene**Michigan Critical Materials List (Michigan Natural Resources and Environmental Protection Act (Act. 451 of 1994)):** Benzene**Minnesota Hazardous Substances List:** Benzene**New Jersey Right-To-Know List:** Benzene**Pennsylvania Right-To-Know List:** Benzene**Rhode Island Right-To-Know List:** Benzene**16 OTHER INFORMATION****HAZARD RATINGS**

	Health Hazard	Fire Hazard	Instability	Special Hazard
NFPA	2	4	0	NONE

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

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

	Health Hazard	Flammability	Physical Hazard	Personal Protection
HMIS	2*	4	0	--

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

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

Issue Date: 31-Mar-2009**Supersedes Date:** 28-Jul-1999**SDS No.:** 1023419**Disclaimer:** This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

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**
 - **Table 2 – Release Parameter Data**
-

EMISSION POINTS DATA SUMMARY SHEET

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						
		Table 1: Emissions Data																
CE-1 (1E)	Upward Vertical Stack	Compressor Engine - Ajax DPC-2802LE																
		RSV-1 (2E)	Upward Vertical Stack	TEG Dehydrator - Flash Tank & Still Vent														

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data																
Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission 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-1 (3E)	Upward Vertical Stack	TEG Dehydrator - Reboiler														
T01 (4E)	Upward Vertical Stack	Storage Tank - Produced Water														

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission 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			
Truck Load-Out - Produced Water															
TLO (5E)	Upward Vertical Stack	TLO (5E)	TLO (5E)	na	na	I	na	NOX	---	---	---	---	---	---	---
								CO	---	---	---	---	---	---	---
								VOC	---	0.17	---	0.17	Gas	AP-42	---
								SO2	---	---	---	---	---	---	---
								PM10/2.5	---	---	---	---	---	---	---
								Benzene	---	0.01	---	0.01	Gas	AP-42	---
								Ethylbenzene	---	0.01	---	0.01	Gas	AP-42	---
								HCHO	---	---	---	---	---	---	---
								n-Hexane	---	0.02	---	0.02	Gas	AP-42	---
								Toluene	---	0.01	---	0.01	Gas	AP-42	---
								2,2,4-TMP	---	0.01	---	0.01	Gas	AP-42	---
								Xylenes	---	0.01	---	0.01	Gas	AP-42	---
								Other HAP	---	---	---	---	---	---	---
								Total HAP	---	0.04	---	0.04	Gas	AP-42	---
								CO2e	---	---	---	---	---	---	---
Startup/Shutdown/Maintenance															
								NOX	---	---	---	---	---	---	---
								CO	---	---	---	---	---	---	---
								VOC	---	2.89	---	2.89	Gas	MB	---
								SO2	---	---	---	---	---	---	---
								PM10/2.5	---	---	---	---	---	---	---
								Benzene	---	0.01	---	0.01	Gas	MB	---
								Ethylbenzene	---	0.01	---	0.01	Gas	MB	---
								HCHO	---	---	---	---	---	---	---
								n-Hexane	---	0.04	---	0.04	Gas	MB	---
								Toluene	---	0.01	---	0.01	Gas	MB	---
								2,2,4-TMP	---	0.01	---	0.01	Gas	MB	---
								Xylenes	---	0.01	---	0.01	Gas	MB	---
								Other HAP	---	---	---	---	---	---	---
								Total HAP	---	0.08	---	0.08	Gas	MB	---
								CO2e	---	337	---	337	Gas	EPA	---

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & Plot Plan)		Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (Chemical processes only)		All Regulated Pollutants - Chemical Name/CAS ³ (Speciate VOCs & HAPS)	Maximum Potential Uncontrolled Emissions ⁴		Maximum Potential Controlled Emissions ⁵		Emission Form or Phase (At exit conditions, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁶	Emission Concentration ⁷ (ppmv or mg/m ³)	
		ID No.	Source	ID No.	Device Type	Short Term ²	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr				
RPC (7E)	Upward Vertical Stack	Rod Packing/Crankcase Leaks														
										NOX						
										CO						
										VOC	0.33	1.44	0.33	1.44	Gas	Vendor
										SO2						
										PM10/2.5						
										Benzene	1.6E-03	0.01	1.6E-03	0.01	Gas	MB
										Ethylbenzene	1.6E-03	0.01	1.6E-03	0.01	Gas	MB
										HCHO	3.9E-03	0.02	3.9E-03	0.02	Gas	MB
								n-Hexane	1.6E-03	0.01	1.6E-03	0.01	Gas	MB		
								Toluene	1.6E-03	0.01	1.6E-03	0.01	Gas	MB		
								2,2,4-TMP	1.6E-03	0.01	1.6E-03	0.01	Gas	MB		
								Xylenes	1.6E-03	0.01	1.6E-03	0.01	Gas	MB		
								Other HAP								
								Total HAP	0.01	0.06	0.01	0.06	Gas	MB		
								CO2e	44	192	44	192	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.

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

EMISSION POINTS DATA SUMMARY SHEET - 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 - 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					
Varies	Varies	Total Plant-Wide (w/o Fugitives)															
										NOX	1.71	7.51	1.71	7.51	Gas	Varies	
										CO	1.03	4.53	1.03	4.53	Gas	Varies	
										VOC	11.54	53.63	11.54	53.63	Gas	Varies	
										SO2	2.1E-03	0.01	2.1E-03	0.01	Gas	Varies	
										PM10/2.5	0.17	0.73	0.17	0.73	Solid/Gas	Varies	
										Benzene	0.17	0.73	0.17	0.73	Gas	Varies	
										Ethylbenzene	0.17	0.76	0.17	0.76	Gas	Varies	
										HCHO	0.26	1.13	0.26	1.13	Gas	Varies	
										n-Hexane	0.27	1.23	0.27	1.23	Gas	Varies	
										Toluene	0.49	2.17	0.49	2.17	Gas	Varies	
										2,2,4-TMP	0.11	0.50	0.11	0.50	Gas	Varies	
										Xylenes	0.97	4.24	0.97	4.24	Gas	Varies	
								Other HAP	0.07	0.29	0.07	0.29	Gas	Varies			
								Total HAP	2.50	11.05	2.50	11.05	Gas	Varies			
								CO2e	937	4,447	937	4,447	Gas	Varies			
Varies	Varies	Total Plant-Wide (w/ Fugitives)															
										NOX	1.71	7.51	1.71	7.51	Gas	Varies	
										CO	1.03	4.53	1.03	4.53	Gas	Varies	
										VOC	13.77	63.42	13.77	63.42	Gas	Varies	
										SO2	0.00	0.01	0.00	0.01	Gas	Varies	
										PM10/2.5	0.17	0.73	0.17	0.73	Solid/Gas	Varies	
										Benzene	0.19	0.85	0.19	0.85	Gas	Varies	
										Ethylbenzene	0.20	0.88	0.20	0.88	Gas	Varies	
										HCHO	0.26	1.13	0.26	1.13	Gas	Varies	
										n-Hexane	0.27	1.23	0.27	1.23	Gas	Varies	
										Toluene	0.59	2.17	0.59	2.28	Gas	Varies	
										2,2,4-TMP	0.14	0.50	0.14	0.62	Gas	Varies	
										Xylenes	0.99	4.24	0.99	4.36	Gas	Varies	
								Other HAP	0.09	0.29	0.09	0.29	Gas	Varies			
								Total HAP	2.50	11.05	2.50	12.09	Gas	Varies			
								CO2e	1,046	4,922	1,046	4,922	Gas	Varies			

ATTACHMENT K
Fugitive Emissions Data Summary Sheet

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

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

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION
 Application for 45CSR13 NSR Modification Permit
Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? <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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No ((Truck Load-Out (TLO (5E)) is included in the Point Source Emissions)) <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."

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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						
((Truck Load-Out (TLO (5E)) is include in the Point Source Emissions))						
Wastewater Treatment	na	---	---	---	---	---
Process and Piping Fugitives (FUG-G (1F) and FUG-W (2F) (Total Combined))	VOC	2.23	9.79	2.23	9.79	O - AP-42
	Benzene	0.03	0.12	0.03	0.12	O - AP-42
	E-Benzene	0.03	0.12	0.03	0.12	O - AP-42
	Formaldehyde	---	---	---	---	---
	n-Hexane	0.10	0.44	0.10	0.44	O - AP-42
	Toluene	0.03	0.12	0.03	0.12	O - AP-42
	2,2,4-TMP	0.03	0.12	0.03	0.12	O - AP-42
	Xylenes	0.03	0.12	0.03	0.12	O - AP-42
	Other HAP	---	---	---	---	---
	Total HAP	0.24	1.03	0.24	1.03	O - AP-42
CO2e	108	475	108	475	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).

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LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (Days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	Light Liquid VOC ^{6,7}	2			See ATTACHMENT N EMISSION CALCULATIONS
	Heavy Liquid VOC ⁸	---			
	Non-VOC ⁸	---			
Valves ¹⁰	Gas VOC	386			
	Light Liquid VOC	193			
	Heavy Liquid VOC	---			
Safety Relief Valves ¹¹	Non-VOC	---			
	Gas VOC	See "Other"			
	Light Liquid VOC	See "Other"			
Open Ended Lines ¹²	Non-VOC	---			
	Gas VOC	21			
	Light Liquid VOC	11			
Sampling Connections ¹³	Non-VOC	---			
	Gas VOC	See "Open Ended Lines"			
	Light Liquid VOC	See "Open Ended Lines"			
Compressors	Non-VOC	---			
	Gas VOC	See "Other"			
	Non-VOC	---			
Flanges	Gas VOC	180			
	Light Liquid VOC	90			
	Non-VOC	---			
Other (Connectors)	Gas VOC	1,151			
	Light Liquid VOC	575			
	Non-VOC	---			

na - LDAR Does NOT Apply

Continued

Attachment K
DESCRIPTION OF FUGITIVE EMISSIONS - Continued

Notes for Leak Source Data Sheet

1. For VOC sources include components on streams and equipment that contain greater than 10% VOC, including feed streams, reaction/separation facilities, and product/by-product delivery lines. Do not include certain leakless equipment as defined below by category.
2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in visual or soap-bubble leak detection ppm. Do not include monitoring by methods. "M/Q(M)/Q/SA/A/0" means the time period between inspections as follows: Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/other (specify time period)
If source category is not monitored, a single zero in the space will suffice. For example, if 50 gas-service valves are monitored quarterly, with monthly follow-up of those repaired, 75 are monitored semi-annually, and 50 are checked bimonthly (alternate months), with non checked at any other frequency, you would put in the category valves, gas service: 0/50/0/75/0/50 (bimonthly).
3. Give the average number of days, after a leak is discovered, that an attempt will be made to repair the leak.
4. Note the method used: MB - material balance; 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 L
Emissions Unit Data Sheet(s)

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

- Natural Gas Compressor/Generator Engine Data Sheet
 - Ajax 2802LE Compressor Engine – Vendor Data
 - Natural Gas Glycol Dehydration Unit Data Sheet
 - 40 CFR Part 63; Subpart HH & HHH Registration Form
 - Storage Tank Data Sheet
 - Storage Tank List (Insignificant Sources)
 - Bulk Liquid Transfer Operations
-

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NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Compressor Station		Zien			
Source Identification Number ¹		CE-1			
Engine Manufacturer and Model		Ajax DPC-2802LE			
Manufacturer's Rated bhp/rpm		384 / 440			
Source Status ²		ES			
Date Installed/Modified/Removed ³		2013			
Manufactured/Reconstruction Date ⁴		Oct-2000			
Certified Engine (40CFR60 NSPS JJJJ) ⁵		No			
Engine, Fuel and Combustion Data	Engine Type ⁶	LB2S			
	APCD Type ⁷	na			
	Fuel Type ⁸	RG			
	H ₂ S (gr/100 scf)	0.2			
	Operating bhp/rpm	384 / 440			
	BSFC (Btu/bhp-hr)	8,837			
	Fuel (ft ³ /hr)	3,353			
	Fuel (MMft ³ /yr)	29.38			
Operation (hrs/yr)	8,760				
Reference ⁹	PTE ¹⁰	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NOx	1.69	7.42		
MD	CO	1.02	4.45		
MD	VOC	1.21	5.30		
AP	SOx	2.0E-03	0.01		
AP	PM10/2.5	0.16	0.72		
MD/AP	Benzene	0.01	0.03		
MD/AP	Ethylbenzene	3.7E-04	1.6E-03		
MD	HCHO	0.25	1.11		
MD/AP	n-Hexane	1.5E-03	0.01		
MD/AP	Toluene	3.3E-03	0.01		
MD/AP	2,2,4-TMP	2.9E-03	0.01		
MD/AP	Xylenes	9.1E-04	0.00		
MD/AP	Other HAP	0.07	0.29		
MD/AP	Total HAP	0.34	1.47		
MD/AP	CO2	397	1,739		
MD/AP	CH4	4	18		
MD/40CFR98	N2O	7.48E-04	3.28E-03		
MD/40CFR98	CO2e	501	2,194		

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ATTACHMENT L - NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET - Continued

Notes to NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS = Construction of New Source (installation)

ES = Existing Source

MS = Modification of Existing Source

RS = Removal of Source

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

4. Enter the date that the engine was manufactured, modified or reconstructed.

5. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate.

Provide a manufacturer's data sheet for all engines being registered.

6. Enter the Engine Type designation(s) using the following codes:

LB2S = Lean Burn Two Stroke

RB4S = Rich Burn Four Stroke

LB4S = Lean Burn Four Stroke

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

A/F = Air/Fuel Ratio

IR = Ignition Retard

HEIS = High Energy Ignition System

SIPC = Screw-in Precombustion Chambers

PSC = Prestratified Charge

LEC = Low Emission Combustion

NSCR = Non-Selective Catalytic Reduction

SCR = Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ = Pipeline Quality Natural Gas

RG = Raw Natural Gas

9. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this Compressor/Generator Data Sheet(s).

MD = Manufacturer's Data

AP = AP-42

GR = GRI-HAPCalc™

OT = Other (please list) _____

10. Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the Emissions Summary Sheet.



USA Compression Unit 1097 Ajax 2802LE Engine Emissions

Date of Manufacture	<u>October 12, 2000</u>	Package Serial Number	<u>84554</u>	Date Modified/Reconstructed	<u>Not Any</u>
Driver Rated HP	<u>400</u>	Rated Speed in RPM	<u>440</u>	Combustion Type	<u>Spark Ignited 2 Stroke</u>
# of Power Cylinders	<u>2</u>	Compression Ratio	<u>6.1:1</u>	Combustion Setting	<u>Lean Burn</u>
Displacement, in ³	<u>5652</u>	Fuel Delivery Method	<u>Carburetor</u>	Combustion Air Treatment	<u>Naturally Aspirated</u>

Raw Engine Emissions (Pipeline Quality Fuel Gas with little to no H2S)

Fuel Consumption 7800 LHV BTU/bhp-hr or 8580 HHV BTU/bhp-hr
 Altitude 1500 ft
 Maximum Air Inlet Temp 65 F

	<u>g/bhp-hr¹</u>	<u>lb/MMBTU²</u>	<u>lb/hr</u>	<u>TPY</u>
Nitrogen Oxides (NOx)	2.0		1.76	7.72
Carbon Monoxide (CO)	1.2		1.06	4.63
Volatile Organic Compounds (NMHC)	1.2		1.06	4.63
Formaldehyde (CH2O)	0.3		0.26	1.16
Particulate Matter (PM) ^{Filtrable+Condensable}		4.83E-02	1.66E-01	7.26E-01
Sulfur Dioxide (SO2)		5.88E-04	2.02E-03	8.84E-03
	<u>g/bhp-hr¹</u>		<u>lb/hr</u>	<u>Metric Tonne/yr</u>
Carbon Dioxide (CO2)	NA		NA	NA
Methane (CH4)	4.9		4.32	17.17

¹ g/bhp-hr are based on Cameron Specifications assuming pipeline quality fuel gas, < 1500 ft elevation, and 100 F Air Inlet Temperature.

NOx may be higher at higher ambient temperatures.

Note that g/bhp-hr values are based on 100% Load Operation.

It is recommended to apply a safety factor to CO emissions, VOC emissions and CH2O emissions to allow for operational flexibility and fuel gas composition variability.

² Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-1).

Catalytic Converter Emissions

Catalytic Converter Make and Model: None
 Number of Elements in Housing: None

	<u>% Reduction</u>	<u>lb/hr</u>	<u>TPY</u>
Nitrogen Oxides (NOx)	0	1.76	7.72
Carbon Monoxide (CO)	0	1.06	4.63
Volatile Organic Compounds (NMHC)	0	1.06	4.63
Formaldehyde (CH2O)	0	0.26	1.16
Particulate Matter (PM)	0	1.66E-01	7.26E-01
Sulfur Dioxide (SO2)	0	2.02E-03	8.84E-03
	<u>% Reduction</u>	<u>lb/hr</u>	<u>Metric Tonne/yr</u>
Carbon Dioxide (CO2)	0	NA	NA
Methane (CH4)	0	4.32	17.17

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NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Compressor Station		Zien CS			
		Manufacturer and Model		KW Int'l			
		Max Dry Gas Flow Rate (MMscfd)		7.0			
		Heat Input (MMBtu/hr) - HHV		0.22			
		Design Type (DEG or TEG)		TEG			
		Source Status ²		ES			
		Date Installed/Modified/Removed ³		2013			
		Regenerator Still Vent APCD ⁴		NA			
		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-1 (2E)	Dehydrator 01 Flash Tank + Still Vent (Minimum of 50% "Recycle" of Flash Gas as Fuel in the Reboiler)	GRI-GLYCalc	VOC	9.44	41.34		
		GRI-GLYCalc	Benzene	0.14	0.61		
		GRI-GLYCalc	E-Benzene	0.15	0.66		
		GRI-GLYCalc	Formaldehyde	---	---		
		GRI-GLYCalc	n-Hexane	0.21	0.91		
		GRI-GLYCalc	Toluene	0.47	2.06		
		GRI-GLYCalc	2,2,4-TMP	0.09	0.40		
		GRI-GLYCalc	Xylenes	0.95	4.14		
		GRI-GLYCalc	Other HAPs	---	---		
		GRI-GLYCalc	Total HAP	2.01	8.79		
		GRI-GLYCalc	CO ₂ e	362	1,586		
RBV-01 (3E)	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	PM10/2.5	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				

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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.**

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40 CFR Part 63; Subpart HH & HHH Registration Form

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

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

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

Section A: Facility Description	
Affected facility actual annual average natural gas throughput (scf/day):	7.0 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
The affected facility is:	<input checked="" type="checkbox"/> prior to a NG processing plant <input type="checkbox"/> NG processing plant <input type="checkbox"/> prior to the point of custody transfer and there is no NG processing plant
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
The affected facility exclusively processes, stores, or transfers black oil with an initial producing gas-to-oil ratio (GOR): na scf/bbl API gravity: na degrees	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Section B: Dehydration Unit (if applicable) ¹			
Description: 7.0 MMscfd - TEG Dehy 01 (RSV-1 (2E))			
Date of Installation: 2013	Annual Operating Hours: 8,760	Burner rating (MMbtu/hr): 0.22	
Exhaust Stack Height (ft): 10.0	Stack Diameter (ft): 0.6	Stack Temp. (oF): 120	
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: 1,000 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: 7.0 MMscfd Design: 7.0 MMscfd		
	Water Content: 7.0 lb/MMscf		
Lean Glycol:	Circulation Rate: Actual ³ : 0.67 gpm Max ⁴ : 1.5 gpm		
	Pump make/model: Kimray 9015PV		
Glycol Flash Tank (if applicable):	Temp: 65 oF Pressure: 150 psig Vented: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	If no, describe vapor control: At least 50% of flash tank vapors used as reboiler fuel, the remainder is vented to atmosphere.		
Stripping Gas (if applicable):	Source of Gas: na Rate: na		

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

Please attach the following required dehydration unit information:

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

Section C: Facility NESHAPS Subpart HH/HHH status

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

Affected facility status:
 (choose only one)

Subject to Subpart HHH

Not Subject
 Because:

- < 10/25 TPY
- Affected facility exclusively handles black oil.
- Facility-wide actual annual average NG throughput is < 650 thousand scf/day and facility-wide actual annual average hydrocarbon liquid is < 250 bpd.
- No affected source is present.

Attachment L
EMISSIONS UNIT DATA SHEET
STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

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

II. TANK INFORMATION (required)

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

13A. Maximum annual throughput (gal/yr) 70,560	13B. Maximum daily throughput (gal/day) 193.3
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 8	
15. Maximum tank fill rate (gal/min) 0.134	
16. Tank fill method <input type="checkbox"/> Submerged <input checked="" type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems <input checked="" type="checkbox"/> Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input type="checkbox"/> vertical <input type="checkbox"/> horizontal <input type="checkbox"/> flat roof <input type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe) <input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> lifter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (describe)	

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

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

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

26. Complete the following section for Internal Floating Roof Tanks <input type="checkbox"/> Does Not Apply	
26A. Deck Type: <input type="checkbox"/> Bolted <input type="checkbox"/> Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: <input type="checkbox"/> Continuous sheet construction 5 feet wide <input type="checkbox"/> Continuous sheet construction 6 feet wide <input type="checkbox"/> Continuous sheet construction 7 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 7.5 feet wide <input type="checkbox"/> Continuous sheet construction 5 × 12 feet wide <input type="checkbox"/> Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft ²)
For column supported tanks:	26G. Diameter of each column:
26F. Number of columns:	

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

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

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

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

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

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

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing

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

<p>MONITORING</p> <p>See Attachment O</p>	<p>RECORDKEEPING</p> <p>See Attachment O</p>
<p>REPORTING</p>	<p>TESTING</p>

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

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

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

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

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

ATTACHMENT M
Air Pollution Control Device Sheet(s)
(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 POLLUTANTS – 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**
 - Compressor Engine – 384 bhp Ajax 2802LE (2SLB@440 rpm)
 - Triethylene Glycol (TEG) Dehydrator – 7.0 MMscfd
 - Triethylene Glycol (TEG) Reboiler – 0.22 MMBtu/hr
 - Storage Tank – 210 bbl Produced Water
 - Truck Load-Out – 1,680 bbl/yr Produced Water
 - Startup/Shutdown/Maintenance (SSM)
 - Process Piping Fugitives – Gas & Water/Oil
 - **AP-42 and GHG Emission Factors**
 - **Model Results**
 - Dehydrator - GRI-GLYCalc 4.0
 - Summary of Emissions
 - Summary of Input Values
 - Aggregate Calculations Report
 - Storage Tank - HYSYS
 - Flowchart
 - Workbook
-

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
CE-1	1E	na	Compressor Engine - Ajax DPC-2802LE	384 bhp	1.69	1.02	1.21	2.0E-03	0.16
RSV-1	2E	na	TEG Dehydrator - Flash Tank & Still Vent	7.0 MMscfd	---	---	9.44	---	---
RBV-1	3E	na	TEG Dehydrator - Reboiler	0.22 MMbtu/hr	0.02	0.06	1.2E-03	1.3E-04	1.7E-03
T01	4E	na	Storage Tank - Produced Water	210 bbl	---	---	0.56	---	---
TLO	5E	na	Truck Load-Out - Produced Water	1,880 bb/yr	---	---	---	---	---
SSM	6E	na	Startup/Shutdown/Maintenance	384 bhp	---	---	---	---	---
RPC	7E	na	Rod Packing/Crankcase Leaks	384 bhp	---	---	0.33	---	---
TOTAL POINT SOURCE EMISSIONS:					1.71	1.03	11.64	2.1E-03	0.17

WV NSR THRESHOLD:

6 lb/hr AND 10 tpy				
---	100	---	100	---

TVOP THRESHOLD:

6 lb/hr AND 10 tpy				
---	100	---	100	---

Unit ID	Description	NOX lb/hr tpy	CO lb/hr tpy	VOC lb/hr tpy	SO2 lb/hr tpy	PM10/2.5 lb/hr tpy
FUG-G	Piping and Equipment Fugitives - Gas	---	---	1.36	---	---
FUG-W	Piping and Equipment Fugitives - Water/Oil	---	---	0.88	---	---
TOTAL FUGITIVE EMISSIONS:					2.23	9.79

TOTAL FACILITY-WIDE EMISSIONS:

1.71	7.51	1.03	4.53	13.77	63.42	2.1E-03	0.01	0.17	0.73
------	------	------	------	-------	-------	---------	------	------	------

- 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; Other HAP includes Acetaldehyde, Acrolein, 1,3-Butadiene, Methanol, Methylene Chloride, and traces of other HAP.

Attachment N - Supporting Emissions Calculations

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

Unit ID	Point ID	Benzene		Ethylbenzene		Formaldehyde		n-Hexane		Toluene		2,2,4-TMP		Xylenes		Other HAP		Total HAP	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-1	1E	0.01	0.03	3.7E-04	1.6E-03	0.25	1.11	1.5E-03	0.01	3.3E-03	0.01	2.9E-03	0.01	9.1E-04	4.0E-03	0.07	0.29	0.34	1.47
RSV-1	2E	0.14	0.61	0.15	0.66	—	—	0.21	0.91	0.47	2.06	0.09	0.40	0.95	4.14	—	—	2.01	8.79
RBV-1	3E	4.6E-07	2.0E-06	—	—	1.8E-05	7.1E-05	3.9E-04	1.7E-03	7.4E-07	3.2E-06	—	—	—	—	4.1E-07	1.8E-06	4.1E-04	1.8E-03
T01	4E	0.02	0.07	0.02	0.07	—	—	0.06	0.25	0.02	0.07	0.02	0.07	0.02	0.07	—	—	0.14	0.81
TLO	5E	—	0.01	—	0.01	—	—	—	0.02	—	0.01	—	0.01	—	0.01	—	—	—	0.04
SSM	6E	—	6.4E-03	—	6.4E-03	—	—	—	0.04	—	6.4E-03	—	6.4E-03	—	6.4E-03	—	—	—	0.08
RPC	7E	1.9E-03	0.01	1.6E-03	0.01	3.9E-03	0.02	1.6E-03	0.01	1.6E-03	0.01	1.6E-03	0.01	1.6E-03	0.01	—	—	0.01	0.06
TOTAL POINT:		0.17	0.73	0.17	0.76	0.26	1.13	0.27	1.23	0.49	2.17	0.11	0.50	0.97	4.24	0.07	0.29	2.50	11.05
FUG-G	1F	6.3E-04	2.8E-03	6.3E-04	2.8E-03	—	—	0.01	0.06	6.3E-04	2.8E-03	6.3E-04	2.8E-03	6.3E-04	2.8E-03	—	—	0.02	0.07
FUG-W	2F	0.03	0.12	0.03	0.12	—	—	0.09	0.38	0.03	0.12	0.03	0.12	0.03	0.12	—	—	0.22	0.96
TOTAL FUG:		0.03	0.12	0.03	0.12	—	—	0.10	0.44	0.03	0.12	0.03	0.12	0.03	0.12	—	—	0.24	1.03
TOTAL FACILITY:		0.19	0.85	0.20	0.88	0.26	1.13	0.37	1.68	0.52	2.28	0.14	0.52	0.99	4.36	0.07	0.29	2.73	12.09
NSR THRESHOLD:		2 lb/hr	OR 0.5 tpy	2 lb/hr	OR 5 tpy	2 lb/hr	OR 0.5 tpy	2 lb/hr	OR 5 tpy	2 lb/hr	OR 5 tpy	2 lb/hr	OR 5 tpy	2 lb/hr	OR 5 tpy	2 lb/hr	OR 5 tpy	2 lb/hr	OR 5 tpy
VOP THRESHOLD:		—	10	—	10	—	10	—	10	—	10	—	10	—	10	—	10	—	25

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

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

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

4 - HCHO is formaldehyde; Total HAP includes HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP (1-octane), acetaldehyde, acrolein, and methanol.

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	kg/MMBtu: GWP: CO2 tpy	kg/MMBtu: GWP: CH4 tpy	kg/MMBtu: GWP: N2O tpy	1,00E-03 CO2e tpy	1,00E-04 CO2e tpy	TOTAL CO2e tpy
CE-1	1E	na	Compressor Engine - Ajax DPC-2802LE	3.39	8,760	1,739	18	3.3E-03	454	1	2,194
RSV-1	2E	na	TEG Dehydrator - Flash Tank & Still Vent	---	8,760	---	63	---	1,586	---	1,586
RBV-1	3E	na	TEG Dehydrator - Reboiler	0.22	8,760	114	2.2E-03	2.1E-03	0.1	1	115
T01	4E	na	Storage Tank - Produced Water	---	8,760	0.03	1	---	23.0	---	23
TLO	5E	na	Truck Load-Out - Produced Water	---	---	---	---	---	---	---	---
SSM	6E	na	Startup/Shutdown/Maintenance	---	---	0.10	13	---	337.1	---	337
RPC	7E	na	Rod Packing/Crankcase Leaks	---	8,760	27	7	---	166	---	192
TOTAL POINT SOURCE EMISSIONS:						1,880	103	5E-03	2,566	2	4,447

NSR/P-SD Threshold: (na	- OR -	na	- AND -	na
Title V Major Source Threshold:	na	- OR -	na	- AND -	na

Unit ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr	kg/MMBtu: GWP: CO2 tpy	kg/MMBtu: GWP: CH4 tpy	kg/MMBtu: GWP: N2O tpy	1,00E-03 CO2e tpy	1,00E-04 CO2e tpy	TOTAL CO2e tpy
FUG-G 1F	Piping and Equipment Fugitives - Gas	---	8,760	0.1	0.1	---	18	---	446
FUG-W 2F	Piping and Equipment Fugitives - Water/Oil	---	8,761	0.04	0.04	1.15	29	---	29
TOTAL FUGITIVE EMISSIONS:						---	19	476	476

TOTAL FACILITY-WIDE PTE: 1,880 122 0 4,922

- Notes:
- 1 - Emissions are based on operation at 100% of rated load.
 - 2 - Engine CO2 and CH4 emissions are based on vendor specifications.
 - 3 - Fugitive CH4 emissions are based on EPA Fugitive Emission Factors for Oil and Gas Production Operations.
 - 4 - All other GHG emissions are based on default values in 40CFR98, Subpart C, Table C-1.
 - 5 - High Heat Value (HHV) = Low Heat Value (LHV) / 0.90.
 - 6 - GHG NSR/P-SD Thresholds and Title V Major Source Thresholds are applicable only if other regulated air pollutants exceed the corresponding Thresholds.

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

Unit ID	Point ID	Control ID	Description	Site Rating	NOX lb/hr	tpy	CO lb/hr	tpy	VOC lb/hr	tpy	XYLENE lb/hr	tpy	TOTAL HAP lb/hr	tpy
CE-1	1E	na	Compressor Engine - Ajax DPC-2802LE	384 bhp	1.89	7.42	1.02	4.45	1.21	5.30	9.1E-04	0.00	0.34	1.47
RSV-1	2E	na	TEG Dehydrator - Flash Tank & Still Vent	7.0 MMsqfd	---	---	---	---	9.44	41.34	---	---	2.01	8.79
RBV-1	3E	na	TEG Dehydrator - Reboiler	0.22 MMsqft/hr	0.02	0.10	0.02	0.08	1.2E-03	0.01	0.95	4.14	4.1E-04	1.8E-03
T01	4E	na	Storage Tank - Produced Water	210 bbl	---	---	---	---	0.56	2.49	0.02	0.07	0.14	0.61
TLO	5E	na	Truck Load-Out - Produced Water	1,660 bbl/yr	---	---	---	---	---	0.17	---	0.01	---	0.04
SSM	6E	na	Startup/Shutdown/Maintenance	384 bhp	---	---	---	---	---	2.89	---	6.4E-03	---	0.08
RPC	7E	na	Rod Packing/Crankcase Leaks	384 bhp	---	---	---	---	0.33	1.44	1.6E-03	0.01	0.01	0.06
TOTAL POINT SOURCE EMISSIONS:					1.71	7.51	1.03	4.63	11.64	53.63	0.97	4.24	2.50	11.05

WV NSR THRESHOLD:

6 lb/hr AND 10 tpy						
---	100	---	100	---	100	---

TVOP THRESHOLD:

---	---	---	---	---	---	---
-----	-----	-----	-----	-----	-----	-----

Unit ID	Point ID	Control ID	Description	Site Rating	NOX lb/hr	tpy	CO lb/hr	tpy	VOC lb/hr	tpy	XYLENE lb/hr	tpy	TOTAL HAP lb/hr	tpy
FUG-G	1F	na	Piping and Equipment Fugitives - Gas	1,737 units	---	---	---	---	1.36	5.95	6.3E-04	2.8E-03	0.02	0.07
FUG-W	2F	na	Piping and Equipment Fugitives - Water/Oil	873 units	---	---	---	---	0.88	3.84	0.03	0.12	0.22	0.96
TOTAL FUGITIVE EMISSIONS:					---	---	---	---	2.23	9.79	0.03	0.12	0.24	1.03

TOTAL FACILITY-WIDE EMISSIONS:

1.71	7.51	1.03	4.63	13.77	53.42	0.99	4.36	2.73	12.09
------	------	------	------	-------	-------	------	------	------	-------

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; Other HAP includes Acetaldehyde, Acrolein, 1,3-Butadiene, Methanol, Methylene Chloride, and traces of other HAP.

Williams Ohio Valley Midstream LLC
ZIEN COMPRESSOR STATION

Application for 45CSR13 NSR Modification Permit
Attachment N - Supporting Emissions Calculations

Compressor Engine - Ajax DPC-2802LE

Unit ID (Point ID)	Description	Reference	Pollutant	g/bhp-hr	lb/hr	tpy	Control Efficiency	g/bhp-hr	lb/hr	tpy
CE-1 (1E)	Ajax DPC-2802LE 2SLB 384 bhp (site rated) 440 rpm 2,826 in3/cyl Commenced Construction Prior to 07/01/08 NSPS JJJJ - NO NESHAP ZZZZ - YES 8,760 hr/yr 8,094 Btu/bhp-hr (LHV)* 8,897 Btu/bhp-hr (HHV)* 3.09 MMBtu/hr (LHV) 3.39 MMBtu/hr (HHV) 27,025 MMBtu/yr (LHV) 3,353 scf/hr 29.38 MMscf/yr 920 Btu/scf (LHV) 1,020 Btu/scf (HHV) * Includes 3% Cushion	Vendor Specs	NOx	2.00	1.69	7.42	0.0%	2.00	1.69	7.42
		Vendor Specs	CO	1.20	1.02	4.45	0.0%	1.20	1.02	4.45
		NMHC+CH4	THC	6.10	5.16	22.62	0.0%	6.10	5.16	22.62
		Vendor Specs	NMHC	1.20	1.02	4.45	0.0%	1.20	1.02	4.45
		NMHC+HCHO	NMNEHC	1.13	0.96	4.19	0.0%	1.13	0.96	4.19
		AP-42 Table 3.2-2	VOC	1.43	1.21	5.30	0.0%	1.43	1.21	5.30
		AP-42 Table 3.2-2	SO2	2.4E-03	2.0E-03	0.01	0.0%	2.4E-03	2.0E-03	0.01
		AP-42 Table 3.2-2	PM10/2.5	0.19	0.16	0.72	0.0%	0.19	0.16	0.72
		AP-42 Table 3.2-2	Benzene	0.01	0.01	0.03	0.0%	0.01	0.01	0.03
		AP-42 Table 3.2-2	Ethylbenzene	4.3E-04	3.7E-04	1.6E-03	0.0%	4.3E-04	3.7E-04	1.6E-03
		Vendor Specs	HCHO	0.30	0.25	1.11	0.0%	0.30	0.25	1.11
		AP-42 Table 3.2-2	n-Hexane	1.8E-03	1.5E-03	0.01	0.0%	1.8E-03	1.5E-03	6.6E-03
		AP-42 Table 3.2-2	Toluene	3.8E-03	3.3E-03	0.01	0.0%	3.8E-03	3.3E-03	0.01
		AP-42 Table 3.2-2	2,2,4-TMP	3.4E-03	2.9E-03	0.01	0.0%	3.4E-03	2.9E-03	0.01
		AP-42 Table 3.2-2	Xylenes	1.1E-03	9.1E-04	4.0E-03	0.0%	1.1E-03	9.1E-04	4.0E-03
		AP-42 Table 3.2-2	Other HAP	0.08	0.07	0.29	0.0%	0.08	0.07	0.29
		Sum	Total HAP	0.40	0.34	1.47	0.0%	0.40	0.34	1.47
AP-42 Table 3.2-3	CO2	469	397	1,739	0.0%	469	397	1,739		
Vendor Specs	CH4	5	4	18	0.0%	5	4	18		
AP-42 Table 3.2-3	N2O	8.8E-04	7.5E-04	3.3E-03	0.0%	8.8E-04	7.5E-04	3.3E-03		
40CFR98 - Table A-1	CO2e	592	501	2,194	0.0%	592	501	2,194		

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

2 - As per Engine Specifications, emission values are based on adjustment to specified NOx level, all other emission values are "Not to Exceed" (i.e., Vendor Guarantee).

3 - As per Engine Specifications, NMNEHC (non-methane/non-ethane hydrocarbon) does not include HCHO. VOC is the sum of NMNEHC and HCHO.

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

5 - HCHO is Formaldehyde; Other HAP includes Acetaldehyde, Acrolein, 1,3-Butadiene, Methanol, Methylene Chloride, and traces of other HAP.

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

7 - The fuel heating value will vary, 920 Btu/scf (LHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.

8 - Only the calculations based on Vendor Guarantees should be used to establish emission limitations.

TEG Dehydrator - Flash Tank & Still Vent

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor lb/MMscf	Emission Factor lb/MMBtu	Pre-Control Emissions lb/hr	Pre-Control Emissions tpy	Control %	Controlled Emissions lb/hr	Controlled Emissions tpy
RSV-1 (2E)	Dehydrator 01 (Flash Tank + Still Vent) (No Combustion Emissions Shown) (See RBV-1 (3E)) 7.0 MMscfd 8,760 hr/yr 0.28 MMscf/hr 2,565 MMscf/yr NESHAP HH - Exempt	See BLR-01	NOX	---	---	---	---	---	---	---
		See BLR-01	CO	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	THC	---	---	28.39	124.35	---	28.39	124.35
		GRI-GLYCalc 4.0	NMHC	---	---	13.91	60.93	---	13.91	60.93
		GRI-GLYCalc 4.0	NMNEHC	---	---	9.44	41.34	---	9.44	41.34
		GRI-GLYCalc 4.0	VOC	---	---	9.44	41.34	---	9.44	41.34
		See BLR-01	SO2	---	---	---	---	---	---	---
		See BLR-01	PM10/2.5	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	Benzene	---	---	0.14	0.61	---	0.14	0.61
		GRI-GLYCalc 4.0	Ethylbenzene	---	---	0.15	0.66	---	0.15	0.66
		See BLR-01	HCHO	---	---	---	---	---	---	---
		GRI-GLYCalc 4.0	n-Hexane	---	---	0.21	0.91	---	0.21	0.91
		GRI-GLYCalc 4.0	Toluene	---	---	0.47	2.06	---	0.47	2.06
		GRI-GLYCalc 4.0	2,2,4-TMP	---	---	0.09	0.40	---	0.09	0.40
		GRI-GLYCalc 4.0	Xylenes	---	---	0.95	4.14	---	0.95	4.14
GRI-GLYCalc 4.0	Other HAP	---	---	---	---	---	---	---		
GRI-GLYCalc 4.0	Total HAP	---	---	2.01	8.79	---	2.01	8.79		
See BLR-01	CO2	---	---	---	---	---	---	---	---	
GRI-GLYCalc 4.0	CH4	---	---	14	63	---	14	63		
See BLR-01	N2O	---	---	---	---	---	---	---	---	
40CFR98 - Table A-1	CO2e	---	---	---	---	362	1,586	---	362	1,586

Notes: 1 - To be conservative, and to account for potential future changes in gas quality, the following worst-case emissions were assumed:

Worst-Case (With 20% Margin)	*Dehydrator Operating Parameters (See Attachment N)	
	Flow Rate: 7.0 MMscfd	Flash Tank Temperature: 65 oF
124.35 tpy	Gas Analysis: Attachment H	Flash Tank Pressure: 150 psig
60.93 tpy	Wet Gas Temperature: 65 oF	Flash Tank Control: na - 50% Recycle
41.34 tpy	Wet Gas Pressure: 1,000 psig	Stripping Gas: na
0.61 tpy	Wet Gas Water Content: Saturated	Stripping Gas Flow Rate: na
0.66 tpy	Dry Gas Water Content: 7.0 lb H2O/MMscf	Condenser Temperature: na
---	Lean Glycol Water Content: 1.5 wt% H2O	Condenser Pressure: na
0.91 tpy	Glycol Circulation Rate: 1.50 gpm	Combustor Temperature: na
2.06 tpy	Glycol Pump: Gas Injection	Combustor Excess O2: na
0.40 tpy	Glycol Pump: Kimray 9016PV	Combustor Efficiency: na
4.14 tpy	Additional Model Results:	
---	Glycol Recirculation Ratio: 16 gal/lb-H2O	Flash Tank Off-Gas Flow: 690 scf/hr
8.79 tpy	Rich Glycol Water Content: 2.1 wt% H2O	Overheads Flow: 162 scf/hr
63 tpy		

TEG Dehydrator - Reboiler

Unit ID (Point ID)	Description	Reference	Pollutant	Emission Factor lb/MMBtu	Pre-Controlled Emissions lb/hr	Control Efficiency %	Controlled Emissions lb/hr	tpy
RBV-1 (3E)	TRIETHYLENE GLYCOL (TEG) REBOILER	EPA AP-42 Table 1.4-1	NOX	100.00	0.10	0.02	0.10	0.10
		EPA AP-42 Table 1.4-1	CO	84.00	0.08	0.02	0.08	0.08
		EPA AP-42 Table 1.4-2	THC	11.00	0.01	2.4E-03	0.01	2.4E-03
		EPA AP-42 Table 1.4-2	NMHC	8.70	0.01	1.9E-03	0.01	1.9E-03
		EPA AP-42 Table 1.4-2	NMNEHC	5.60	0.01	1.2E-03	0.01	1.2E-03
		EPA AP-42 Table 1.4-2	VOC	5.68	0.01	1.2E-03	0.01	1.2E-03
		EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	1.3E-04	5.7E-04	5.7E-04
		EPA AP-42 Table 1.4-2	PM10/2.5	7.80	0.01	1.7E-03	0.01	1.7E-03
		EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	4.6E-07	2.0E-06	4.6E-07
		EPA AP-42 Table 1.4-3	Ethylbenzene	—	—	—	—	—
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	1.6E-05	7.1E-05	7.1E-05
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	3.9E-04	1.7E-03	3.9E-04
		EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	7.4E-07	3.2E-06	7.4E-07
		EPA AP-42 Table 1.4-3	2,2,4-TMP	—	—	—	—	—
		EPA AP-42 Table 1.4-3	Xylenes	—	—	—	—	—
EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	4.1E-07	1.8E-06	4.1E-07		
	SUM	1.88	1.8E-03	4.1E-04	1.8E-03	4.1E-04	1.8E-03	
	EPA AP-42 Table 1.4-3	CO2	120,000	118	26	114	26	
	EPA AP-42 Table 1.4-3	CH4	2.30	2.3E-03	5.0E-04	2.2E-03	5.0E-04	
	EPA AP-42 Table 1.4-3	N2O	2.20	2.2E-03	4.8E-04	2.1E-03	4.8E-04	
	40CFR98 - Table A-1	CO2e	120,713	118	26	115	26	

- Notes:
- The fuel heating value will vary, 920 Btu/scf (LHV) is at the low end of the range and results in a high (conservative) fuel consumption estimate.
 - PM10/2.5 is filterable and condensable particulate matter, including PM10 and PM2.5.
 - HCHO is Formaldehyde; Other HAP includes Acetaldehyde, Acrolein, 1,3-Butadiene, Methanol, Methylene Chloride, and traces of other HAP.
 - Emission factors in AP-42 are NOT EPA-recommended emission limits. Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

Storage Tank - Produced Water

Unit ID (Point ID)	Material Stored	Capacity bbl	Turn-overs /yr	T-Put bbl/yr	EPA-450/ (Working and Breathing Losses)	HYSYS (Flashing Losses)	VOC lb/hr	n-Hexane 10.00 Wgt% lb/hr	BTEX, TMP-aa 3.00 Wgt% lb/hr	Total HAP 25.00 Wgt% lb/hr	CO2 1.00 Wgt% lb/hr	CH4 30,000 lb/MMcf lb/hr	CO2e GWP = 26 lb/hr
T01 (4E)	Prod H2O	210	8.0	1,680	0.039 lb/bbl	2,873 lb/bbl	0.56	0.06	0.02	0.14	0.01	0.17	4
TOTAL VOLUME:													
		210	8.0	1,680						0.14	0.01	0.17	4

Unit ID (Point ID)	Material Stored	Capacity bbl	Turn-overs /yr	T-Put bbl/yr	Tank Volume	Blanket Gas Volume	VOC lb/hr	n-Hexane 140 lb/MMcf lb/hr	BTEX, TMP-aa 48 lb/MMcf lb/hr	Total HAP 240 lb/MMcf lb/hr	CO2 300 lb/MMcf lb/hr	CH4 42,000 lb/MMcf lb/hr	CO2e GWP = 25 lb/hr
T01 (4E)	Prod H2O	210	8.0	1,680	1,100 scf	8,800 scf	0.04	8.2E-04	2.1E-04	1.1E-03	1.3E-03	0.18	5
TOTAL VOLUME:													
		210	8.0	1,680			0.56	0.06	0.02	0.14	0.01	0.17	4

TOTAL EMISSIONS:

Notes: 1 - EPA-450/3-85-001a - "Volatile Organic Compound Emissions from Petroleum Refinery Wastewater Systems - Background Information for Proposed Standards" is a reasonable protocol for estimating potential water/oil storage tank working and breathing losses. EPA-450/3-85-001a, page 3-39, gives a VOC emission factor of 420 kg/MMgal wastewater produced in an oil-water separator. (0.420 g/gal * 0.0022 lb/g * 42 gal/bbl = 0.03888 lb/bbl)

2 - These emission estimates are nearly 4X more conservative than emission factors required by the TCEQ on the Barnett Shale produced water tanks at gas-only sites.

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

Pollutant	Average Produced Water Emission Factor (lb/bbl)	
	Gas Production Only Sites	Liquid Hydrocarbon and Gas Production Sites
VOC	0.01	0.0402
Benzene	0.0001	0.000054
Toluene	0.0003	0.000130
Ethylbenzene	0.000006	0.000003
Xylene(s)	0.000006	0.000049
n-Hexane	NA	0.000087

3 - Total HAP is estimated at 25.0% of VOC emissions. This is a very conservative estimate based on an investigation of other produced water emission estimating protocols, as exemplified above (e.g., (0.0001+0.0003+0.000006+0.000006)*100 = 4.7%).

4 - The HYSYS Simulation software was used to estimate flashing losses from the produced water storage tank.

5 - A natural gas blanket may be used on the produced water tank to prevent air from entering the tank and causing an explosion. Field natural gas would be used as the blanket gas. An option to use blanket gas on the produced water tank is requested.

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Truck Load-Out - Produced Water

Unit ID (Point ID)	Description	S sat. fac.	P psia	MW lb/lb-mol	T °R	CE %	L _L lb/Mgal	T-Put Mgal/yr	VOC AP-42 Sect 5.2 lb/hr	n-Hexane 10.00% of VOC lb/hr	BTEX, TMP (ea) 3.00% of VOC lb/hr	Total HAP 25.0% of VOC lb/hr
TLO (BE)	Produced Water	1.45	1.5	92	510	—	4.90	71	14.39	1.44	0.43	3.60
TOTAL TLO EMISSIONS:									14.39	1.44	0.43	3.60

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

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

where:

L_L = Loading loss, lb/1000 gal of liquid loaded.

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

P = True vapor pressure of liquid loaded, psia. Estimated at 1.5 psia.

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

T = Temperature of bulk liquid loaded, °R = °F + 460. (Conservatively assumed 50 °F.)

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

5 - Assume 50 gpm load-out results in: 24 hr/yr.

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

Attachment N - Supporting Emissions Calculations

Startup/Shutdown/Maintenance

Unit ID (Point ID)	Description	No of Comp- ressor Units	Total bhp	SSM and Blowdown Eventsf/yr	a. Engine "Cold-Start" Gas Volume scf/SSM	b. Blowdown Gas Volume scf/SSM	Total Gas Vented MMscf/yr	VOC lb/MMscf	n-Hexane lb/MMscf	BTEX, TMP (ea) lb/MMscf	Total HAP lb/MMscf	CO2 lb/MMscf	CH4 lb/MMscf	CO2e GWP = 25 tpy			
															tpy	tpy	tpy
SSM (6E)	a. Cold Start (Engine)	1	384	208	700	2,387	0.15	0.86	0.01	1.5E-03	0.02	0.02	3	76			
	b. Blowdown (Recip Comp)			208			0.50	2.23	5.0E-03	0.07	10	261					
TOTAL FACILITY-WIDE SSM EMISSIONS:											2.89	0.04	6.4E-03	0.08	0.10	13	337

- Notes: 1 - SSM Emissions are the sum of:
- a. Unburned fuel resulting from "cold-start" of idle gas-fired engines; and
 - b. Natural gas that is purged (aka blowdown) from the compressors and associated piping and equipment.
- 2 - CM-01 and CM-02 thru CM-07 are gas compressors driven by electric motors. CM-01 is the Columbia compressor, CM-02 thru CM-07 are the residue gas compressors.
- 3 - Starting Gas Quantity and Blowdown (B-D) Gas Quantity as per Engineering Department
 (e.g., 8,577 scf/B-D of a compressor with a 1,380 bhp engine equals 6.22 scf/bhp/B-D.)

Engines	a. Unburned "Cold-Start" Gas is Constant at:	700 scf/start
	b. Blowdown Gas is Related to bhp at:	6.22 scf/bhp/B-D

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

Pollutant	Inlet Gas Analysis	Estimated
Carbon Dioxide	225 lb/MMscf	300 lb/MMscf
Methane	34,585 lb/MMscf	42,000 lb/MMscf
VOC (Propane)	8,318 lb/MMscf	9,000 lb/MMscf
n-Hexane	116 lb/MMscf	140 lb/MMscf
BTEX, TMP (ea)	16 lb/MMscf	20 lb/MMscf
Total HAP:	195 lb/MMscf	240 lb/MMscf

5 - Emission estimates are conservatively based on:

Starts-Stops per week per Engine.	4.0
Blowdown(s) per week per Compressor	4.0

Piping and Equipment Fugitives - Gas & Water/Oil

Unit ID (Point ID)	Description	Component (Unit) Type (Gas)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Hydrocarbons (THC) lb/hr tpy	VOC 25.00 Wgt% lb/hr tpy	n-Hexane 0.25 Wgt% lb/hr tpy	BTEX, TMP-ea 0.01 Wgt% lb/hr tpy	Total HAP 0.31 Wgt% lb/hr tpy	CO2 0.68 Wgt% lb/hr tpy	CH4 75.00 Wgt% lb/hr tpy	CO2e GWP = 25 lb/hr tpy	
FUG-G (1F)	Process Piping Fugitives (Gas)	Valves	386	0.00992	0%	3.82	0.96	4.19	4.4E-04	0.01	0.02	2.87	72	
		Pump Seals	0	—	—	—	—	—	—	—	—	—	—	—
		Other	45	0.01940	0%	0.87	0.22	0.96	2.2E-03	1.0E-04	2.7E-03	5.1E-03	0.65	16
		Connectors	1,106	0.00044	0%	0.49	0.12	0.53	1.2E-03	5.6E-05	1.5E-03	2.8E-03	0.37	9
		Flanges	180	0.00086	0%	0.15	0.68	0.04	3.9E-04	1.7E-03	4.8E-04	9.0E-04	0.12	3
		Open-ended	21	0.00441	0%	0.09	0.41	0.02	2.3E-04	1.0E-03	2.9E-04	5.4E-04	0.07	2
Pre-Controlled:						5.43	1.36	5.95	6.3E-04	0.02	0.03	4.07	102	
Controlled:						6.43	1.36	5.95	6.3E-04	0.02	0.03	4.07	102	

Unit ID (Point ID)	Description	Component (Unit) Type (Water/Oil)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Hydrocarbons (THC) lb/hr tpy	VOC 100.00 Wgt% lb/hr tpy	n-Hexane 10.00 Wgt% lb/hr tpy	BTEX, TMP-ea 3.00 Wgt% lb/hr tpy	Total HAP 25.00 Wgt% lb/hr tpy	CO2 1.00 Wgt% lb/hr tpy	CH4 30.00 Wgt% lb/hr tpy	CO2e GWP = 25 lb/hr tpy	
FUG-W (2F)	Process Piping Fugitives (Water/Oil)	Valves	193	0.00022	0%	0.04	0.04	1.8E-02	1.2E-03	5.5E-03	4.2E-04	0.01	0.31	
		Pump Seals	4	0.00005	0%	2.1E-04	2.1E-04	9.3E-04	6.3E-06	2.8E-05	2.1E-06	9.3E-06	6.3E-05	
		Other	23	0.03086	0%	0.69	3.04	3.04	2.1E-02	9.1E-02	1.7E-01	6.9E-03	0.21	5
		Connectors	553	0.00024	0%	0.13	0.59	0.59	1.3E-02	5.9E-02	3.4E-02	1.3E-03	0.01	1
		Flanges	90	0.00001	0%	5.8E-04	2.5E-03	2.5E-03	1.7E-05	7.9E-05	1.4E-04	5.8E-06	2.5E-05	1.7E-04
		Open-ended	11	0.00055	0%	5.8E-03	0.03	0.03	5.8E-03	2.5E-03	1.4E-03	6.3E-03	5.8E-05	0.01
Pre-Controlled:						0.88	3.84	3.84	8.8E-02	3.84	0.01	0.26	7	
Controlled:						0.88	3.84	3.84	8.8E-02	3.84	0.01	0.26	7	

TOTAL PRE-CONTROLLED FUGITIVE EMISSIONS:	6.31	27.63	2.23	9.79	0.10	0.44	0.03	0.12	1.03	0.24	0.04	0.18	108
TOTAL CONTROLLED FUGITIVE EMISSIONS:	6.31	27.63	2.23	9.79	0.10	0.44	0.03	0.12	1.03	0.24	0.04	0.18	108

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

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

3 - Component in Gas Service are based on GRI-HAPCalc estimates, plus a margin

4 - Component in Water/Oil Service are based on Gas Component count, times a reduction

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

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

O&G PROD (AVE)	Gas kg/hr	Water/Oil lb/hr
Valves	4.5E-03	0.00992
Pump Seals	na	9.8E-05
Others	8.8E-03	0.00005
Connectors	2.0E-04	0.03086
Flanges	3.9E-04	0.00044
Open-Ended Lines	2.0E-03	0.00086
		2.5E-04

Pollutant	Gas		Water/Oil	
	Analysis	Estimated	Analysis	Estimated
Carbon Dioxide	0.33 Wgt%	0.58 Wgt%	— Wgt%	— Wgt%
Methane	66.81 Wgt%	75.00 Wgt%	— Wgt%	— Wgt%
VOC	19.63 Wgt%	25.00 Wgt%	100.00 Wgt%	100.00 Wgt%
n-Hexane	0.21 Wgt%	0.25 Wgt%	10.00 Wgt%	10.00 Wgt%
BTEX, TMP-ea	0.01 Wgt%	0.01 Wgt%	3.00 Wgt%	3.00 Wgt%
Total HAP	0.23 Wgt%	0.31 Wgt%	25.00 Wgt%	25.00 Wgt%

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: Zien CS - 7.0 MMscfd Dehy-01

File Name: C:\projects2\wfs\OVM\Zien\R13 Application#2\Zien 7.0 Dehy - 01.13.15.ddf

Date: January 28, 2015

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.4270	10.249	1.8704
Ethane	0.5242	12.580	2.2959
Propane	0.6122	14.694	2.6816
Isobutane	0.1884	4.521	0.8252
n-Butane	0.4525	10.859	1.9818
Isopentane	0.1741	4.179	0.7627
n-Pentane	0.1862	4.468	0.8153
Cyclopentane	0.0003	0.007	0.0013
n-Hexane	0.1350	3.240	0.5913
Cyclohexane	0.1523	3.655	0.6670
Other Hexanes	0.2544	6.106	1.1143
Heptanes	0.5227	12.545	2.2894
Methylcyclohexane	0.1944	4.666	0.8515
2,2,4-Trimethylpentane	0.0601	1.441	0.2631
Benzene	0.1160	2.784	0.5081
Toluene	0.3905	9.372	1.7103
Ethylbenzene	0.1262	3.028	0.5526
Xylenes	0.7872	18.893	3.4480
C8+ Heavies	0.6966	16.719	3.0513
Total Emissions	6.0002	144.005	26.2809
Total Hydrocarbon Emissions	6.0002	144.005	26.2809
Total VOC Emissions	5.0490	121.176	22.1147
Total HAP Emissions	1.6149	38.758	7.0734
Total BTEX Emissions	1.4199	34.077	6.2190

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	11.6398	279.356	50.9824
Ethane	3.2029	76.869	14.0286
Propane	1.5713	37.710	6.8822
Isobutane	0.2736	6.566	1.1983
n-Butane	0.4658	11.178	2.0401
Isopentane	0.1405	3.373	0.6155
n-Pentane	0.1119	2.686	0.4901
Cyclopentane	<0.0001	0.001	0.0002
n-Hexane	0.0380	0.913	0.1666
Cyclohexane	0.0100	0.241	0.0440
Other Hexanes	0.1006	2.414	0.4406
Heptanes	0.0602	1.444	0.2635
Methylcyclohexane	0.0089	0.214	0.0391
2,2,4-Trimethylpentane	0.0154	0.370	0.0675
Benzene	0.0008	0.019	0.0034
Toluene	0.0014	0.034	0.0063
Ethylbenzene	0.0002	0.006	0.0010
Xylenes	0.0010	0.023	0.0042
C8+ Heavies	0.0159	0.382	0.0697

Total Emissions	17.6583	423.799	77.3434
Total Hydrocarbon Emissions	17.6583	423.799	77.3434
Total VOC Emissions	2.8156	67.574	12.3323
Total HAP Emissions	0.0569	1.364	0.2490
Total BTEX Emissions	0.0034	0.082	0.0149

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	23.2796	558.711	101.9648
Ethane	6.4058	153.738	28.0573
Propane	3.1425	75.421	13.7643
Isobutane	0.5472	13.132	2.3966
n-Butane	0.9315	22.357	4.0801
Isopentane	0.2811	6.745	1.2310
n-Pentane	0.2238	5.371	0.9802
Cyclopentane	0.0001	0.002	0.0004
n-Hexane	0.0761	1.826	0.3332
Cyclohexane	0.0201	0.482	0.0879
Other Hexanes	0.2012	4.829	0.8813
Heptanes	0.1203	2.888	0.5271
Methylcyclohexane	0.0179	0.428	0.0782
2,2,4-Trimethylpentane	0.0308	0.740	0.1351
Benzene	0.0016	0.038	0.0069
Toluene	0.0029	0.069	0.0125
Ethylbenzene	0.0005	0.011	0.0020
Xylenes	0.0019	0.046	0.0083
C8+ Heavies	0.0318	0.764	0.1395
Total Emissions	35.3166	847.598	154.6867
Total Hydrocarbon Emissions	35.3166	847.598	154.6867
Total VOC Emissions	5.6312	135.149	24.6646
Total HAP Emissions	0.1137	2.729	0.4980
Total BTEX Emissions	0.0068	0.163	0.0298

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	12.0668	289.604	52.8528
Ethane	3.7271	89.450	16.3245
Propane	2.1835	52.404	9.5638
Isobutane	0.4620	11.088	2.0235
n-Butane	0.9182	22.038	4.0219
Isopentane	0.3147	7.552	1.3782
n-Pentane	0.2980	7.153	1.3054
Cyclopentane	0.0003	0.008	0.0014
n-Hexane	0.1730	4.153	0.7579
Cyclohexane	0.1623	3.895	0.7109
Other Hexanes	0.3550	8.520	1.5549
Heptanes	0.5829	13.989	2.5530
Methylcyclohexane	0.2033	4.880	0.8906
2,2,4-Trimethylpentane	0.0755	1.811	0.3306
Benzene	0.1168	2.803	0.5115
Toluene	0.3919	9.406	1.7166
Ethylbenzene	0.1264	3.033	0.5536

Xylenes	0.7882	18.916	3.4522
C8+ Heavies	0.7126	17.101	3.1210

Total Emissions	23.6585	567.804	103.6243
Total Hydrocarbon Emissions	23.6585	567.804	103.6243
Total VOC Emissions	7.8646	188.751	34.4470
Total HAP Emissions	1.6718	40.123	7.3224
Total BTEX Emissions	1.4233	34.158	6.2339

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Zien CS - 7.0 MMscfd Dehy-01

File Name: C:\projects2\wfs\OVM\Zien\R13 Application#2\Zien 7.0 Dehy - 01.13.15.ddf

Date: January 28, 2015

DESCRIPTION:

Description: Wet Gas: 65oF, 1,000 psig
 Glycol Pump: Kimray 9015 PV, 1.5 gpm
 Flash Tank: 65 oF, 150 psig, 50% Recycle
 No Condenser, No Flare

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 65.00 deg. F
 Pressure: 1000.00 psig
 Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1940
Nitrogen	2.1145
Methane	81.8095
Ethane	10.4975
Propane	3.4380
Isobutane	0.4534
n-Butane	0.7477
Isopentane	0.2026
n-Pentane	0.1577
Cyclopentane	0.0000
n-Hexane	0.0513
Cyclohexane	0.0122
Other Hexanes	0.1319
Heptanes	0.0883
Methylcyclohexane	0.0125
2,2,4-Trimethylpentane	0.0210
Benzene	0.0010
Toluene	0.0021
Ethylbenzene	0.0005
Xylenes	0.0024
C8+ Heavies	0.0614

DRY GAS:

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

LEAN GLYCOL:

Glycol Type: TEG
 Water Content: 1.5 wt% H2O
 Flow Rate: 1.5 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: 65.0 deg. F
Pressure: 150.0 psig

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Zien CS - 7.0 MMscfd Dehy-01

File Name: C:\projects2\wfs\OVM\Zien\R13 Application#2\Zien 7.0 Dehy - 01.13.15.ddf

Date: January 28, 2015

DESCRIPTION:

Description: Wet Gas: 65oF, 1,000 psig
 Glycol Pump: Kimray 9015 PV, 1.5 gpm
 Flash Tank: 65 oF, 150 psig, 50% Recycle
 No Condenser, No Flare

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.4270	10.249	1.8704
Ethane	0.5242	12.580	2.2959
Propane	0.6122	14.694	2.6816
Isobutane	0.1884	4.521	0.8252
n-Butane	0.4525	10.859	1.9818
Isopentane	0.1741	4.179	0.7627
n-Pentane	0.1862	4.468	0.8153
Cyclopentane	0.0003	0.007	0.0013
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Cyclohexane	0.1523	3.655	0.6670
Other Hexanes	0.2544	6.106	1.1143
Heptanes	0.5227	12.545	2.2894
Methylcyclohexane	0.1944	4.666	0.8515
2,2,4-Trimethylpentane	0.0601	1.441	0.2631
Benzene	0.1160	2.784	0.5081
Toluene	0.3905	9.372	1.7103
Ethylbenzene	0.1262	3.028	0.5526
Xylenes	0.7872	18.893	3.4480
C8+ Heavies	0.6966	16.719	3.0513
Total Emissions	6.0002	144.005	26.2809
Total Hydrocarbon Emissions	6.0002	144.005	26.2809
Total VOC Emissions	5.0490	121.176	22.1147
Total HAP Emissions	1.6149	38.758	7.0734
Total BTEX Emissions	1.4199	34.077	6.2190

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	11.6398	279.356	50.9824
Ethane	3.2029	76.869	14.0286
Propane	1.5713	37.710	6.8822
Isobutane	0.2736	6.566	1.1983
n-Butane	0.4658	11.178	2.0401
Isopentane	0.1405	3.373	0.6155
n-Pentane	0.1119	2.686	0.4901

Cyclopentane	<0.0001	0.001	0.0002
n-Hexane	0.0380	0.913	0.1666
Cyclohexane	0.0100	0.241	0.0440
Other Hexanes	0.1006	2.414	0.4406
Heptanes	0.0602	1.444	0.2635
Methylcyclohexane	0.0089	0.214	0.0391
2,2,4-Trimethylpentane	0.0154	0.370	0.0675
Benzene	0.0008	0.019	0.0034
Toluene	0.0014	0.034	0.0063
Ethylbenzene	0.0002	0.006	0.0010
Xylenes	0.0010	0.023	0.0042
C8+ Heavies	0.0159	0.382	0.0697

Total Emissions	17.6583	423.799	77.3434

Total Hydrocarbon Emissions	17.6583	423.799	77.3434
Total VOC Emissions	2.8156	67.574	12.3323
Total HAP Emissions	0.0569	1.364	0.2490
Total BTEX Emissions	0.0034	0.082	0.0149

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	23.2796	558.711	101.9648
Ethane	6.4058	153.738	28.0573
Propane	3.1425	75.421	13.7643
Isobutane	0.5472	13.132	2.3966
n-Butane	0.9315	22.357	4.0801
Isopentane	0.2811	6.745	1.2310
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Cyclopentane	0.0001	0.002	0.0004
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Cyclohexane	0.0201	0.482	0.0879
Other Hexanes	0.2012	4.829	0.8813
Heptanes	0.1203	2.888	0.5271
Methylcyclohexane	0.0179	0.428	0.0782
2,2,4-Trimethylpentane	0.0308	0.740	0.1351
Benzene	0.0016	0.038	0.0069
Toluene	0.0029	0.069	0.0125
Ethylbenzene	0.0005	0.011	0.0020
Xylenes	0.0019	0.046	0.0083
C8+ Heavies	0.0318	0.764	0.1395

Total Emissions	35.3166	847.598	154.6867

Total Hydrocarbon Emissions	35.3166	847.598	154.6867
Total VOC Emissions	5.6312	135.149	24.6646
Total HAP Emissions	0.1137	2.729	0.4980
Total BTEX Emissions	0.0068	0.163	0.0298

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	12.0668	289.604	52.8528
Ethane	3.7271	89.450	16.3245
Propane	2.1835	52.404	9.5638
Isobutane	0.4620	11.088	2.0235
n-Butane	0.9182	22.038	4.0219

Isopentane	0.3147	7.552	1.3782
n-Pentane	0.2980	7.153	1.3054
Cyclopentane	0.0003	0.008	0.0014
n-Hexane	0.1730	4.153	0.7579
Cyclohexane	0.1623	3.895	0.7109
Other Hexanes	0.3550	8.520	1.5549
Heptanes	0.5829	13.989	2.5530
Methylcyclohexane	0.2033	4.880	0.8906
2,2,4-Trimethylpentane	0.0755	1.811	0.3306
Benzene	0.1168	2.803	0.5115
Toluene	0.3919	9.406	1.7166
Ethylbenzene	0.1264	3.033	0.5536
Xylenes	0.7882	18.916	3.4522
C8+ Heavies	0.7126	17.101	3.1210

Total Emissions	23.6585	567.804	103.6243
Total Hydrocarbon Emissions	23.6585	567.804	103.6243
Total VOC Emissions	7.8646	188.751	34.4470
Total HAP Emissions	1.6718	40.123	7.3224
Total BTEX Emissions	1.4233	34.158	6.2339

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	103.8352	52.8528	49.10
Ethane	30.3532	16.3245	46.22
Propane	16.4459	9.5638	41.85
Isobutane	3.2218	2.0235	37.19
n-Butane	6.0619	4.0219	33.65
Isopentane	1.9937	1.3782	30.87
n-Pentane	1.7956	1.3054	27.30
Cyclopentane	0.0016	0.0014	11.19
n-Hexane	0.9245	0.7579	18.02
Cyclohexane	0.7549	0.7109	5.82
Other Hexanes	1.9956	1.5549	22.08
Heptanes	2.8165	2.5530	9.36
Methylcyclohexane	0.9297	0.8906	4.20
2,2,4-Trimethylpentane	0.3981	0.3306	16.96
Benzene	0.5150	0.5115	0.67
Toluene	1.7228	1.7166	0.36
Ethylbenzene	0.5546	0.5536	0.18
Xylenes	3.4563	3.4522	0.12
C8+ Heavies	3.1907	3.1210	2.19

Total Emissions	180.9677	103.6243	42.74
Total Hydrocarbon Emissions	180.9677	103.6243	42.74
Total VOC Emissions	46.7793	34.4470	26.36
Total HAP Emissions	7.5714	7.3224	3.29
Total BTEX Emissions	6.2488	6.2339	0.24

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: 0.70 lbs. H2O/MMSCF

Temperature: 65.0 deg. F
 Pressure: 1000.0 psig
 Dry Gas Flow Rate: 7.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.0376 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 20.19 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 15.83 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.47%	96.53%
Carbon Dioxide	99.61%	0.39%
Nitrogen	99.97%	0.03%
Methane	99.98%	0.02%
Ethane	99.93%	0.07%
Propane	99.89%	0.11%
Isobutane	99.85%	0.15%
n-Butane	99.80%	0.20%
Isopentane	99.81%	0.19%
n-Pentane	99.74%	0.26%
Cyclopentane	98.83%	1.17%
n-Hexane	99.59%	0.41%
Cyclohexane	98.03%	1.97%
Other Hexanes	99.69%	0.31%
Heptanes	99.27%	0.73%
Methylcyclohexane	97.96%	2.04%
2,2,4-Trimethylpentane	99.72%	0.28%
Benzene	80.64%	19.36%
Toluene	73.78%	26.22%
Ethylbenzene	69.19%	30.81%
Xylenes	59.93%	40.07%
C8+ Heavies	99.30%	0.70%

FLASH TANK

Flash Control: Combustion device
 Flash Control Efficiency: 50.00 %
 Flash Temperature: 65.0 deg. F
 Flash Pressure: 150.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.98%	0.02%
Carbon Dioxide	26.10%	73.90%
Nitrogen	1.79%	98.21%
Methane	1.80%	98.20%
Ethane	7.56%	92.44%
Propane	16.31%	83.69%

Isobutane	25.61%	74.39%
n-Butane	32.69%	67.31%
Isopentane	38.40%	61.60%
n-Pentane	45.56%	54.44%
Cyclopentane	77.72%	22.28%
n-Hexane	64.08%	35.92%
Cyclohexane	88.69%	11.31%
Other Hexanes	56.10%	43.90%
Heptanes	81.36%	18.64%
Methylcyclohexane	91.90%	8.10%
2,2,4-Trimethylpentane	66.37%	33.63%
Benzene	98.73%	1.27%
Toluene	99.33%	0.67%
Ethylbenzene	99.67%	0.33%
Xylenes	99.79%	0.21%
C8+ Heavies	96.04%	3.96%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	68.97%	31.03%
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	0.63%	99.37%
n-Pentane	0.61%	99.39%
Cyclopentane	0.55%	99.45%
n-Hexane	0.52%	99.48%
Cyclohexane	3.27%	96.73%
Other Hexanes	1.07%	98.93%
Heptanes	0.48%	99.52%
Methylcyclohexane	3.96%	96.04%
2,2,4-Trimethylpentane	1.30%	98.70%
Benzene	5.01%	94.99%
Toluene	7.90%	92.10%
Ethylbenzene	10.38%	89.62%
Xylenes	12.88%	87.12%
C8+ Heavies	9.87%	90.13%

STREAM REPORTS:

WET GAS STREAM

Temperature: 65.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 2.92e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	4.25e-002	5.89e+000
Carbon Dioxide	1.94e-001	6.57e+001
Nitrogen	2.11e+000	4.55e+002
Methane	8.18e+001	1.01e+004
Ethane	1.05e+001	2.43e+003
Propane	3.44e+000	1.17e+003
Isobutane	4.53e-001	2.03e+002
n-Butane	7.47e-001	3.34e+002
Isopentane	2.03e-001	1.12e+002
n-Pentane	1.58e-001	8.75e+001
Cyclopentane	5.00e-005	2.70e-002
n-Hexane	5.13e-002	3.40e+001
Cyclohexane	1.22e-002	7.90e+000
Other Hexanes	1.32e-001	8.74e+001
Heptanes	8.83e-002	6.80e+001
Methylcyclohexane	1.25e-002	9.44e+000
2,2,4-Trimethylpentane	2.10e-002	1.84e+001
Benzene	1.00e-003	6.01e-001
Toluene	2.10e-003	1.49e+000
Ethylbenzene	5.00e-004	4.08e-001
Xylenes	2.40e-003	1.96e+000
C8+ Heavies	6.14e-002	8.04e+001
Total Components	100.00	1.53e+004

DRY GAS STREAM

Temperature: 65.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 2.92e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.48e-003	2.04e-001
Carbon Dioxide	1.93e-001	6.54e+001
Nitrogen	2.11e+000	4.55e+002
Methane	8.18e+001	1.01e+004
Ethane	1.05e+001	2.43e+003
Propane	3.44e+000	1.16e+003
Isobutane	4.53e-001	2.02e+002
n-Butane	7.46e-001	3.33e+002
Isopentane	2.02e-001	1.12e+002
n-Pentane	1.57e-001	8.73e+001
Cyclopentane	4.94e-005	2.66e-002
n-Hexane	5.11e-002	3.39e+001
Cyclohexane	1.20e-002	7.74e+000
Other Hexanes	1.32e-001	8.71e+001
Heptanes	8.77e-002	6.75e+001
Methylcyclohexane	1.23e-002	9.25e+000
2,2,4-Trimethylpentane	2.09e-002	1.84e+001
Benzene	8.07e-004	4.84e-001
Toluene	1.55e-003	1.10e+000
Ethylbenzene	3.46e-004	2.82e-001
Xylenes	1.44e-003	1.17e+000
C8+ Heavies	6.10e-002	7.99e+001

 Total Components 100.00 1.52e+004

LEAN GLYCOL STREAM

 Temperature: 65.00 deg. F
 Flow Rate: 1.50e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.31e+002
Water	1.50e+000	1.27e+001
Carbon Dioxide	3.04e-012	2.56e-011
Nitrogen	1.57e-012	1.33e-011
Methane	9.70e-018	8.19e-017
Ethane	1.01e-007	8.56e-007
Propane	6.25e-009	5.28e-008
Isobutane	1.10e-009	9.25e-009
n-Butane	2.00e-009	1.69e-008
Isopentane	1.30e-004	1.10e-003
n-Pentane	1.34e-004	1.13e-003
Cyclopentane	1.87e-007	1.58e-006
n-Hexane	8.30e-005	7.00e-004
Cyclohexane	6.10e-004	5.15e-003
Other Hexanes	3.25e-004	2.74e-003
Heptanes	2.97e-004	2.51e-003
Methylcyclohexane	9.49e-004	8.01e-003
2,2,4-Trimethylpentane	9.38e-005	7.92e-004
Benzene	7.25e-004	6.12e-003
Toluene	3.97e-003	3.35e-002
Ethylbenzene	1.73e-003	1.46e-002
Xylenes	1.38e-002	1.16e-001
C8+ Heavies	9.04e-003	7.63e-002
Total Components	100.00	8.44e+002

RICH GLYCOL AND PUMP GAS STREAM

 Temperature: 65.00 deg. F
 Pressure: 1014.70 psia
 Flow Rate: 1.61e+000 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.31e+001	8.31e+002
Water	2.06e+000	1.84e+001
Carbon Dioxide	4.42e-002	3.95e-001
Nitrogen	1.22e-001	1.09e+000
Methane	2.66e+000	2.37e+001
Ethane	7.76e-001	6.93e+000
Propane	4.21e-001	3.75e+000
Isobutane	8.24e-002	7.36e-001
n-Butane	1.55e-001	1.38e+000
Isopentane	5.11e-002	4.56e-001
n-Pentane	4.61e-002	4.11e-001
Cyclopentane	4.18e-005	3.73e-004
n-Hexane	2.37e-002	2.12e-001

Cyclohexane	1.99e-002	1.77e-001
Other Hexanes	5.13e-002	4.58e-001
Heptanes	7.23e-002	6.46e-001
Methylcyclohexane	2.47e-002	2.20e-001
2,2,4-Trimethylpentane	1.03e-002	9.17e-002
Benzene	1.39e-002	1.24e-001
Toluene	4.78e-002	4.27e-001
Ethylbenzene	1.58e-002	1.41e-001
Xylenes	1.01e-001	9.05e-001
C8+ Heavies	9.02e-002	8.05e-001

Total Components	100.00	8.93e+002

FLASH TANK OFF GAS STREAM

 Temperature: 65.00 deg. F
 Pressure: 164.70 psia
 Flow Rate: 6.90e+002 scfh

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

Water	8.67e-003	2.84e-003
Carbon Dioxide	3.65e-001	2.92e-001
Nitrogen	2.11e+000	1.07e+000
Methane	7.98e+001	2.33e+001
Ethane	1.17e+001	6.41e+000
Propane	3.92e+000	3.14e+000
Isobutane	5.18e-001	5.47e-001
n-Butane	8.81e-001	9.32e-001
Isopentane	2.14e-001	2.81e-001
n-Pentane	1.71e-001	2.24e-001
Cyclopentane	6.52e-005	8.32e-005
n-Hexane	4.85e-002	7.61e-002
Cyclohexane	1.31e-002	2.01e-002
Other Hexanes	1.28e-001	2.01e-001
Heptanes	6.60e-002	1.20e-001
Methylcyclohexane	1.00e-002	1.79e-002
2,2,4-Trimethylpentane	1.48e-002	3.08e-002
Benzene	1.10e-003	1.57e-003
Toluene	1.71e-003	2.86e-003
Ethylbenzene	2.41e-004	4.64e-004
Xylenes	9.87e-004	1.91e-003
C8+ Heavies	1.03e-002	3.18e-002

Total Components	100.00	3.67e+001

FLASH TANK GLYCOL STREAM

 Temperature: 65.00 deg. F
 Flow Rate: 1.52e+000 gpm

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

TEG	9.71e+001	8.31e+002
Water	2.15e+000	1.84e+001
Carbon Dioxide	1.20e-002	1.03e-001
Nitrogen	2.28e-003	1.95e-002
Methane	4.99e-002	4.27e-001

Ethane	6.12e-002	5.24e-001
Propane	7.15e-002	6.12e-001
Isobutane	2.20e-002	1.88e-001
n-Butane	5.29e-002	4.52e-001
Isopentane	2.05e-002	1.75e-001
n-Pentane	2.19e-002	1.87e-001
Cyclopentane	3.39e-005	2.90e-004
n-Hexane	1.59e-002	1.36e-001
Cyclohexane	1.84e-002	1.57e-001
Other Hexanes	3.00e-002	2.57e-001
Heptanes	6.14e-002	5.25e-001
Methylcyclohexane	2.36e-002	2.02e-001
2,2,4-Trimethylpentane	7.11e-003	6.08e-002
Benzene	1.43e-002	1.22e-001
Toluene	4.95e-002	4.24e-001
Ethylbenzene	1.64e-002	1.41e-001
Xylenes	1.06e-001	9.04e-001
C8+ Heavies	9.03e-002	7.73e-001

Total Components	100.00	8.56e+002

FLASH GAS EMISSIONS

Flow Rate: 1.55e+003 scfh
Control Method: Combustion Device
Control Efficiency: 50.00

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

Water	4.94e+001	3.63e+001
Carbon Dioxide	2.79e+001	5.01e+001
Nitrogen	9.39e-001	1.07e+000
Methane	1.78e+001	1.16e+001
Ethane	2.61e+000	3.20e+000
Propane	8.73e-001	1.57e+000
Isobutane	1.15e-001	2.74e-001
n-Butane	1.96e-001	4.66e-001
Isopentane	4.77e-002	1.41e-001
n-Pentane	3.80e-002	1.12e-001
Cyclopentane	1.45e-005	4.16e-005
n-Hexane	1.08e-002	3.80e-002
Cyclohexane	2.92e-003	1.00e-002
Other Hexanes	2.86e-002	1.01e-001
Heptanes	1.47e-002	6.02e-002
Methylcyclohexane	2.23e-003	8.93e-003
2,2,4-Trimethylpentane	3.31e-003	1.54e-002
Benzene	2.46e-004	7.84e-004
Toluene	3.80e-004	1.43e-003
Ethylbenzene	5.36e-005	2.32e-004
Xylenes	2.20e-004	9.53e-004
C8+ Heavies	2.29e-003	1.59e-002

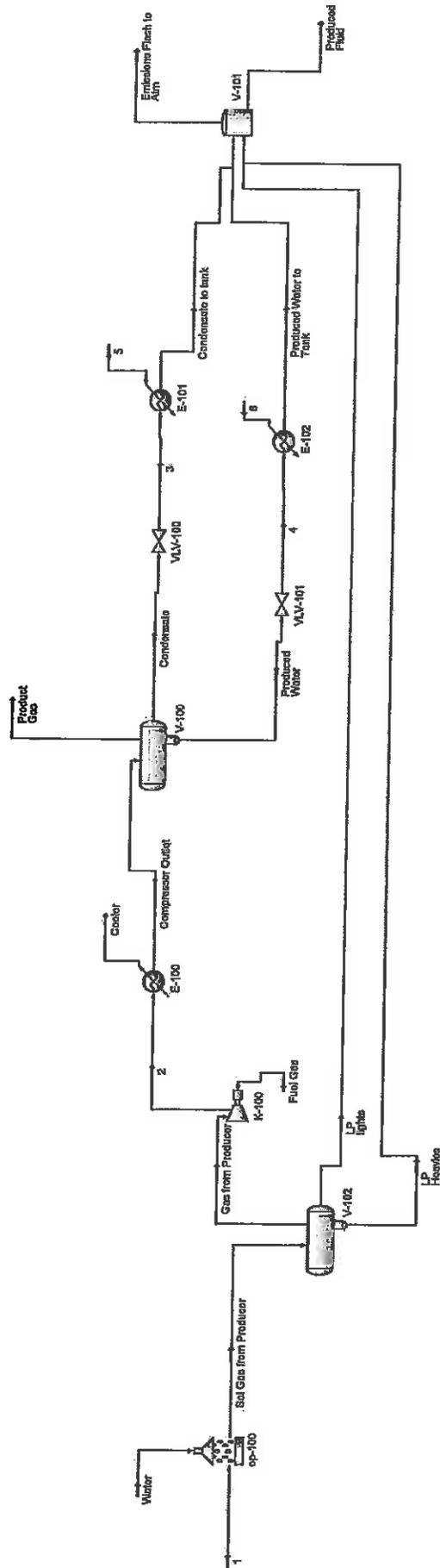
Total Components	100.00	1.05e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F

Pressure: 14.70 psia
 Flow Rate: 1.62e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
-----	-----	-----
Water	7.43e+001	5.70e+000
Carbon Dioxide	5.50e-001	1.03e-001
Nitrogen	1.64e-001	1.95e-002
Methane	6.25e+000	4.27e-001
Ethane	4.09e+000	5.24e-001
Propane	3.26e+000	6.12e-001
Isobutane	7.61e-001	1.88e-001
n-Butane	1.83e+000	4.52e-001
Isopentane	5.67e-001	1.74e-001
n-Pentane	6.06e-001	1.86e-001
Cyclopentane	9.66e-004	2.89e-004
n-Hexane	3.68e-001	1.35e-001
Cyclohexane	4.25e-001	1.52e-001
Other Hexanes	6.93e-001	2.54e-001
Heptanes	1.22e+000	5.23e-001
Methylcyclohexane	4.65e-001	1.94e-001
2,2,4-Trimethylpentane	1.23e-001	6.01e-002
Benzene	3.49e-001	1.16e-001
Toluene	9.95e-001	3.90e-001
Ethylbenzene	2.79e-001	1.26e-001
Xylenes	1.74e+000	7.87e-001
C8+ Heavies	9.60e-001	6.97e-001
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Total Components	100.00	1.18e+001



Workbook: Case (Main)

Material Streams Fluid Pkg: All

Name	1	Water	Sat Gas from Product	2	Compressor Outlet
Vapour Fraction	0.9993	0.0000	0.9993	1.0000	0.9995
Temperature (F)	40.00 *	40.00 *	40.00	390.7	75.00
Pressure (psia)	119.7 *	119.7 *	119.7	1115 *	1110
Molar Flow (lbmole/hr)	219.6 *	0.2259	219.8	219.7	219.7
Mass Flow (lb/hr)	4358	4.069	4362	4343	4343
Liquid Volume Flow (barrel/day)	898.4	0.2792	898.7	896.9	896.9
Heat Flow (Btu/hr)	-7.534e+006	-2.795e+004	-7.558e+006	-6.754e+006	-7.649e+006
Name	Produced Water	Condensate	Product Gas	3	4
Vapour Fraction	0.0000	0.0000	1.0000	0.7740	0.0000
Temperature (F)	75.00	75.00	75.00	-59.34	77.99
Pressure (psia)	1110	1110	1110	14.70 *	14.70
Molar Flow (lbmole/hr)	0.1091	0.0000	219.6	0.0000	0.1091
Mass Flow (lb/hr)	1.965	0.0000	4341	0.0000	1.965
Liquid Volume Flow (barrel/day)	0.1348	0.0000	896.7	0.0000	0.1348
Heat Flow (Btu/hr)	-1.342e+004	-0.0000	-7.636e+006	-0.0000	-1.342e+004
Name	Condensate to tank	Produced Water to T	Produced Fluid	Emissions Flash to A	Gas from Producer
Vapour Fraction	0.9674	0.0000	0.0000	1.0000	1.0000
Temperature (F)	75.00 *	75.00 *	40.24	40.24	40.00
Pressure (psia)	14.70	14.70	14.70	14.70	119.7
Molar Flow (lbmole/hr)	0.0000	0.1091	0.2550	1.516e-002	219.7
Mass Flow (lb/hr)	0.0000	1.965	20.50	0.4693	4343
Liquid Volume Flow (barrel/day)	0.0000	0.1348	1.902	7.783e-002	896.9
Heat Flow (Btu/hr)	-0.0000	-1.343e+004	-3.061e+004	-610.4	-7.540e+006
Name	LP lights	LP Heavies			
Vapour Fraction	0.0000	0.0000			
Temperature (F)	40.00	40.00			
Pressure (psia)	119.7	119.7			
Molar Flow (lbmole/hr)	0.1610	0.0000			
Mass Flow (lb/hr)	19.01	0.0000			
Liquid Volume Flow (barrel/day)	1.845	0.0000			
Heat Flow (Btu/hr)	-1.779e+004	-0.0000			

Compositions Fluid Pkg: All

Name	1	Water	Sat Gas from Product	2	Compressor Outlet
Master Comp Mass Flow (Methane) (lb/hr)	2854.0805 *	0.0000	2854.0805	2853.9814	2853.9814
Master Comp Mass Flow (H2O) (lb/hr)	0.0000 *	4.0688	4.0688	4.0683	4.0683
Master Comp Mass Flow (Nitrogen) (lb/hr)	21.9702 *	0.0000	21.9702	21.9699	21.9699
Master Comp Mass Flow (Oxygen) (lb/hr)	0.0000 *	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (CO2) (lb/hr)	18.7749 *	0.0000	18.7749	18.7728	18.7728
Master Comp Mass Flow (n-Hexane) (lb/hr)	26.2087 *	0.0000	26.2087	24.8183	24.8183
Master Comp Mass Flow (n-Pentane) (lb/hr)	24.7511 *	0.0000	24.7511	24.3843	24.3843
Master Comp Mass Flow (i-Pentane) (lb/hr)	31.5735 *	0.0000	31.5735	31.2358	31.2358
Master Comp Mass Flow (n-Butane) (lb/hr)	94.8391 *	0.0000	94.8391	94.4732	94.4732
Master Comp Mass Flow (i-Butane) (lb/hr)	55.0885 *	0.0000	55.0885	54.9426	54.9426
Master Comp Mass Flow (Propane) (lb/hr)	333.3825 *	0.0000	333.3825	333.0700	333.0700
Master Comp Mass Flow (Ethane) (lb/hr)	875.3510 *	0.0000	875.3510	875.1513	875.1513
Master Comp Mass Flow (n-C14) (lb/hr)	0.4362 *	0.0000	0.4362	0.0003	0.0003
Master Comp Mass Flow (n-C12) (lb/hr)	5.2441 *	0.0000	5.2441	0.0661	0.0661
Master Comp Mass Flow (n-C11) (lb/hr)	6.5310 *	0.0000	6.5310	0.2299	0.2299
Master Comp Mass Flow (n-Nonane) (lb/hr)	1.4102 *	0.0000	1.4102	0.4119	0.4119
Master Comp Mass Flow (p-Xylene) (lb/hr)	0.4669 *	0.0000	0.4669	0.2473	0.2473
Master Comp Mass Flow (n-Octane) (lb/hr)	6.0287 *	0.0000	6.0287	3.5148	3.5148
Master Comp Mass Flow (Toluene) (lb/hr)	0.4047 *	0.0000	0.4047	0.3340	0.3340
Master Comp Mass Flow (Benzene) (lb/hr)	0.1715 *	0.0000	0.1715	0.1627	0.1627
Master Comp Mass Flow (Cyclohexane) (lb/hr)	0.9241 *	0.0000	0.9241	0.8646	0.8646



Workbook: Case (Main) (continued)

Compositions (continued)

Fluid Pkg:

All

Name	Produced Water	Condensate	Product Gas	3	4
Master Comp Mass Flow (Metha(lb/hr)	0.0000	0.0000	2853.9814	0.0000	0.0000
Master Comp Mass Flow (H2O) (lb/hr)	1.9651	0.0000	2.1032	0.0000	1.9651
Master Comp Mass Flow (Nitrogen) (lb/hr)	0.0000	0.0000	21.9699	0.0000	0.0000
Master Comp Mass Flow (Oxygen) (lb/hr)	0.0000	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (CO2) (lb/hr)	0.0002	0.0000	18.7726	0.0000	0.0002
Master Comp Mass Flow (n-Hexane) (lb/hr)	0.0000	0.0000	24.8183	0.0000	0.0000
Master Comp Mass Flow (n-Pentane) (lb/hr)	0.0000	0.0000	24.3843	0.0000	0.0000
Master Comp Mass Flow (i-Pentane) (lb/hr)	0.0000	0.0000	31.2358	0.0000	0.0000
Master Comp Mass Flow (n-Butane) (lb/hr)	0.0000	0.0000	94.4732	0.0000	0.0000
Master Comp Mass Flow (i-Butane) (lb/hr)	0.0000	0.0000	54.9426	0.0000	0.0000
Master Comp Mass Flow (Propane) (lb/hr)	0.0000	0.0000	333.0700	0.0000	0.0000
Master Comp Mass Flow (Ethane) (lb/hr)	0.0000	0.0000	875.1513	0.0000	0.0000
Master Comp Mass Flow (n-C14) (lb/hr)	0.0000	0.0000	0.0003	0.0000	0.0000
Master Comp Mass Flow (n-C12) (lb/hr)	0.0000	0.0000	0.0661	0.0000	0.0000
Master Comp Mass Flow (n-C11) (lb/hr)	0.0000	0.0000	0.2299	0.0000	0.0000
Master Comp Mass Flow (n-Nonane) (lb/hr)	0.0000	0.0000	0.4119	0.0000	0.0000
Master Comp Mass Flow (p-Xylene) (lb/hr)	0.0000	0.0000	0.2473	0.0000	0.0000
Master Comp Mass Flow (n-Octane) (lb/hr)	0.0000	0.0000	3.5148	0.0000	0.0000
Master Comp Mass Flow (Toluene) (lb/hr)	0.0000	0.0000	0.3340	0.0000	0.0000
Master Comp Mass Flow (Benzene) (lb/hr)	0.0000	0.0000	0.1627	0.0000	0.0000
Master Comp Mass Flow (Cyclohexane) (lb/hr)	0.0000	0.0000	0.8646	0.0000	0.0000
Name	Condensate to tank	Produced Water to Tank	Produced Fluid	Emissions Flash to Air	Gas from Producer
Master Comp Mass Flow (Metha(lb/hr)	0.0000	0.0000	0.0053	0.0938	2853.9814
Master Comp Mass Flow (H2O) (lb/hr)	0.0000	1.9651	1.9634	0.0022	4.0683
Master Comp Mass Flow (Nitrogen) (lb/hr)	0.0000	0.0000	0.0000	0.0002	21.9699
Master Comp Mass Flow (Oxygen) (lb/hr)	0.0000	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (CO2) (lb/hr)	0.0000	0.0002	0.0004	0.0020	18.7728
Master Comp Mass Flow (n-Hexane) (lb/hr)	0.0000	0.0000	1.3783	0.0121	24.8183
Master Comp Mass Flow (n-Pentane) (lb/hr)	0.0000	0.0000	0.3547	0.0121	24.3843
Master Comp Mass Flow (i-Pentane) (lb/hr)	0.0000	0.0000	0.3223	0.0154	31.2358
Master Comp Mass Flow (n-Butane) (lb/hr)	0.0000	0.0000	0.3215	0.0444	94.4732
Master Comp Mass Flow (i-Butane) (lb/hr)	0.0000	0.0000	0.1213	0.0246	54.9426
Master Comp Mass Flow (Propane) (lb/hr)	0.0000	0.0000	0.1960	0.1164	333.0700
Master Comp Mass Flow (Ethane) (lb/hr)	0.0000	0.0000	0.0584	0.1434	875.1513
Master Comp Mass Flow (n-C14) (lb/hr)	0.0000	0.0000	0.4359	0.0000	0.0003
Master Comp Mass Flow (n-C12) (lb/hr)	0.0000	0.0000	5.1779	0.0000	0.0661
Master Comp Mass Flow (n-C11) (lb/hr)	0.0000	0.0000	6.3009	0.0001	0.2299
Master Comp Mass Flow (n-Nonane) (lb/hr)	0.0000	0.0000	0.9981	0.0002	0.4119
Master Comp Mass Flow (p-Xylene) (lb/hr)	0.0000	0.0000	0.2195	0.0001	0.2473
Master Comp Mass Flow (n-Octane) (lb/hr)	0.0000	0.0000	2.5123	0.0016	3.5148
Master Comp Mass Flow (Toluene) (lb/hr)	0.0000	0.0000	0.0705	0.0002	0.3340
Master Comp Mass Flow (Benzene) (lb/hr)	0.0000	0.0000	0.0087	0.0001	0.1627
Master Comp Mass Flow (Cyclohexane) (lb/hr)	0.0000	0.0000	0.0591	0.0004	0.8646

Flashing Losses:
0.2277 lb VOC/hr
for tank throughput
of 1.902 bbl/day =
2.87 lb VOC/bbl.

Workbook: Case (Main) (continued)

Compositions (continued)

Fluid Pkg: All

Name	LP lights	LP Heavies			
Master Comp Mass Flow (Methane) (lb/hr)	0.0991	0.0000			
Master Comp Mass Flow (H2O) (lb/hr)	0.0005	0.0000			
Master Comp Mass Flow (Nitrogen) (lb/hr)	0.0002	0.0000			
Master Comp Mass Flow (Oxygen) (lb/hr)	0.0000	0.0000			
Master Comp Mass Flow (CO2) (lb/hr)	0.0021	0.0000			
Master Comp Mass Flow (n-Hexane) (lb/hr)	1.3905	0.0000			
Master Comp Mass Flow (n-Pentane) (lb/hr)	0.3668	0.0000			
Master Comp Mass Flow (i-Pentane) (lb/hr)	0.3377	0.0000			
Master Comp Mass Flow (n-Butane) (lb/hr)	0.3659	0.0000			
Master Comp Mass Flow (i-Butane) (lb/hr)	0.1459	0.0000			
Master Comp Mass Flow (Propane) (lb/hr)	0.3125	0.0000			
Master Comp Mass Flow (Ethane) (lb/hr)	0.1997	0.0000			
Master Comp Mass Flow (n-C14) (lb/hr)	0.4359	0.0000			
Master Comp Mass Flow (n-C12) (lb/hr)	5.1780	0.0000			
Master Comp Mass Flow (n-C11) (lb/hr)	6.3010	0.0000			
Master Comp Mass Flow (n-Nonane) (lb/hr)	0.9983	0.0000			
Master Comp Mass Flow (p-Xylene) (lb/hr)	0.2196	0.0000			
Master Comp Mass Flow (n-Octane) (lb/hr)	2.5139	0.0000			
Master Comp Mass Flow (Toluene) (lb/hr)	0.0707	0.0000			
Master Comp Mass Flow (Benzene) (lb/hr)	0.0088	0.0000			
Master Comp Mass Flow (Cyclohexane) (lb/hr)	0.0596	0.0000			

Energy Streams

Fluid Pkg: All

Name	Fuel Gas	Cooler	5	6	
Heat Flow (Btu/hr)	7.854e+005	8.947e+005	-0.0000	-6.059	

Unit Ops

Operation Name	Operation Type	Feeds	Products	Ignored	Calc Level
op-100	Saturate with water	1	Sat Gas from Producer	No	500.0
		Water			
K-100	Compressor	Gas from Producer	2	No	500.0
		Fuel Gas			
E-100	Cooler	2	Compressor Outlet	No	500.0
			Cooler		
V-100	3 Phase Separator	Compressor Outlet	Condensate	No	500.0
			Product Gas		
			Produced Water		
V-102	3 Phase Separator	Sat Gas from Producer	LP lights	No	500.0
			Gas from Producer		
			LP Heavies		
VLV-100	Valve	Condensate	3	No	500.0
VLV-101	Valve	Produced Water	4	No	500.0
E-101	Heater	3	Condensate to tank	No	500.0
		5			
E-102	Heater	4	Produced Water to Tank	No	500.0
		6			
V-101	Tank	Condensate to tank	Produced Fluid	No	500.0
		Produced Water to Tank	Emissions Flash to Atm		
		LP Heavies			
		LP lights			

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
ZIEN COMPRESSOR STATION
Application for 45CSR13 NSR Modification Permit

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. Monitor and record quantity of natural gas combusted in the engine.
2. Monitor and record quantity of natural gas treated in the dehydrator.
3. Monitor and record quantity of produced water transferred from the storage tank.
4. Use data collected above as input into GRI-GLYCalc Model to determine actual and potential VOC and HAP emissions on yearly basis.

B. Recordkeeping

1. Maintain records of the amount of natural gas consumed and hours of operation for the engine.
2. Maintain records of the amount of natural gas treated in the dehydrator.
3. Maintain records demonstrating the actual annual average volume of natural gas treated in the dehydrator is less than 3 MMscfd OR the actual annual average benzene emissions are less than one ton per year.
4. Maintain records of the amount of produced water transferred from the storage tank.
5. Maintain records of testing conducted in accordance with the permit. Said records will be maintained on-site or in a readily accessible off-site location.
6. Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility. These records shall include the natural gas compressor engine, dehydration unit and ancillary equipment.
7. The records shall be maintained on site or 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 described 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
ZIEN COMPRESSOR STATION
Application for 45CSR13 NSR Modification Permit
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 Review (NSR) Modification Permit for the existing Zien Compressor Station; located ~0.7 Miles South-Southeast of Irish Ridge Rd, ~8.0 Miles East-Southeast of Moundsville, in Marshall County, West Virginia.

The latitude and longitude coordinates are 39.8982 degrees North and -80.5798 degrees West.

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

- (0.22) tons of nitrogen oxides per year
- 0.07 tons of carbon monoxide per year
- 41.01 tons of volatile organic compounds per year
- (0.001) tons of sulfur dioxide per year
- (0.01) tons of particulate matter per year
- 0.36 tons of benzene per year
- 0.81 tons of ethylbenzene per year
- (0.03) tons of formaldehyde per year
- 1.17 tons of n-hexane per year
- 2.00 tons of toluene per year
- 0.07 tons of 2,2,4-trimethylpentane per year
- 4.08 tons of xylenes per year
- 0.09 tons of other hazardous air pollutants per year
- 8.55 tons of total hazardous air pollutants per year
- 1,921 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 _____ 2015.

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)

ATTACHMENT T

Current Permit

Permit Type: **Permit to Construct**
Permit No: **R13-3074**
Issued to: **Williams Ohio Valley Midstream**
Site Name: **Zien Station**
Address: **~0.7 Miles South-Southeast of Irish Ridge Rd**
~8.0 Miles East-Southeast of Moundsville
Location: **Moundsville, Marshall Co, WV**
Lat x Lon: **39.898200° North x -80.579781° West**
UTM: **535,923 m Easting x 4,416,543 m Northing x 17S**
Sources: **One (1) 384 bhp Ajax DPC-2802LE Compressor Engine**
One (1) 7.0 MMscfd TEG Dehydrator
One (1) 0.20 MMBtu/hr Reboiler
One (1) 210 bbl Produced Water Storage Tank
Produced Water Truck Load-Out
Issued: **10/31/13**
Expires: **na**

oOo

**Proposed modifications to the current permit
are provided in a ~~redline/strike-through~~ format**

1.0. Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
Point Sources					
CE-1	CE-1 1E	Compressor Engine Ajax DPC-2802LE	2013	384 bhp	None
RSV-1	RSV-1 2E	TEG Dehydrator Flash Tank and Still Vent	2013	7.0 MMscfd	None
RBV-1	RBV-1 3E	TEG Dehydrator Reboiler	2013	0.20 MMBtu/hr 0.22 MMBtu/hr	None
T01	T01 4E	Storage Tank Produced Water	2013	8,820 gal	None
TLO	TLO 5E	Truck Load-Out Produced Water	2013	70,560 gal/yr	None

2.0. General Conditions ... No Change

3.0. Facility-Wide Requirements ... No Change

4.0. Source-Specific Requirements ... No Change

5.0. Source-Specific Requirements (Engine, CE-1)

5.1. Limitations and Standards

5.1.1. No Change

5.1.2. Maximum emissions from the 384 bhp natural gas fired reciprocating engine, Caterpillar G3306 TA (CE-1) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Nitrogen Oxides	1.76	7.73
Carbon Monoxide	1.06	4.64
Volatile Organic Compounds	4.06 1.21	4.64 5.30
Formaldehyde	0.26	1.16

5.1.3. No Change

5.1.4. No Change

5.1.5. No Change

5.1. Recordkeeping Requirements ... No Change

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

6.1. Limitations and Standards ... No Change

6.2. Monitoring Requirements ... No Change

6.3. Testing Requirements ... No Change

6.4. Recordkeeping Requirements ... No Change

6.5. Reporting Requirements ... No Change

7.0. Source-Specific Requirements (TEG Dehydration Unit, RSV-1)**7.1. Limitations and Standards**

7.1.1. No Change

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

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/yr)
Volatile Organic Compounds	4.99 9.44	8.70 41.34
n-Hexane	0.06 0.21	0.26 0.91
Benzene	0.04 0.14	0.17 0.61
Toluene	0.06 0.47	0.24 2.03
Xylenes	0.04 0.95	0.18 4.14

7.1.3. ... No Change

7.1.4. ... No Change

7.1.5. ... No Change

7.1.6. At least ~~85%~~ 50% of the vapors from the flash tank will be sent to reboiler RBV-1 to be used as fuel.

7.2. Monitoring Requirements ... No Change

7.3. Testing Requirements ... No Change

7.4. Recordkeeping Requirements ... No Change

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

8.1. Limitations and Standards ... No Change

8.2. Recordkeeping Requirements ... No Change

Facility Location: near Moundsville, Marshall County, West Virginia
Mailing Address: Park Place Corporate Center 2
2000 Commerce Drive
Pittsburgh, PA 15275
Facility Description: Natural Gas Compression Station
NAICS Codes: 213112
UTM Coordinates: 536.142 km Easting • 4,415.7 km Northing • Zone 17
Permit Type: Construction
Description of Change: Installation of one (1) 384 bhp compressor engine, one (1) 7 MMscf/day TEG dehydration unit, one (1) 0.2 MMBTU/hr TEG dehydration reboiler, and one (1) produced water tank.

Any person whose interest may be affected, including, but not necessarily limited to, the applicant and any person who participated in the public comment process, by a permit issued, modified or denied by the Secretary may appeal such action of the Secretary to the Air Quality Board pursuant to article one [§§22B-1-1 et seq.], Chapter 22B of the Code of West Virginia. West Virginia Code §§22-5-14.

The source is not subject to 45CSR30.

Any wells located at this production pad drilled after August 23, 2011 and storage tanks constructed after August 23, 2011 will be affected sources subject to the applicable provisions of 40CFR60 Subpart OOOO, signed on April 17, 2012.

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1.0. Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
CE-1	CE-1	Compressor Engine AJAX 2802LE	2013	384 bhp	None
RSV-1	RSV-1	TEG Dehydrator Still Vent	2013	7 MMscf/day	None
RBV-1	RBV-1	TEG Dehydrator Reboiler	2013	0.20 MMBTU/hr	None
T01	T01	Produced Fluids Tank	2013	8,820 gallons	None
TLO	TLO	Produced Fluids Truck Loading	2013	70,560 gallons/year	None

2.0. General Conditions

2.1. Definitions

- 2.1.1. All references to the "West Virginia Air Pollution Control Act" or the "Air Pollution Control Act" mean those provisions contained in W.Va. Code §§ 22-5-1 to 22-5-18.
- 2.1.2. The "Clean Air Act" means those provisions contained in 42 U.S.C. §§ 7401 to 7671q, and regulations promulgated thereunder.
- 2.1.3. "Secretary" means the Secretary of the Department of Environmental Protection or such other person to whom the Secretary has delegated authority or duties pursuant to W.Va. Code §§ 22-1-6 or 22-1-8 (45CSR§30-2.12.). The Director of the Division of Air Quality is the Secretary's designated representative for the purposes of this permit.

2.2. Acronyms

BBL or bbl	Barrel	NO _x	Nitrogen Oxides
CAAA	Clean Air Act Amendments	NSPS	New Source Performance Standards
CBI	Confidential Business Information	PM	Particulate Matter
CEM	Continuous Emission Monitor	PM _{2.5}	Particulate Matter less than 2.5 µm in diameter
CES	Certified Emission Statement	PM ₁₀	Particulate Matter less than 10µm in diameter
C.F.R. or CFR	Code of Federal Regulations	Ppb	Pounds per Batch
CO	Carbon Monoxide	Pph	Pounds per Hour
C.S.R. or CSR	Codes of State Rules	Ppm	Parts per Million
DAQ	Division of Air Quality	Ppm _v or ppmv	Parts per Million by Volume
DEP	Department of Environmental Protection	PSD	Prevention of Significant Deterioration
dscm	Dry Standard Cubic Meter	Psi	Pounds per Square Inch
FOIA	Freedom of Information Act	SIC	Standard Industrial Classification
HAP	Hazardous Air Pollutant	SIP	State Implementation Plan
HON	Hazardous Organic NESHAP	SO ₂	Sulfur Dioxide
HP	Horsepower	TAP	Toxic Air Pollutant
lbs/hr	Pounds per Hour	TPY	Tons per Year
LDAR	Leak Detection and Repair	TRS	Total Reduced Sulfur
M	Thousand	TSP	Total Suspended Particulate
MACT	Maximum Achievable Control Technology	USEPA	United States Environmental Protection Agency
MDHI	Maximum Design Heat Input	UTM	Universal Transverse Mercator
MM	Million	VEE	Visual Emissions Evaluation
MMBtu/hr or mmbtu/hr	Million British Thermal Units per Hour	VOC	Volatile Organic Compounds
MMCF/hr or mmeft/hr	Million Cubic Feet per Hour	VOL	Volatile Organic Liquids
NA	Not Applicable		
NAAQS	National Ambient Air Quality Standards		
NESHAPS	National Emissions Standards for Hazardous Air Pollutants		

2.3. Authority

This permit is issued in accordance with West Virginia air pollution control law W.Va. Code §§ 22-5-1. et seq. and the following Legislative Rules promulgated thereunder:

- 2.3.1. 45CSR13 – *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation;*

2.4. Term and Renewal

- 2.4.1. This Permit shall remain valid, continuous and in effect unless it is revised, suspended, revoked or otherwise changed under an applicable provision of 45CSR13 or any other applicable legislative rule;

2.5. Duty to Comply

- 2.5.1. The permitted facility shall be constructed and operated in accordance with the plans and specifications filed in Permit Application R13-3074 and any modifications, administrative updates, or amendments thereto. The Secretary may suspend or revoke a permit if the plans and specifications upon which the approval was based are not adhered to; [45CSR§§13-5.11 and -10.3.]
- 2.5.2. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the West Virginia Code and the Clean Air Act and is grounds for enforcement action by the Secretary or USEPA;
- 2.5.3. Violations of any of the conditions contained in this permit, or incorporated herein by reference, may subject the permittee to civil and/or criminal penalties for each violation and further action or remedies as provided by West Virginia Code 22-5-6 and 22-5-7;
- 2.5.4. Approval of this permit does not relieve the permittee herein of the responsibility to apply for and obtain all other permits, licenses, and/or approvals from other agencies; i.e., local, state, and federal, which may have jurisdiction over the construction and/or operation of the source(s) and/or facility herein permitted.

2.6. Duty to Provide Information

The permittee shall furnish to the Secretary within a reasonable time any information the Secretary may request in writing to determine whether cause exists for administratively updating, modifying, revoking, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Secretary copies of records to be kept by the permittee. For information claimed to be confidential, the permittee shall furnish such records to the Secretary along with a claim of confidentiality in accordance with 45CSR31. If confidential information is to be sent to USEPA, the permittee shall directly provide such information to USEPA along with a claim of confidentiality in accordance with 40 C.F.R. Part 2.

2.7. Duty to Supplement and Correct Information

Upon becoming aware of a failure to submit any relevant facts or a submittal of incorrect information in any permit application, the permittee shall promptly submit to the Secretary such supplemental facts or corrected information.

2.8. Administrative Update

The permittee may request an administrative update to this permit as defined in and according to the procedures specified in 45CSR13.
[45CSR§13-4.]

2.9. Permit Modification

The permittee may request a minor modification to this permit as defined in and according to the procedures specified in 45CSR13.
[45CSR§13-5.4.]

2.10 Major Permit Modification

The permittee may request a major modification as defined in and according to the procedures specified in 45CSR14 or 45CSR19, as appropriate.
[45CSR§13-5.1]

2.11. Inspection and Entry

The permittee shall allow any authorized representative of the Secretary, upon the presentation of credentials and other documents as may be required by law, to perform the following:

- a. At all reasonable times (including all times in which the facility is in operation) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times (including all times in which the facility is in operation) any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit;
- d. Sample or monitor at reasonable times substances or parameters to determine compliance with the permit or applicable requirements or ascertain the amounts and types of air pollutants discharged.

2.12. Emergency

- 2.12.1. An "emergency" means any situation arising from sudden and reasonable unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to

the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.

- 2.12.2. Effect of any emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions of Section 2.12.3 are met.
- 2.12.3. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:
- a. An emergency occurred and that the permittee can identify the cause(s) of the emergency;
 - b. The permitted facility was at the time being properly operated;
 - c. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and
 - d. The permittee submitted notice of the emergency to the Secretary within one (1) working day of the time when emission limitations were exceeded due to the emergency and made a request for variance, and as applicable rules provide. This notice must contain a detailed description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.
- 2.12.4. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof.
- 2.12.5 The provisions of this section are in addition to any emergency or upset provision contained in any applicable requirement.

2.13. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it should have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. However, nothing in this paragraph shall be construed as precluding consideration of a need to halt or reduce activity as a mitigating factor in determining penalties for noncompliance if the health, safety, or environmental impacts of halting or reducing operations would be more serious than the impacts of continued operations.

2.14. Suspension of Activities

In the event the permittee should deem it necessary to suspend, for a period in excess of sixty (60) consecutive calendar days, the operations authorized by this permit, the permittee shall notify the Secretary, in writing, within two (2) calendar weeks of the passing of the sixtieth (60) day of the suspension period.

2.15. Property Rights

This permit does not convey any property rights of any sort or any exclusive privilege.

2.16. Severability

The provisions of this permit are severable and should any provision(s) be declared by a court of competent jurisdiction to be invalid or unenforceable, all other provisions shall remain in full force and effect.

2.17. Transferability

This permit is transferable in accordance with the requirements outlined in Section 10.1 of 45CSR13.
[45CSR§13-10.1.]

2.18. Notification Requirements

The permittee shall notify the Secretary, in writing, no later than thirty (30) calendar days after the actual startup of the operations authorized under this permit.

2.19. Credible Evidence

Nothing in this permit shall alter or affect the ability of any person to establish compliance with, or a violation of, any applicable requirement through the use of credible evidence to the extent authorized by law. Nothing in this permit shall be construed to waive any defense otherwise available to the permittee including, but not limited to, any challenge to the credible evidence rule in the context of any future proceeding.

3.0. Facility-Wide Requirements

3.1. Limitations and Standards

- 3.1.1. **Open burning.** The open burning of refuse by any person, firm, corporation, association or public agency is prohibited except as noted in 45CSR§6-3.1.
[45CSR§6-3.1.]
- 3.1.2. **Open burning exemptions.** The exemptions listed in 45CSR§6-3.1 are subject to the following stipulation: Upon notification by the Secretary, no person shall cause, suffer, allow or permit any form of open burning during existing or predicted periods of atmospheric stagnation. Notification shall be made by such means as the Secretary may deem necessary and feasible.
[45CSR§6-3.2.]
- 3.1.3. **Asbestos.** The permittee is responsible for thoroughly inspecting the facility, or part of the facility, prior to commencement of demolition or renovation for the presence of asbestos and complying with 40 C.F.R. § 61.145, 40 C.F.R. § 61.148, and 40 C.F.R. § 61.150. The permittee, owner, or operator must notify the Secretary at least ten (10) working days prior to the commencement of any asbestos removal on the forms prescribed by the Secretary if the permittee is subject to the notification requirements of 40 C.F.R. § 61.145(b)(3)(i). The USEPA, the Division of Waste Management, and the Bureau for Public Health - Environmental Health require a copy of this notice to be sent to them.
[40CFR§61.145(b) and 45CSR§34]
- 3.1.4. **Odor.** No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.
[45CSR§4-3.1] *[State Enforceable Only]*
- 3.1.5. **Permanent shutdown.** A source which has not operated at least 500 hours in one 12-month period within the previous five (5) year time period may be considered permanently shutdown, unless such source can provide to the Secretary, with reasonable specificity, information to the contrary. All permits may be modified or revoked and/or reapplication or application for new permits may be required for any source determined to be permanently shutdown.
[45CSR§13-10.5.]
- 3.1.6. **Standby plan for reducing emissions.** When requested by the Secretary, the permittee shall prepare standby plans for reducing the emissions of air pollutants in accordance with the objectives set forth in Tables I, II, and III of 45CSR11.
[45CSR§11-5.2.]

3.2. Monitoring Requirements

[Reserved]

3.3. Testing Requirements

- 3.3.1. **Stack testing.** As per provisions set forth in this permit or as otherwise required by the Secretary, in accordance with the West Virginia Code, underlying regulations, permits and orders, the permittee shall conduct test(s) to determine compliance with the emission

limitations set forth in this permit and/or established or set forth in underlying documents. The Secretary, or his duly authorized representative, may at his option witness or conduct such test(s). Should the Secretary exercise his option to conduct such test(s), the operator shall provide all necessary sampling connections and sampling ports to be located in such manner as the Secretary may require, power for test equipment and the required safety equipment, such as scaffolding, railings and ladders, to comply with generally accepted good safety practices. Such tests shall be conducted in accordance with the methods and procedures set forth in this permit or as otherwise approved or specified by the Secretary in accordance with the following:

- a. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with 40 C.F.R. Parts 60, 61, and 63 in accordance with the Secretary's delegated authority and any established equivalency determination methods which are applicable. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.
- b. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with applicable requirements which do not involve federal delegation. In specifying or approving such alternative testing to the test methods, the Secretary, to the extent possible, shall utilize the same equivalency criteria as would be used in approving such changes under Section 3.3.1.a. of this permit. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.
- c. All periodic tests to determine mass emission limits from or air pollutant concentrations in discharge stacks and such other tests as specified in this permit shall be conducted in accordance with an approved test protocol. Unless previously approved, such protocols shall be submitted to the Secretary in writing at least thirty (30) days prior to any testing and shall contain the information set forth by the Secretary. In addition, the permittee shall notify the Secretary at least fifteen (15) days prior to any testing so the Secretary may have the opportunity to observe such tests. This notification shall include the actual date and time during which the test will be conducted and, if appropriate, verification that the tests will fully conform to a referenced protocol previously approved by the Secretary.
- d. The permittee shall submit a report of the results of the stack test within sixty (60) days of completion of the test. The test report shall provide the information necessary to document the objectives of the test and to determine whether proper procedures were used to accomplish these objectives. The report shall include the following: the certification described in paragraph 3.5.1.; a statement of compliance status, also signed by a responsible official; and, a summary of conditions which form the basis for the compliance status evaluation. The summary of conditions shall include the following:
 1. The permit or rule evaluated, with the citation number and language;
 2. The result of the test for each permit or rule condition; and,
 3. A statement of compliance or noncompliance with each permit or rule condition.

[WV Code § 22-5-4(a)(14-15) and 45CSR13]

3.4. Recordkeeping Requirements

- 3.4.1. **Retention of records.** The permittee shall maintain records of all information (including monitoring data, support information, reports, and notifications) required by this permit recorded in a form suitable and readily available for expeditious inspection and review. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation. The files shall be maintained for at least five (5) years following the date of each occurrence, measurement, maintenance, corrective action, report, or record. Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official. Where appropriate, the permittee may maintain records electronically (on a computer, on computer floppy disks, CDs, DVDs, or magnetic tape disks), on microfilm, or on microfiche.
- 3.4.2. **Odors.** For the purposes of 45CSR4, the permittee shall maintain a record of all odor complaints received, any investigation performed in response to such a complaint, and any responsive action(s) taken.
[45CSR§4. *State Enforceable Only.*]

3.5. Reporting Requirements

- 3.5.1. **Responsible official.** Any application form, report, or compliance certification required by this permit to be submitted to the DAQ and/or USEPA shall contain a certification by the responsible official that states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.
- 3.5.2. **Confidential information.** A permittee may request confidential treatment for the submission of reporting required by this permit pursuant to the limitations and procedures of W. Va. Code § 22-5-10 and 45CSR31.
- 3.5.3. **Correspondence.** All notices, requests, demands, submissions and other communications required or permitted to be made to the Secretary of DEP and/or USEPA shall be made in writing and shall be deemed to have been duly given when delivered by hand, or mailed first class with postage prepaid to the address(es) set forth below or to such other person or address as the Secretary of the Department of Environmental Protection may designate:

If to the DAQ:
Director
WVDEP
Division of Air Quality
601 57th Street
Charleston, WV 25304-2345

If to the US EPA:
Associate Director
Office of Enforcement and Compliance Assistance
(3AP20)
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

3.5.4. Operating Fee

- 3.5.4.1. In accordance with 45CSR22 – Air Quality Management Fee Program, the permittee shall not operate nor cause to operate the permitted facility or other associated facilities on the same or contiguous sites comprising the plant without first obtaining and having in current effect a Certificate to Operate (CTO). Such Certificate to Operate (CTO) shall be renewed annually, shall be maintained on the premises for which the certificate has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.
- 3.5.4.2. In accordance with 45CSR22 – Air Quality Management Fee Program, enclosed with this permit is an Application for a Certificate to Operate (CTO), from the date of initial startup through the following June 30. Said application and the appropriate fee shall be submitted to this office no later than 30 days prior to the date of initial startup. For any startup date other than July 1, the permittee shall pay a fee or prorated fee in accordance with Section 4.5 of 45CSR22. A copy of this schedule may be found on the reverse side of the Application for a Certificate to Operate (CTO).
- 3.5.5. **Emission inventory.** At such time(s) as the Secretary may designate, the permittee herein shall prepare and submit an emission inventory for the previous year, addressing the emissions from the facility and/or process(es) authorized herein, in accordance with the emission inventory submittal requirements of the Division of Air Quality. After the initial submittal, the Secretary may, based upon the type and quantity of the pollutants emitted, establish a frequency other than on an annual basis.

4.0. Source-Specific Requirements

4.1. Limitations and Standards

- 4.1.1. **Record of Monitoring.** The permittee shall keep records of monitoring information that include the following:
- a. The date, place as defined in this permit, and time of sampling or measurements;
 - b. The date(s) analyses were performed;
 - c. The company or entity that performed the analyses;
 - d. The analytical techniques or methods used;
 - e. The results of the analyses; and
 - f. The operating conditions existing at the time of sampling or measurement.
- 4.1.2. **Minor Source of Hazardous Air Pollutants (HAP).** HAP emissions from the facility shall be less than 10 tons/year of any single HAP and 25 tons/year of any combination of HAPs. Compliance with this Section shall ensure that the facility is a minor HAP source.
- 4.1.3. **Operation and Maintenance of Air Pollution Control Equipment.** The permittee shall, to the extent practicable, install, maintain, and operate the control devices listed in Section 1.1 and associated monitoring equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions, or comply with any more stringent limits set forth in this permit or as set forth by any State rule, Federal regulation, or alternative control plan approved by the Secretary.
[45CSR§13-5.11.]
- 4.1.4. **Record of Malfunctions of Air Pollution Control Equipment.** For the control devices listed in Section 1.1, the permittee shall maintain records of the occurrence and duration of any malfunction or operational shutdown of the air pollution control equipment during which excess emissions occur. For each such case, the following information shall be recorded:
- a. The equipment involved.
 - b. Steps taken to minimize emissions during the event.
 - c. The duration of the event.
 - d. The estimated increase in emissions during the event.

For each such case associated with an equipment malfunction, the additional information shall also be recorded:

- e. The cause of the malfunction.
- f. Steps taken to correct the malfunction.
- g. Any changes or modifications to equipment or procedures that would help prevent future recurrences of the malfunction.

5.0. Source-Specific Requirements (Engine, CE-1)

5.1. Limitations and Standards

- 5.1.1. To demonstrate compliance with Section 5.1.2., the quantity of natural gas that shall be consumed in the 384 bhp natural gas fired reciprocating engine, AJAX DPC-2802 LE shall not exceed 3,448 cubic feet per hour and 30.21×10^6 cubic feet per year.
- 5.1.2. Maximum emissions from the 384 bhp natural gas fired reciprocating engine, Caterpillar G3306 TA (CE-1) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	1.76	7.73
Carbon Monoxide	1.06	4.64
Volatile Organic Compounds	1.06	4.64
Formaldehyde	0.26	1.16

- 5.1.3. Change oil and filter every 4,320 hours of operation or annually, whichever comes first.
- 5.1.4. Inspect spark plugs every 4,320 hours of operation or annually, whichever comes first, and replace as necessary.
- 5.1.5. Inspect all hoses and belts every 4,320 hours of operation or annually, whichever comes first, and replace as necessary.

5.2. Recordkeeping Requirements

- 5.2.1. To demonstrate compliance with sections 5.1-5.4, the permittee shall maintain records of the amount of natural gas consumed in each engine and the hours of operation of each engine. Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.
- 5.2.2. To demonstrate compliance with section 5.1.3. – 5.1.5., the permittee shall maintain records of the maintenance performed on engine CE-1. Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.

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

6.1. Limitations and Standards

- 6.1.1. Maximum Design Heat Input. The maximum design heat input for the Reboiler RBV-1 shall not exceed 0.2 MMBTU/hr.
- 6.1.2. Maximum emissions from the 0.2 MMBTU/hr Reboiler RBV-1 shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	0.02	0.10
Carbon Monoxide	0.02	0.08

- 6.1.3. To demonstrate compliance with Section 6.1.2., the quantity of natural gas that shall be consumed in the 0.2 MMBTU/hr Reboiler RBV-1 shall not exceed 221 cubic feet per hour and 1.94×10^6 cubic feet per year.
- 6.1.4. No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any fuel burning unit which is greater than ten (10) percent opacity based on a six minute block average.
[45CSR§2-3.1.]

6.2. Monitoring Requirements

- 6.2.1. For the purpose of determining compliance with the opacity limits of 45CSR2, the permittee shall conduct visible emission checks and/or opacity monitoring and recordkeeping for the Reboiler RBV-1.

The visible emission check shall determine the presence or absence of visible emissions. At a minimum, the observer must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions. This training may be obtained from written materials found in the References 1 and 2 from 40CFR Part 60, Appendix A, Method 22 or from the lecture portion of the 40CFR Part 60, Appendix A, Method 9 certification course.

Visible emission checks shall be conducted at least once per calendar month with a maximum of forty-five (45) days between consecutive readings. These checks shall be performed at each source for a sufficient time interval, but no less than one (1) minute, to determine if any visible emissions are present. Visible emission checks shall be performed during periods of facility operation and appropriate weather conditions.

If visible emissions are present at a source(s) for three (3) consecutive monthly checks, the permittee shall conduct an opacity reading at that source(s) using the procedures and requirements of Method 9 as soon as practicable, but within seventy-two (72) hours of the final visual emission check. A Method 9 observation at a source(s) restarts the count of the number of consecutive readings with the presence of visible emissions.

6.3. Testing Requirements

- 6.3.1. Compliance with the visible emission requirement of section 6.1.4. shall be determined in accordance with 40 CFR Part 60, Appendix A, Method 9, Method 22, or by using measurements from continuous opacity monitoring systems approved by the Director. The Director may require the installation, calibration, maintenance and operation of continuous opacity monitoring systems and may establish policies for the evaluation of continuous opacity monitoring results and the determination of compliance with the visible emission requirements of section 6.1.3. Continuous opacity monitors shall not be required on fuel burning units which employ wet scrubbing systems for emission control.

6.4. Recordkeeping Requirements

- 6.4.1. To demonstrate compliance with sections 6.1.1., 6.1.2., 6.1.3., the permittee shall maintain records of the amount of natural gas consumed in the 0.2 MMBTU/hr Reboiler RBV-1. Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.
- 6.4.2. The permittee shall maintain records of all monitoring data required by Section 6.2.1. documenting the date and time of each visible emission check, the emission point or equipment/source identification number, the name or means of identification of the observer, the results of the check(s), whether the visible emissions are normal for the process, and, if applicable, all corrective measures taken or planned. The permittee shall also record the general weather conditions (i.e. sunny, approximately 80°F, 6 - 10 mph NE wind) during the visual emission check(s). Should a visible emission observation be required to be performed per the requirements specified in Method 9, the data records of each observation shall be maintained per the requirements of Method 9. Should a visible emission observation be required to be performed per the requirements specified in Method 22, the data records of each observation shall be maintained per the requirements of Method 22.

6.5. Reporting Requirements

- 6.5.1. Any deviation(s) from the allowable visible emission requirement for any emission source discovered during observations using 40CFR Part 60, Appendix A, Method 9 or 22 shall be reported in writing to the Director of the Division of Air Quality as soon as practicable, but in any case within ten (10) calendar days of the occurrence and shall include at least the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.

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

7.1. Limitations and Standards

7.1.1. **Maximum Throughput Limitation.** The maximum wet natural gas throughput to the glycol dehydration unit/still column shall not exceed 7.0 million standard cubic feet per day (MMscf/day). Compliance with the Maximum Throughput Limitation shall be determined using a twelve month rolling total. A twelve month rolling total shall mean the sum of the monthly throughput at any given time during the previous twelve consecutive calendar months.

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

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Volatile Organic Compounds	1.99	8.70
n-Hexane	0.06	0.26
Benzene	0.04	0.17
Toluene	0.06	0.24
Xylenes	0.04	0.18

7.1.3. For purposes of determining potential HAP emissions at production-related facilities, the methods specified in 40 CFR 63, Subpart HH (i.e. excluding compressor engines from HAP PTE) shall be used.

7.1.4. Any source that determines it is not a major source but has actual emissions of 5 tons per year or more of a single HAP, or 12.5 tons per year or more of a combination of HAP (i.e., 50 percent of the major source thresholds), shall update its major source determination within 1 year of the prior determination or October 15, 2012, whichever is later, and each year thereafter, using gas composition data measured during the preceding 12 months.
[40CFR§63.760(c)]

7.1.5. The permittee is exempt from the requirements of 40CFR§63.760(b)(2) if the criteria below is met, except that the records of the determination of these criteria must be maintained as required in 40CFR§63.774(d)(1).

a. The actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram per year (1 ton/yr), as determined by the procedures specified in §63.772(b)(2) of this subpart.
[40CFR§63.764(e)]

7.1.6. At least 85% of the vapors from the flash tank will be sent to reboiler RBV-1 to be used as fuel.

7.2. Monitoring Requirements

7.2.1. The permittee shall monitor the throughput of wet natural gas process stream which flows through the contactor of the TEG dehydration unit on a monthly basis.

7.2.2. In order to demonstrate compliance with the area source status, claimed within sections 7.1.2 and

7.1.3, as well as the benzene exemption provided under section 7.1.5., the following parameters shall be measured at least once quarterly, with the exception of the natural gas flowrate annual daily average, natural gas flowrate maximum design capacity, and wet gas composition, in order to define annual average values or, if monitoring is not practical, some parameters may be assigned default values as listed below.

- a. Natural Gas Flowrate
 - i. Number of hours operated per quarter
 - ii. Quarterly throughput (MMscf/quarter)
 - iii. Annual daily average (MMscf/day), and
 - iv. Maximum design capacity (MMscf/day)
- b. Absorber temperature and pressure
- c. Lean glycol circulation rate
- d. Glycol pump type and maximum design capacity (gpm)
- e. Flash tank temperature and pressure, if applicable
- f. Stripping Gas flow rate, if applicable
- g. Wet gas composition (upstream of the absorber – dehydration column) sampled in accordance with GPA method 2166 and analyzed consistent with GPA extended method 2286 as well as the procedures presented in the GRI-GLYCalc™ Technical Reference User Manual and Handbook V4
- h. Wet gas water content (lbs H₂O/MMscf)
- i. Dry gas water content (lbs H₂O/MMscf) at a point directly after exiting the dehydration column and before any additional separation points

The following operating parameter(s) may be assigned default values when using GRI-GLYCalc:

- a. Dry gas water content can be assumed to be equivalent to pipeline quality at 7 lb H₂O / MMscf
- b. Wet gas water content can be assumed to be saturated
- c. Lean glycol water content if not directly measured may use the default value of 1.5 % water as established by GRI
- d. Lean glycol circulation rate may be estimated using the TEG recirculation ratio of 3 gal TEG / lb H₂O removed.

Note: If you are measuring and using actual wet or dry gas water content, then you should also measure the glycol recirculation rate rather than using the default TEG recirculation ratio. [45CSR§13-5.11, §63.772(b)(2)(i)]

7.3. Testing Requirements

- 7.3.1. The permittee shall determine the composition of the wet natural gas by sampling in accordance with GPA Method 2166 and analyzing according to extended GPA Method 2286 analysis as specified in the GRI-GLYCalc™ V4 Technical Reference User Manual and Handbook. As specified in the handbook, the permittee shall sample the wet gas stream at a location prior to the glycol dehydration contactor column, but after any type of separation device, in accordance with GPA method 2166. The permittee may utilize other equivalent methods provided they are approved in advance by DAQ as part of a testing protocol. If alternative methods are proposed, a test protocol shall be submitted for approval no later than 60 days before the scheduled test date. The initial compliance test must be conducted within 180 days of permit issuance or within 180 days of startup of the glycol dehydration unit, whichever is later.

Note: The DAQ defines a representative wet gas sample to be one that is characteristic of the average gas composition dehydrated throughout a calendar year. If an isolated sample is not indicative of the annual average composition, the permittee may opt to produce a weighted average based on throughput between multiple sampling events, which can be used to define a more representative average annual gas composition profile.

[45CSR§13-5.11]

7.3.2. The following testing and compliance provisions of Part 63 Subpart HH National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities are applicable to the facility:

§ 63.772 Test methods, compliance procedures, and compliance demonstrations.

(b) Determination of glycol dehydration unit flowrate, benzene emissions, or BTEX emissions. The procedures of this paragraph shall be used by an owner or operator to determine glycol dehydration unit natural gas flowrate, benzene emissions, or BTEX emissions.

(2) The determination of actual average benzene emissions or BTEX emissions from a glycol dehydration unit shall be made using the procedures of paragraph (b)(2)(i) of this requirement. Emissions shall be determined either uncontrolled, or with federally enforceable controls in place.

(i) The owner or operator shall determine actual average benzene emissions using the model GRI-GLYCalc™, Version 3.0 or higher, and the procedures presented in the associated GRI-GLYCalc™ Technical Reference Manual. Inputs to the model shall be representative of actual operating conditions of the glycol dehydration unit and may be determined using the procedures documented in Gas Research Institute (GRI) report entitled "Atmospheric Rich/Lean Method for Determining Glycol Dehydrator Emissions" (GRI-95/0368.1).

[§63.772(b)(2)(i)]

7.4. Recordkeeping Requirements

7.4.1. The permittee shall maintain a record of the wet natural gas throughput through the TEG dehydration contactor to demonstrate compliance with section 7.1.1 of this permit. Said records shall be maintained for a period of five (5) years on site or in a readily accessible off-site location maintained by the permittee. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.

7.4.2. For the purpose of documenting compliance with the emission limitations, HAP major source thresholds, as well as the benzene exemption, the permittee shall maintain records of all monitoring data, wet gas sampling, and annual GRI-GLYCalc™ emission estimates. Said records shall be maintained for a period of five (5) years on site or in a readily accessible off-site location maintained by the permittee. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.

[45CSR§13-5.11]

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

8.1. Limitations and Standards

- 8.1.1. The maximum volume of the produced fluids tank T01 shall not exceed 8,820 gallons.
- 8.1.2. The permittee shall not exceed 70,560 gallons per year for truck loading TLO for tank T01. Compliance with the annual throughput limitation shall be determined using a twelve month rolling total. A twelve month rolling total shall mean the sum of the tank throughput at any given time during the previous twelve consecutive months.

8.2. Recordkeeping Requirements

- 8.2.1. To demonstrate compliance with section 8.1.2, the permittee shall maintain a record of the aggregate throughput for tank T01 on a monthly and rolling twelve month total.
- 8.2.2. Documentation that the VOC emission rate is less than 6 tpy per storage vessel including the calculation methodology will be kept at all times, [40CFR60.5420]
- 8.2.3. All records required under Section 8.2 shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.

CERTIFICATION OF DATA ACCURACY

I, the undersigned, hereby certify that, based on information and belief formed after reasonable inquiry, all information contained in the attached _____, representing the period beginning _____ and ending _____, and any supporting documents appended hereto, is true, accurate, and complete.

Signature¹ _____
(please use blue ink) Responsible Official or Authorized Representative Date

Name & Title _____
(please print or type) Name Title

Telephone No. _____ Fax No. _____

- ¹ This form shall be signed by a "Responsible Official." "Responsible Official" means one of the following:
- a. For a corporation: The president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:
 - (i) the facilities employ more than 250 persons or have a gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), or
 - (ii) the delegation of authority to such representative is approved in advance by the Director;
 - b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
 - c. For a municipality, State, Federal, or other public entity: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of U.S. EPA); or
 - d. The designated representative delegated with such authority and approved in advance by the Director.

APPLICATION FEE

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

- As per WV Rule 22 (45CSR22) filed on May 6, 1991, a **minimum fee of \$1,000** must be submitted for each 45CSR13 permit application filed with the WVDEP-DAQ.
 - **Additional charges** may apply, depending on the nature of the application as outlined in Section 3.4.b. of Regulation 22, and shown below:
 - NSPS Requirements: \$1,500 Not Applicable
 - NESHAP Requirements: \$2,500 Not Applicable
 - Total application fee is **\$1,000** [= \$1,000 minimum fee + \$0 additional charges]
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******* End of Application for 45CSR13 NSR Permit *******