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

May 28, 2015
(Via Federal Express)

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

Subject: **Application for 45CSR13 NSR Modification Permit**
Williams Ohio Valley Midstream LLC (OVM)
HAZLET COMPRESSOR STATION (CS)
Glen Dale, Marshall County, West Virginia

Dear Ms. McKeone,

Williams Ohio Valley Midstream LLC (OVM) is submitting an Application for 45CSR13 New Source Review (NSR) Permit to modify the existing Hazlet Compressor Station (CS) located off Markey Lane, approx. 2.2 mi northeast of Glen Dale, in Marshall County, West Virginia.

The existing Cummins GTA855 compressor engine will be replaced with another Cummins GTA855 compressor engine at the site. Although the new engine will result in an emissions decrease and emissions will be below the 45CSR13 permit exemption thresholds, the new engine will be subject to NSPS Subpart JJJJ requirements. Approval to change the engine prior to obtaining a permit modification was granted by Mr. Robert Keatley via e-mail dated May 19, 2015. This approval is contingent upon the submittal of a permit modification application by June 1, 2015. Accordingly, this application for 45CSR13 NSR Modification Permit has been prepared and submitted to request authorization for construction and operation of the facility, as follows:

Emission Units

Unit ID	Point ID	Emission Unit Description	Year Installed	Design Capacity
CE-01	1E	78 bhp Ajax DPC-81 Compressor Engine	2012	78 bhp
CE-02	2E	225 bhp Cummins GTA-855 Compressor Engine	2015	225 bhp
RPC	3E	Rod Packing/Crankcase Leaks	2012	303 bhp (tot)
SSM	4E	Startup/Shutdown/Maintenance (Blowdown (BD))	2012	208 BD/unit/yr
DFT-01	5E	5.0 MMscfd Dehydrator - Flash Tank	2012	5.0 MMscfd
DSV-01	6E	5.0 MMscfd Dehydrator - Regenerator/Still Vent	2012	5.0 MMscfd
RBV-01	7E	0.22 MMBtu/hr Reboiler Vent	2012	0.22 MMBtu/hr
TK-01	8E	Produced Water - Storage Tank	2014	210 bbl
TLO	9E	Produced Water - Truck Load-Out	2014	2,520 bbl/yr
FUG	10E	Piping and Equipment Fugitives	2012	na

(NEW and Modified Units are in Shaded Cells)

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

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

Sincerely,

R. Danell Zawaski, PE
Environmental Specialist

Enclosures:

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

APPLICATION FOR 45CSR13
NEW SOURCE REVIEW (NSR) MODIFICATION PERMIT

For the:

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Glen Dale, Marshall County, West Virginia

Submitted to:

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

Submitted by:

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

Prepared by:

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

May 2015

APPLICATION FOR
NEW SOURCE REVIEW (NSR) MODIFICATION PERMIT

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Glen Dale, Marshall County, West Virginia

TABLE OF CONTENTS

APPLICATION FOR 45CSR13 NSR MODIFICATION PERMIT

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):*
HAZLET COMPRESSOR STATIONS (CS)

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

5A. Applicant's mailing address:
PARK PLACE CORPORATE CENTER 2
2000 COMMERCE DRIVE, PITTSBURGH, PA 15275

5B. Facility's present physical address:
1078 MARKEY LN
GLEN DALE, MARSHALL COUNTY, WV 26033

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

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

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**
– If **YES,** please explain: **APPLICANT OWNS THE COMPRESSOR STATION (CS)**
– If **NO,** you are not eligible for a permit for this source.

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

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

11A. DAQ Plant ID No. (existing facilities):
051-00163

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (existing facilities):
R13-3209

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**.

DIRECTIONS FROM WHEELING AVE IN GLEN DALE:
A. HEAD EAST ONTO 6TH ST ~0.2 MI;
B. CONTINUE ONTO WV-86/GRANDVIEW RD ~ 2.6 MI;
C. TURN RIGHT ONTO WV-10/MARKEY LN ~0.3 MI;
D. STAY STRAIGHT ONTO ACCESS ROAD ~ 0.2 MI;
E. ENTRANCE TO SITE STRAIGHT AHEAD.

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): **1078 MAKEY LN**	12C. Nearest city or town: **GLEN DALE**	12D. County: **MARSHALL**
12.E. UTM Northing (KM): **4,423.53 KM NORTHING**	12F. UTM Easting (KM): **524.18 km EASTING**	12G. UTM Zone: **17S**

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

REPLACE ONE (1) EXISTING 225 BHP CUMMINS GTA-855 COMPRESSOR ENGINE (NESHAP ZZZZ AFFECTED UNIT) WITH ONE NEW 225 BHP CUMMINS GTA-855 COMPRESSOR ENGINE (NSPS JJJJ AFFECTED UNIT). ALSO ACCOUNT FOR FUGITIVE EMISSIONS FROM PIPELINE COMPONENTS IN WATER/OIL SERVICE.

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: **05/22/15 (per approval from WVDEP e-mail dated 05/19/15)**

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

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

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

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

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

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

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

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

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

☒ Bulk Liquid Transfer Operations **(TLO)**	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ Storage Tanks **(TK-01)**
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ **General Emission Unit, specify:**

COMPRESSOR/GENERATOR ENGINE – 78 BHP ARROW VRG-330-A-54 COMPRESSOR ENGINE (CE-01)
COMPRESSOR/GENERATOR ENGINE – 225 BHP CUMMINS GTA-855 COMPRESSOR ENGINE (CE-02)
DEHYDRATOR – 5.0 MMSCFD W/ FLASH TANK, REGEN/STILL VENT, AND REBOILER (DFT-01, DSV-01, RBV-01)

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

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

☐ **Absorption Systems**	☐ **Baghouse**	☐ **Flare**
☐ **Adsorption Systems**	☐ **Condenser**	☐ **Mechanical Collector**
☐ **Afterburner**	☐ **Electrostatic Precipitator**	☐ **Wet Collecting System**

☒ **Other Collectors, specify:**

Non-Selective Catalytic Reduction (NSCR)

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

Submit completed and signed Authority Form as Attachment R.

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

35A. Certification of Information. To certify this permit application, a Responsible Official (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: 5/21/2015 *(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**	36F. FAX: **(304) 843-3131**
36A. Printed name of contact person: **R. DANELL ZAWASKI, PE**	36B. Title: **ENVIRONMENTAL SPECIALIST**	
36C. E-mail: **DANELL.ZAWASKI@WILLIAMS.COM**	36D. Phone: **(412) 787-4259**	36E. FAX: **(412) 787-6002**

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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

ATTACHMENT A

Business Certificate

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

- Certificate of Amendment to the Certificate of Authority

  From: CAIMAN EASTERN MIDSTREAM, LLC

  To: WILLIAMS OHIO VALLEY MIDSTREAM LLC

  Date: May 15, 2012

- Certificate of Authority of a Foreign Limited Liability Company

  To: CAIMAN EASTERN MIDSTREAM, LLC

  Date: September 11, 2009

State of West Virginia

Certificate

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

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

CAIMAN EASTERN MIDSTREAM, LLC

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

CERTIFICATE OF AMENDMENT TO THE CERTIFICATE OF AUTHORITY

changing the name of the limited liability company to

WILLIAMS OHIO VALLEY MIDSTREAM LLC

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

Natalie E Tennant

Secretary of State

State of West Virginia

Certificate

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

CAIMAN EASTERN MIDSTREAM, LLC

Control Number: 99GIS

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

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

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

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

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

Natalie E Tennant

Secretary of State

ATTACHMENT B

Location/Topographic Map

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

Address:

Markey Lane (WV-10)
Glen Dale, WV 26038

Latitude and Longitude:

39°57'41.5" North x -80°43'01.0" West
(39.9615° N x -80.7169°W)

UTM:

524.18 km Easting x 4,423.53 km Northing x Zone: 17S

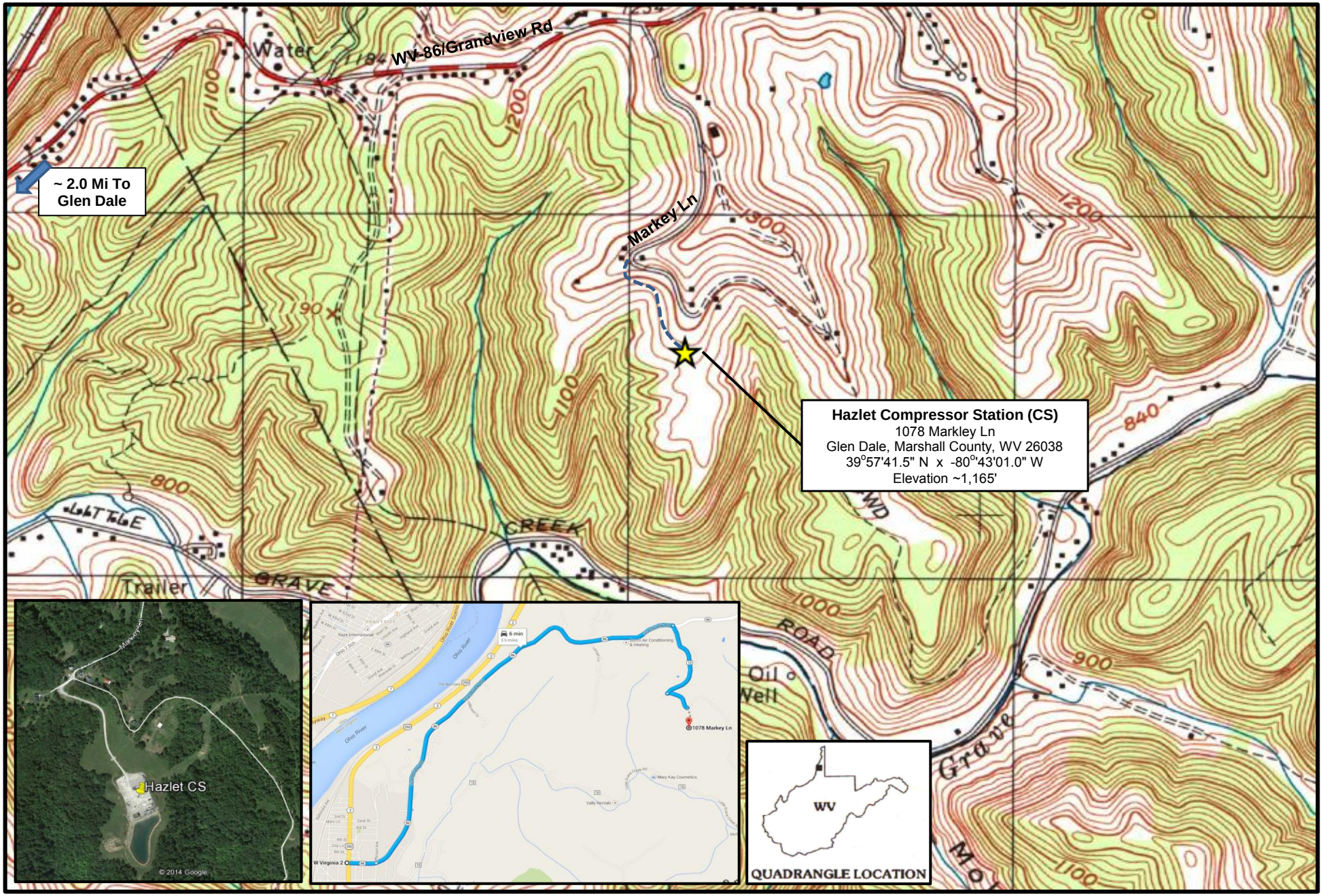
Directions:

From Wheeling Ave in Glen Dale:

a. **Head east onto 6th St ~0.2 mi;**
b. **Continue onto WV-86/Grandview Rd ~ 2.6 mi;**
c. **Turn right onto WV-10/Markey Ln ~0.3 mi;**
d. **Stay straight onto access road ~ 0.2 mi;**
e. **Entrance to site straight ahead.**

- USGS - 7.5 Minute Topographic – Moundsville, WV-OH

Attachment B - Location/Topographic 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 Hazlet CS is an existing operation, including:
    - One (1) 78 bhp Ajax DPC-81 Compressor Engine (CE-01)
        - Rod Packing and Crankcase Emissions (RPC)
        - Startup/Shutdown/Maintenance Emissions (SSM)
    - One (1) 225 bhp Cummins GTA-855 Compressor Engine (CE-02)
        - Rod Packing and Crankcase Emissions (RPC)
        - Startup/Shutdown/Maintenance Emissions (SSM)
    - One 5.0 MMscfd TEG Dehydrator (DFT-01 and DSV-01)
    - One (1) 0.22 MMBtu/hr Reboiler (RBV-01)
    - One (1) 210 bbl Produced Water Storage Tank (TK-01)
    - Produced Water Truck Load-out (TLO)
    - Fugitive Emissions from Piping and Equipment (FUG)

- OVM proposes to replace the existing Cummins GTA-855 compressor engine with a different Cummins GTA-855 compressor engine:

- The new Cummins GTA-855 is anticipated to be installed on May 22, 2015. Approval to change the engine prior to obtaining a permit modification was granted by Mr. Robert Keatley via e-mail dated May 19, 2015 (see following page). This approval is contingent upon the submittal of a permit modification application by June 1, 2015.

From: Keatley, Robert L [mailto:Robert.L.Keatley@wv.gov]
Sent: Tuesday, May 19, 2015 9:20 AM
To: Zawaski, Danell
Cc: McKeone, Beverly D; Durham, Shanda; Fernald, Don; Adkins, Jesse D; Jarrett, James F; Carey, Angela E; Weisenborn, Eric P
Subject: RE: Snyder and Hazlet Engines

Danell,

The DAQ has reviewed your request for a like-kind engine (225 hp) replacement at both Snyder and Hazlet locations prior to obtaining a permit modification. The DAQ approves your request as long as Williams submits permit modification applications by June 1, 2015 and updates the associated permits timely. If you have any questions, please contact myself. Thanks

Rob

Robert Keatley, PE
Senior Engineer
Supervisor, Compliance and Enforcement
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
Direct (304) 926-0499 ext. 1695 | **Fax** (304) 926-0479
e-mail: Robert.L.Keatley@wv.gov
west virginia department of environmental protection
"Promoting a healthy environment"

From: Zawaski, Danell [mailto:Danell.Zawaski@williams.com]
Sent: Thursday, May 14, 2015 11:01 AM
To: Keatley, Robert L
Cc: McKeone, Beverly D; Durham, Shanda; Fernald, Don
Subject: Snyder and Hazlet Engines

Hi Robert,

The Cummins GTA 855 engines have been installed at our Snyder and Hazlet compressor stations in accordance with Permits R13-3210 and R13-3209. We have found that the units will not work and have been unable to keep the engines running for any length of time. We need to get this problem corrected quickly and the fastest way to do this is to replace the units completely. We have identified two like-kind engines that are the same make and model that should work. The difference is that the replacement engines are newly manufactured units and would be subject to NSPS JJJJ. The existing engines are not subject to NSPS JJJJ. Since the replacement engines are subject to NSPS JJJJ they would require a catalyst and have significantly lower emissions than the current engines. Pedigrees for the replacement engines and existing engines are attached.

New Engines
Pedigree 6736
Pedigree 6737

Old Engines
Pedigree 5102
Pedigree 5103

We understand that this change may require a permit modification and have started working on the permit application. We would like permission to install the new engines before the permit modification is issued by WVDEP. Thank you for your consideration.

Regards,
Danell

R. Danell Zawaski, PE
Environmental Specialist
NEGP Environmental Services
304-843-3133 Moundsville
412/787-4259 Pittsburgh
505/787-7926 cell
412/787-6002 fax
Danell.zawaski@williams.com

ATTACHMENT D

Regulatory Discussion

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

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

Attachment D
Regulatory Discussion

Williams Ohio Valley Midstream LLC (OVM)
HAZLET COMPRESSOR STATION (CS)
Application for 45CSR13 NSR Modification Permit

A. Applicability of New Source Review (NSR) Regulations

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

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

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

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

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

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

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

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

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

4. Title V Operating Permit (TVOP) [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 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)).

2. 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)).

3. NSPS GG, Stationary Gas Turbines

40CFR§60.330-§60.335 [Not Applicable]

This rule does not apply because there is no stationary gas turbine at the facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired (§60.330).

4. NSPS KKK, Leaks from Natural Gas Processing Plants

40CFR§60.630-§60.636 [Not Applicable]

This rule does not apply because the affected portion of the facility will commence construction after August 23, 2011 (§60.630(b)).

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

40CFR§60.640-§60.648 [Not Applicable]

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

6. NSPS IIII, Compression Ignition Reciprocating Internal Combustion Engines

40CFR§60.4200-§60.4219 [Not Applicable]

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

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

40CFR§60.4230-§60.4248 [Applicable]

This rule does not apply to the existing 78 bhp Ajax DPC-81 Compressor Engine (CE-01) because the maximum engine power is less than 500 HP and the manufacture date of the engine is prior to 07/01/08 (§60.4230(a)(4)(iii)). This rule does apply to the NEW 225 bhp Cummins GTA-855 Compressor Engine (CE-02) because the maximum engine power is less than 500 HP and the manufacture date of the engine is after 07/01/08 (§60.4230(a)(4)(iii)).

8. NSPS KKKK, Stationary Combustion Turbines

40CFR§60.4300-§60.4420 [Not Applicable]

This rule does not apply because there is no stationary combustion turbine at the facility with a heat input at peak load equal to or greater than 10.7 gigajoules (10 MMBtu) per hour, based on the higher heating value of the fuel (§60.4305).

9. NSPS OOOO, Crude Oil and Natural Gas Production

40CFR§60.5360-§60.5430 [Applicable]

This rule does not apply to the reciprocating compressor driven by CE-01 because it commenced construction before 08/23/11 (§60.5360 and §60.5365(c)). This rule does apply to the reciprocating compressor driven by CE-02 because it commenced construction after 08/23/11 (§60.5360 and §60.5365(c)).

This rule does not apply to the produced water storage tank (TK-01) because it does not have the potential to emit > 6 tpy of VOC (§60.5365(d)(3)(e)). However, there is a requirement to maintain documentation that the VOC emission rate is < 6 tpy per tank (§60.5420(b)(6)(ii) and (c)(5)(ii)).

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)).

10. NESHAP HH, Oil and Natural Gas Production Facilities

40CFR§63.760-§63.779 [Applicable]

This rule does apply to the triethylene glycol (TEG) dehydrator (DFT-01 and DSV-01). However, because the TEG dehydrator will have an actual annual average benzene emissions < 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.

11. NESHAP HHH, Natural Gas Transmission and Storage Facilities

40CFR§63.1270-§63.1289 [Not Applicable]

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

12. NESHAP YYYY, Stationary Combustion Turbines

40CFR§63.6080-§63.6175 [Not Applicable]

This rule does not apply because the facility is not a major HAP source (§63.6085).

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

40CFR§63.6580-§63.6675 [Applicable]

This rule does apply to the existing 78 bhp Ajax DPC-81 Compressor Engine (CE-01). Requirements include changing oil/filter, and inspecting/replacing spark plugs and hoses/belts on a specified schedule; and the development and implementation of a maintenance plan. Note: There are no emission limitations, no initial or subsequent performance test requirements, and no monitoring, notification, or reporting requirements.

This rule does apply to the NEW 225 bhp Cummins GTA-855 Compressor Engine (CE-02), however; because it is "new" (i.e., construction or reconstruction commenced on or after 06/12/06); the only requirement is compliance with NSPS JJJJ for Spark Ignition Internal Combustion Engines (§63.6590(a)(2)(iii)).

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

40CFR§63.7480 – §63.7575 [Not Applicable]

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

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

40CFR§63.11193 – §63.11237 [Not Applicable]

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

16. Chemical Accident Prevention Provisions

40CFR§68.1-§68.220 [Not Applicable]

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

17. Mandatory Greenhouse Gases (GHG) Reporting

40CFR§98.1-§98.9 [Not Applicable]

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

C. Applicability of Source Aggregation

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

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

i) Same Industrial Grouping

The subject facility will operate under SIC code 1321 (Natural Gas Liquids Extraction). The upstream gas production wells will operate under SIC code 1311 (Crude Petroleum and Natural Gas). Therefore, the subject facility shares the same two-digit major SIC code of 13 as the upstream gas production wells.

ii) Contiguous or Adjacent

The determination of whether two or more facilities are "contiguous" or "adjacent" is made on a case-by-case basis. This determination is proximity based, and it is important to focus on this criteria and whether it meets 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" or place any definitive restrictions on how distant two emission units can be and still be considered located on contiguous or adjacent properties for the purposes of a single source determination. 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 subject facility will be located in close proximity to the upstream production wells and will process gas produced by these and other production wells. However, the location of the subject facility was chosen because of suitable characteristics for construction, 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 wells to operate properly. The subject facility could have been located further from the upstream production wells had suitable land been available and could theoretically be moved further from the wells. Therefore, despite the fact that the subject facility is located in close proximity to the upstream production wells, aggregation with the production 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 McClain Compressor Station (CS), which is located approximately 2.6 miles away. The production wells 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 any production well that may send natural gas to the subject facility.

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

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

Summary

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

D. Applicability of State Regulations

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

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

   This rule does apply, however, because the dehydrator reboiler (RBV-01) has 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 there are no “fuel burning units” at the facility w/ a Maximum Design Heat Input (MDHI) rating > 10 MMBtu/hr.

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

   This rule does apply. Williams OVM has published the required Class I legal advertisement notifying the public of their permit application, and paid the appropriate application fee.

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

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

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

   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.

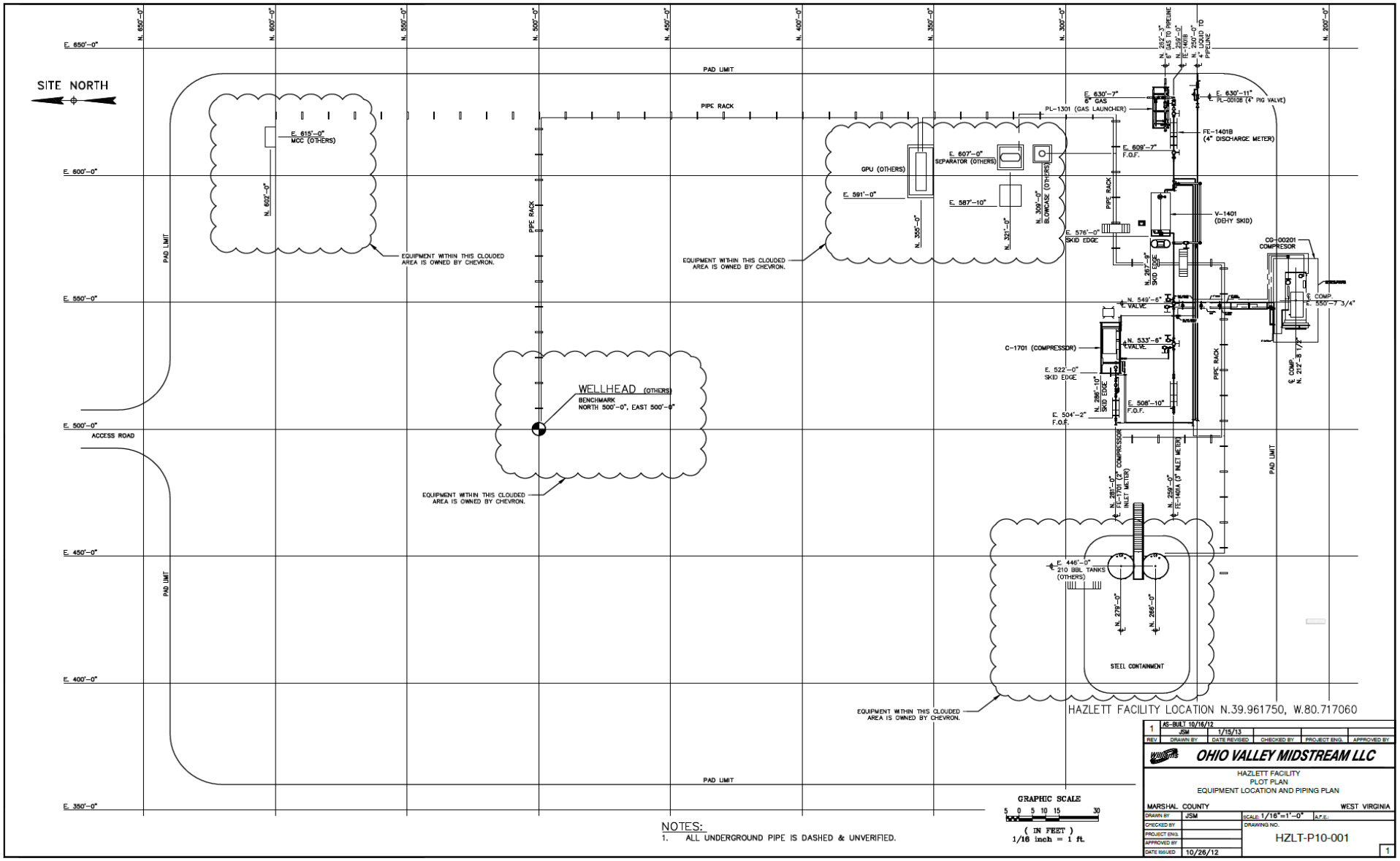
ATTACHMENT E

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 – OVM Hazlet CS

Attachment E - Plot Plan



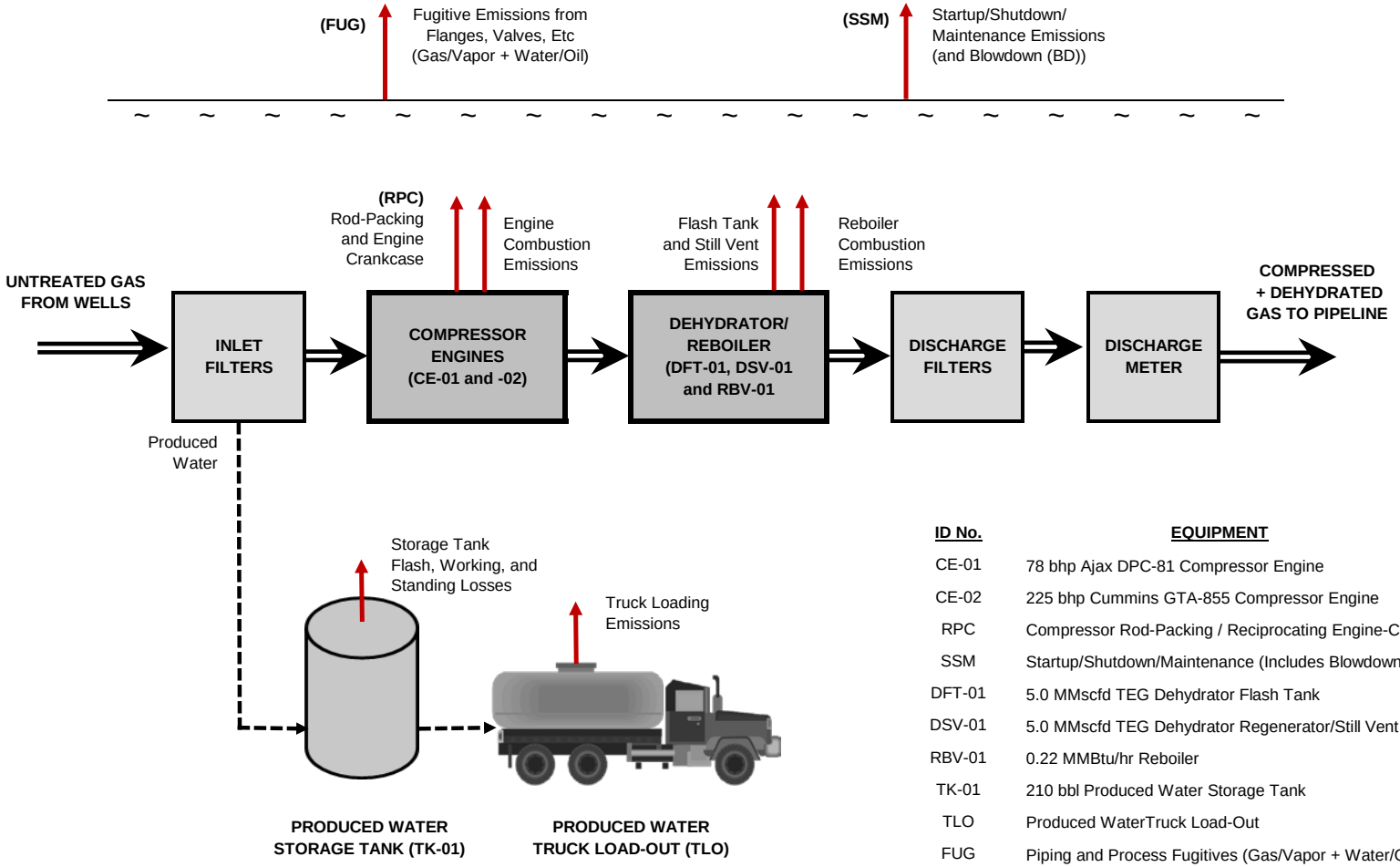
ATTACHMENT F

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)

Process Flow Diagram (PFD)



ID No.	EQUIPMENT
CE-01	78 bhp Ajax DPC-81 Compressor Engine
CE-02	225 bhp Cummins GTA-855 Compressor Engine
RPC	Compressor Rod-Packing / Reciprocating Engine-Crankcase
SSM	Startup/Shutdown/Maintenance (Includes Blowdown)
DFT-01	5.0 MMscfd TEG Dehydrator Flash Tank
DSV-01	5.0 MMscfd TEG Dehydrator Regenerator/Still Vent
RBV-01	0.22 MMBtu/hr Reboiler
TK-01	210 bbl Produced Water Storage Tank
TLO	Produced WaterTruck Load-Out
FUG	Piping and Process Fugitives (Gas/Vapor + Water/Oil)

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 Engines (CE-01 and -02) (1E and 2E)
  C. Rod Packing/Crankcase Leaks (RPC) (3E)
  D. Startup/Shutdown/Maintenance (SSM) (4E)
  E. Tri-Ethylene Glycol (TEG) Dehydrator (DFT-01 and DSV-01) (5E and 6E)
  F. Reboilers (RBV-01) (7E)
  G. Produced Water Storage Tank (TK-01) (8E)
  H. Produced Water Truck Load-Out (TLO) (9E)
  I. Fugitive Emissions (FUG) (10E)

ATTACHMENT G
Process Description

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Application for 45CSR13 Modification Permit

A. Project Overview

Williams Ohio Valley Midstream, LLC (OVM) is proposing to replace the existing Cummins GTA-855 compressor engine (CE-02) with a different Cummins GTA-855 compressor engine at the existing Hazlet Compressor Station (CS), near Glen Dale, in Marshall County, West Virginia. (See Appendix B – Location/Topographic Map). Although the modification will not result in potential emissions exceeding the permit exemption thresholds provided in 45CSR13, the new engine will be subject to NSPS Subpart JJJJ requiring a permit modification.

B. Compressor Engines (CE-01 and -02) (1E and 2E)

One (1) existing 78 bhp Ajax DPC-81 Natural Gas-fueled Compressor Engine and One (1) NEW 225 bhp Cummins GTA-855 Natural Gas-fueled Compressor Engine will be utilized at the facility.

C. Rod Packing and Crankcase Leaks (RPC) (3E)

The Compressor Rod Packing and Engine Crankcase (RPC) generate emissions from mechanical joints, seals, and rotating surfaces.

D. Startup/Shutdown/Maintenance (SSM) (4E)

During routine operation of the facility the compressor engines will undergo periods of startup and shutdown. Often when the engines are 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.

E. Tri-Ethylene Glycol (TEG) Dehydrator (DFT-01 and DSV-02) (5E and 6E)

One (1) Tri-Ethylene Glycol (TEG) Dehydrator is utilized at the facility. The dehydrator is comprised of a Contactor/Absorber Tower (no vented emissions), Flash Tank (DFT-01), and Regenerator/Still Vent (DSV-01).

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. 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.

F. Reboiler (RBV-01) (7E)

One (1) 0.22 MMBtu/hr Reboiler (RBV-01) is utilized to supply heat for the Tri-Ethylene Glycol (TEG) Regeneration/Still (DSV-01).

G. Produced Water/Condensate Storage Tank (TK-01) (8E)

The 210 bbl Produced Water Tank (TK-01) receives liquids from the inlet filter. The inlet separator removes entrained fluids (primarily water) and these liquids are also sent to the atmospheric storage tank.

A HYSYS process simulation was completed, indicating that there are negligible flash gas emissions. A natural gas blanket will be used on the produced water tank to prevent air from entering the tank and causing an explosion.

H. Produced Water/Condensate Truck Load-Out (TLO) (9E)

Loading of Produced Water into tanker trucks (TLO) will produce small quantities of VOC emissions.

I. Fugitive Emissions (FUG) (10E)

During routine operation of the facility there will be leaks from process piping components such as valves, flanges, connectors, etc. Leaks from the process piping components results in VOC and HAP emissions to the atmosphere.

ATTACHMENT H

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

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

- INLET GAS ANALYSIS SUMMARY
- INLET GAS CERTIFICATE OF ANALYSIS
- MATERIAL SAFETY DATA SHEETS (MSDS):
  – Natural Gas
  – Tri-Ethylene Glycol (TEG)
  – Lube Oil
  – Produced Water

ATTACHMENT H - Gas Analysis Summary

Gas Analysis for Hazlet Master - Sampled 07/02/13

Component	Formula	Molecular Weight (MW)	Mole % (M%)	Mole Fraction (M%/Sum-M%)	Weighted Sum (MW*MF)	Weight % (WS/Sum-WS)	lb/MMscf (WS/UGC#)
Nitrogen	N2	32.00	0.59860	0.005986	0.1915	0.895	504.76
Hydrogen Sulfide	H2S	34.08	0.00000	0.000000	0.0000	0.000	0.00
Carbon Dioxide	CO2	44.01	0.12130	0.001213	0.0534	0.249	140.68
Methane*	CH4	16.04	73.37540	0.733762	11.7714	54.984	31,019.53
Ethane*	C2H6	30.07	17.73700	0.177372	5.3334	24.912	14,054.44
Propane**	C3H8	44.10	5.90320	0.059033	2.6031	12.159	6,859.57
i-Butane**	C4H10	58.12	0.42660	0.004266	0.2480	1.158	653.40
n-Butane**	C4H10	58.12	1.19890	0.011989	0.6968	3.255	1,836.28
Cyclopentane**	C5H10	70.13	0.00000	0.000000	0.0000	0.000	0.00
i-Pentane**	C5H12	72.15	0.15890	0.001589	0.1146	0.536	302.11
n-Pentane**	C5H12	72.15	0.23780	0.002378	0.1716	0.801	452.12
Cyclohexane**	C6H12	84.16	0.01450	0.000145	0.0122	0.057	32.16
Other Hexanes**	C6H14	86.18	0.06440	0.000644	0.0555	0.259	146.25
Heptanes**	C7H16	100.20	0.04985	0.000499	0.0500	0.233	131.63
Methylcyclohexane**	C7H14	98.19	0.00950	0.000095	0.0093	0.044	24.58
C8+ Heavies**	C8H18	114.23	0.02990	0.000299	0.0342	0.160	90.00
n-Hexane***	C6H14	86.18	0.06520	0.000652	0.0562	0.262	148.06
Benzene***	C6H6	78.11	0.00090	0.000009	0.0007	0.003	1.85
Toluene***	C7H8	92.14	0.00210	0.000021	0.0019	0.009	5.10
Ethylbenzene***	C8H10	106.17	0.00005	0.000001	0.0001	0.000	0.14
Xylenes***	C8H10	106.17	0.00470	0.000047	0.0050	0.023	13.15
2,2,4-Trimethylpentane***	C8H18	114.23	0.00005	0.000001	0.0001	0.000	0.15
Totals:			**100.00**	**1.000**	**21.41**	**100.00**	**56,416**
Total VOC:			**8.17**	**0.08**	**4.06**	**18.96**	**10,697**
Total HAP:			**0.07**	**0.001**	**0.06**	**0.30**	**168**

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

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

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

Component	Formula	Representative Gas Analysis			Assumed "Worst-Case" Gas Analysis		
		Mole %	Wgt %	lb/MMscf	Mole %	Wgt %	lb/MMscf
Carbon Dioxide	CO2	0.12	0.25	141	0.15	0.30	170
Methane	CH4	73.38	54.98	31,020	100.00	100.00	42,275
VOC	C3 thru C10+	8.17	18.96	10,697	9.85	22.87	12,900
n-Hexane	C6H14	0.0652	0.2624	148.06	0.0793	0.3191	180
Benzene	C6H6	0.0009	0.0033	1.85	0.0024	0.0089	5
Toluene	C7H8	0.0021	0.0090	5.10	0.0041	0.0177	10
Ethylbenzene	C8H10	0.0001	0.0002	0.14	0.0018	0.0089	5
Xylenes	C8H10	0.0047	0.0233	13.15	0.0071	0.0355	20
2,2,4-Trimethylpentane	C8H18	0.0001	0.0003	0.15	0.0017	0.0089	5
Total HAP	C6 thru C8	0.0730	0.2986	168.45	0.0964	0.3988	225

ATTACHMENT Hb - Extended Gas Analysis

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

Customer	: 2259 - WILLIAMS	**Date Sampled**	: 07/02/2013
Station ID	: 52036-50	**Date Analyzed**	: 07/11/2013
Cylinder ID	: W1101	**Effective Date**	: 08/01/2013
Producer	:	**Cyl Pressure**	: 780
Lease	: HAZLETT MASTER	**Temp**	: 75
Area	: 500 - OHIO VALLEY MID	**Cylinder Type**	: Spot
State	: WV	**Sample By**	: JR

COMPONENT	MOL%	GPM@14.73(PSIA)
Oxygen	0.0000	0.000
Nitrogen	0.5986	0.000
Methane	73.3754	0.000
Carbon-Dioxide	0.1213	0.000
Ethane	17.7370	4.760
Propane	5.9032	1.632
Iso-Butane	0.4266	0.140
Normal-Butane	1.1989	0.379
Iso-Pentane	0.1589	0.058
Normal-Pentane	0.2378	0.087
2,2-Dimethylbutane	0.0021	0.001
2,3-Dimethylbutane/CycloC5	0.0071	0.002
2-methylpentane	0.0354	0.015
3-methylpentane	0.0198	0.008
Normal-Hexane	0.0652	0.027
2,2-Dimethylpentane	0.0003	0.000
Methylcyclopentane	0.0076	0.003
BENZENE	0.0009	0.000
3,3-Dimethylpentane	0.0000	0.000
CYCLOHEXANE	0.0069	0.002
2-Methylhexane	0.0140	0.007
2,3-Dimethylpentane	0.0021	0.001
3-Methylhexane	0.0101	0.005
1,t2-DMCYC5 / 2,2,4-TMC5	0.0003	0.000
1,t3-Dimethylcyclopentane	0.0002	0.000
N-Heptane	0.0233	0.011
METHYLCYCLOHEXANE	0.0095	0.004
2,5-Dimethylhexane	0.0006	0.000
2,3-Dimethylhexane	0.0009	0.000
M-XYLENE/P-XYLENE	0.0000	0.000
TOLUENE	0.0021	0.001
2-Methylheptane	0.0045	0.002
4-Methylheptane	0.0019	0.001
3-Methylheptane	0.0030	0.002
1,t4-Dimethylcyclohexane	0.0019	0.001
N-OCTANE / 1,T2-DMCYC6	0.0080	0.004
1,t3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0013	0.001
2,4,4 TMC6	0.0006	0.000
2,6-Dimethylheptane / 1,C2-DMCYC6	0.0003	0.000
Ethylcyclohexane	0.0007	0.000
ETHYLBENZENE	0.0000	0.000
M-XYLENE	0.0027	0.001
P-XYLENE	0.0018	0.001
O-XYLENE	0.0002	0.000
NONANE	0.0035	0.002
N-DECANE	0.0026	0.002
N-UNDECANE	0.0009	0.001
TOTAL	**100.0000**	**7.161**

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9962 **C5+ GPM** : 0.14482

Ideal Gravity: 0.7384 **Real Gravity:** 0.7409 **C5+ Mole %** : 0.3967

BTU @ (PSIA)	@14.65	@14.696	@14.73	@15.025

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Revision Date: 10/02/2013 Version: 1.0

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

Product Identifier

Product Form: Mixture

Product Name: Wellhead Natural Gas

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

Intended Use of the Product

Use of the Substance/Mixture: Fuel.

Name, Address, and Telephone of the Responsible Party

Company

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

Emergency Telephone Number

Emergency number : 800-424-9300

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

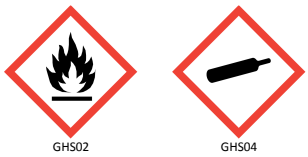
Classification (GHS-US)

Simple Asphy
Flam. Gas 1 H220
Compressed gas H280

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US) :



GHS02 GHS04

Signal Word (GHS-US) : Danger

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

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

Other Hazards

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

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

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

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

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

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

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

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

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

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

Most Important Symptoms and Effects Both Acute and Delayed

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

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

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

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

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

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

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing Media

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

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

Special Hazards Arising From the Substance or Mixture

Fire Hazard: Extremely flammable gas

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

Reactivity: Hazardous reactions will not occur under normal conditions.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire

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

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

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

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

Reference to Other Sections

Refer to section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

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

For Non-Emergency Personnel

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

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

Environmental Precautions

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

Methods and Material for Containment and Cleaning Up

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

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

Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

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

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

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

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

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

Conditions for Safe Storage, Including Any Incompatibilities Not available

Specific End Use(s)

Fuel.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

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

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

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

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

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

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

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

Nitrogen (7727-37-9)		

Methane (74-82-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
British Columbia	OEL TWA (ppm)	1000 ppm
Manitoba	OEL TWA (ppm)	1000 ppm
Newfoundland & Labrador	OEL TWA (ppm)	1000 ppm
Nova Scotia	OEL TWA (ppm)	1000 ppm
Ontario	OEL TWA (ppm)	1000 ppm
Prince Edward Island	OEL TWA (ppm)	1000 ppm
Saskatchewan	OEL STEL (ppm)	1250 ppm
Saskatchewan	OEL TWA (ppm)	1000 ppm

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

Exposure Controls

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

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

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

Hand Protection: Wear chemically resistant protective gloves.Insulated gloves

Eye Protection: Chemical goggles or face shield.

Skin and Body Protection: Not available

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

Thermal Hazard Protection: Wear suitable protective clothing.

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

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State : Gas

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

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions.

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

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

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

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

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

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity : Not classified

LD50 and LC50 Data Not available

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

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

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

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

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

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data

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

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

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

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

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

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

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

Persistence and Degradability

Wellhead Natural Gas	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Wellhead Natural Gas	
Bioaccumulative Potential	Not established.

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

Propane (74-98-6)	
Log Pow	2.3

Butane (106-97-8)	
Log Pow	2.89

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

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

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Mobility in Soil Not available

Other Adverse Effects

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

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

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

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

SECTION 14: TRANSPORT INFORMATION

In Accordance With ICAO/IATA/DOT/TDG

UN Number

UN-No.(DOT): 1971

DOT NA no.: UN1971

UN Proper Shipping Name

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

Hazard Labels (DOT) : 2.1 - Flammable gases

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

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

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

Additional Information

Emergency Response Guide (ERG) Number : 115

Transport by sea

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

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

Air transport

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

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

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

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

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

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

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

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

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

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

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

US State Regulations

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

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

Propane (74-98-6)

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

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

Butane (106-97-8)

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

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

Carbon dioxide (124-38-9)

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

Nitrogen (7727-37-9)

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

Methane (74-82-8)

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

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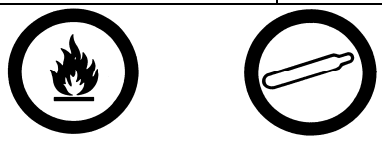
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Excluded Volatile Organic Compounds
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New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

Ethane (74-84-0)

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

Canadian Regulations

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



Hydrogen sulfide (7783-06-4)

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

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

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

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

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

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

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

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

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

SECTION 16: OTHER INFORMATION

Revision date : 10/02/2013

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

GHS Full Text Phrases:

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

Party Responsible for the Preparation of This Document

Wellhead Natural Gas

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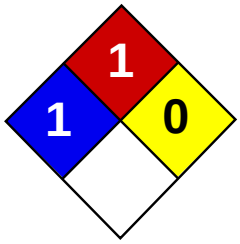
Williams, Inc.
One Williams Center
Tulsa, OK 74172, US
800-688-7507

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

North America GHS US 2012 & WHMIS

ScienceLab.com
Chemicals & Laboratory Equipment



Health	1
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
Triethylene glycol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Triethylene glycol

Catalog Codes: SLT2644

CAS#: 112-27-6

RTECS: YE4550000

TSCA: TSCA 8(b) inventory: Triethylene glycol

CI#: Not available.

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

Chemical Formula: C6H14O4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

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

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

Section 3: Hazards Identification

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

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

Section 4: First Aid Measures

Eye Contact:

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

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

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

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

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

Flammable Limits: LOWER: 0.9% UPPER: 9.2%

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

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

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

Section 7: Handling and Storage

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

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

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

Personal Protection: Splash goggles. Lab coat.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 150.18 g/mole

Color: Colorless.

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

Boiling Point: 285°C (545°F)

Melting Point: -5°C (23°F)

Critical Temperature: Not available.

Specific Gravity: 1.1274 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 5.17 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Ingestion.

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

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

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Slightly hazardous in case of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

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

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Triethylene glycol TSCA 8(b) inventory: Triethylene glycol

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

Other Classifications:

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

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

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

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

Health: 1

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable. Lab coat. Not applicable. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:31 PM

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

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Lubricating Oil FM 32, 46, 68

Product Use: Industrial Oil
Product Number(s): CPS232103, CPS255110, CPS255150
Company Identification
Chevron Products Company
a division of Chevron U.S.A. Inc.
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@chevron.com
Product Information: (800) LUBE TEK

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
White mineral oil	8042-47-5	90 - 100 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory

irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).
FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 192 °C (378 °F) Minimum
Autoignition: No data available
Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Neoprene, Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required. If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Country/ Agency	TWA	STEL	Ceiling	Notation
White mineral oil	ACGIH	5 mg/m3	10 mg/m3	--	--

Consult local authorities for appropriate values.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315°C (599°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Density: 0.867 kg/l @ 15.6°C (60.1°F) (Typical)
Viscosity: 61.2 cSt @ 40°C (104°F) Minimum
Evaporation Rate: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
This material is not expected to be harmful to aquatic organisms. The ecotoxicity hazard is based on an evaluation of data for the components or a similar material.

ENVIRONMENTAL FATE
Ready Biodegradability: This material is not expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO TI OR IATA DGR

SECTION 15 REGULATORY INFORMATION

REGULATORY LISTS SEARCHED:
01-1=IARC Group 1
01-2A=IARC Group 2A
01-2B=IARC Group 2B

The following components of this material are found on the regulatory lists indicated.
White mineral oil 01-1

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

EU RISK AND SAFETY PHRASES: S61: Avoid release to the environment. Refer to special instructions/Safety data sheets.

WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled

Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 0 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : INDUSTRIAL OIL 1 - IND1

REVISION STATEMENT: This is a new Material Safety Data Sheet.
Revision Date: OCTOBER 28, 2010

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the International Standard (ISO 11014-1) & (NBR 14725) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

SECTION 1 – MATERIAL IDENTIFICATION AND USE

Material Name: PRODUCED WATER (SWEET - FROM CRUDE OIL OR DEEP GAS PRODUCTION)
Use: Process stream, waste
WHMIS Classification: Class B, Div. 2; Class D, Div. 2, Sub-Div. A and B
NFPA: **Fire**: 3 **Reactivity**: 0 **Health**: 2
TDG: **UN**: 1267 **Class:** 3 **Packing Group:** II
Shipping Name: PETROLEUM CRUDE OIL

Manufacturer/Supplier: ENCANA CORPORATION
#1800, 855 - 2nd Street S.W., P.O. BOX 2850
CALGARY, ALBERTA, T2P 2S5
Emergency Telephone: (403) 645-3333
Chemical Family: Water with C5+ aliphatic and aromatic hydrocarbons.

SECTION 2 – HAZARDOUS INGREDIENTS OF MATERIAL

Hazardous Ingredients	Approximate Concentrations (%)	C.A.S. Nos.	LD50/LC50 (Incl. Species & Route)	Exposure Limits
Sodium chloride	5-20	7647-14-05	N.Av.	N.Av.
n-Hexane	0.1-1	110-54-3	LD50,rat,oral,28.7 g/kg	50 ppm (OEL,TLV)
Benzene	0.1-1	71-43-2	LD50,rat,oral,930 mg/kg LC50,rat,4 hr,13200 ppm	0.5 ppm (OEL) 0.5 ppm (TLV)

OEL = 8 hr. Alberta Occupational Exposure Limit; TLV = Threshold Limit Value (8 hrs)

SECTION 3 – PHYSICAL DATA FOR MATERIAL

Physical State: Liquid
Specific Gravity: 1,0 - 1.1 @ 20 degrees C
Vapour Density (air=1): 2.5-3.0
Percent Volatiles, by volume: 100
pH: N.Av.
Vapour Pressure (mmHg): 20 @ 20 deg. C.
Odour Threshold (ppm): N.Av.
Evaporation Rate: N.Av.
Boiling Pt. (deg.C): 50 to 100
Freezing Pt. **(deg.C)**: -10 to 0 (est.)
Coefficient of Water/Oil Distribution: >100 / 1
Odour & Appearance: colorless/straw coloured liquid, hydrocarbon odour
(N.AV. = not available N.App. = not applicable)

SECTION 4 – FIRE AND EXPLOSION

Flammability: Yes **Conditions**: Bulk of material is water, and will not ignite. However, sufficient hydrocarbon vapour may be present to cause flash fire at normal temperatures*.
Means of Extinction: Foam, CO2, dry chemical. Explosive accumulations can build up in areas of poor ventilation*.
Special Procedures: Use water spray to cool fire-exposed containers, and to disperse vapors if spill has not ignited. If safe to do so, cut off supply and allow flame to burn out*.
Flash Point (deg.C) & Method: <-40 (TCC) (hydrocarbons)*
Upper Explosive Limit (% by vol.): 8*
Lower Explosive Limit (% by vol.): 1*
Auto Ignition Temp. (deg.C): 260*
Sensitivity to Impact: No
Sensitivity to Static Discharge: Yes, may ignite*
TDG Flammability Classification: Class 3*
Hazardous Combustion Products: Carbon monoxide, carbon dioxide*

**Assuming hydrocarbon content is high enough to ignite. Hydrocarbons may derive from the original produced water or contamination through transportation in a tank that had previously contained crude oil.*

SECTION 5 – REACTIVITY DATA

Chemical Stability: Yes **Conditions**: Heat
Incompatibility: Yes **Substances**: Oxidizing agents (e.g. chlorine, compressed oxygen)
Reactivity: Yes **Conditions**: Heat, strong sunlight
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide

SECTION 6 – TOXICOLOGICAL PROPERTIES OF PRODUCT

Routes of Entry:
Skin Absorption Yes **Skin Contact**: Yes (liquid) **Eye Contact**: Yes
Inhalation: **Acute**: Yes **Chronic**: Yes **Ingestion**: Yes
Effects of Acute Exposure: Vapour may cause irritation of eyes, nose and throat, dizziness and drowsiness. Contact with skin may cause irritation and possibly dermatitis. Hydrocarbons absorbed through intact skin. Contact of liquid with eyes may cause severe irritation.
Effects of Chronic Exposure: Due to presence of benzene and n-hexane, long term exposure may increase the risk of anaemia, leukaemia and nervous system damage.
Sensitization to Product: N.Av.
Exposure Limits of Product: 0.5 ppm (8 hr Alberta OEL for benzene)
Irritancy: Yes
Synergistic Materials: None reported
Carcinogenicity: Yes **Reproductive Effects**: Possibly **Teratogenicity**: Possibly **Mutagenicity**: Possibly

SECTION 7 – PREVENTIVE MEASURES

Personal Protective Equipment: Use positive pressure self-contained breathing apparatus, supplied air breathing apparatus, or cartridge respirator approved for organic vapours where concentrations may exceed exposure limits.
Gloves: Viton (nitrile adequate for short exposure to liquid)
Respiratory: SCBA, SABA or cartridge respirator approved for organic vapours. **Eye**: Chemical splash goggles
Footwear: As per safety policy. **Clothing**: As per fire protection policy.
Engineering Controls: Use only in well ventilated areas. Mechanical ventilation required in confined areas. Equipment must be explosion proof.
Leaks & Spills: Stop leak if safe to do so. Use personal protective equipment. Use water spray to cool containers. Remove all ignition sources. Provide explosion-proof clearing ventilation, if possible. Prevent from entering confined spaces, or from contaminating land and water courses. Dyke and pump into containers for recycling or disposal. Notify appropriate regulatory authorities.
Waste Disposal: Contact appropriate regulatory authorities for disposal requirements.
Handling Procedures & Equipment: Avoid contact with liquid. Avoid inhalation. Bond and ground all transfers. Avoid sparking conditions.
Storage Requirements: Store in a cool, dry, well ventilated area away from heat, strong sunlight, and ignition sources.
Special Shipping Information: N.Av.

SECTION 8 – FIRST AID MEASURES

Skin: Flush skin with water, removing contaminated clothing. Get medical attention if irritation persists or large areas of contact.
Eye: Immediately flush with large amounts of luke warm water for 15 minutes, lifting upper and lower lids at intervals. Get medical attention if irritation persists.
Inhalation: Ensure own safety. Remove victim to fresh air. Give oxygen, artificial respiration, or CPR if needed. Get immediate medical attention.
Ingestion: Give 2-3 glasses of milk or water to drink. DO NOT INDUCE VOMITING. Keep warm and at rest. Get immediate medical attention.

SECTION 9 – PREPARATION DATE OF MSDS

Prepared By: Encana Environment, Health and Safety (EHS)
Phone Number: (403) 645-2000 Preparation Date: July 1, 2011 Expiry Date: July 1, 2014

ATTACHMENT I

Emission Units Table

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

- Emissions Unit Table

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Application for 45CSR13 NSR Modification Permit

ATTACHMENT I - EMISSION UNITS TABLE

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

Unit ID[1]	Pt ID[2]	Description	Installed	Capacity	Type[3]	Control[4]
CE-01	1E	78 bhp Ajax DPC-81 Compressor Engine	2012	78 bhp	Existing	na
CE-02	2E	225 bhp Cummins GTA-855 Compressor Engine	TBD	225 bhp	2015	01-NSCR
RPC	3E	Rod Packing/Crankcase Leaks	2012	303 bhp	Existing	na
SSM	4E	Startup/Shutdown/Maintenance (Blowdown (BD))	2012	na	Existing	na
DFT-01	5E	5.0 MMscfd Dehydrator - Flash Tank	2012	5.0 MMscfd	Existing	na
DSV-01	6E	5.0 MMscfd Dehydrator - Regenerator/Still Vent	2012	5.0 MMscfd	Existing	na
RBV-01	7E	0.22 MMBtu/hr Reboiler Vent	2012	0.22 MMBtu/hr	Existing	na
TK-01	8E	Produced Water - Storage Tank	2014	210 bbl	Existing	na
TLO	9E	Produced Water - Truck Load-Out	2014	2,520 bbl/yr	Existing	na
FUG	10E	Piping and Equipment Fugitives	2012	na	Existing	na
			(NEW/Modified Units are in Shaded Cells)			

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

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

[3] New, modification, removal, etc.

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

ATTACHMENT J

Emission Points Data Summary Sheet

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

- Table 1 – Emissions Data
- Table 2 – Release Parameter Data

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Application for 45CSR13 NSR Modification Permit

ATTACHMENT J - EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Unit ID	Type[1]	Emission Unit		Control Device		Vent Time		Pollutant[3]	Pre-Controlled[4]		Controlled[5]		Emission Phase	Est. Method[6]	Concen-tration[7]
		Point	Source	ID	Type	Term[2]	hr/yr		lb/hr	ton/yr	lb/hr	ton/yr			
CE-01	Upward Vertical Stack	1E	Comp-ressor Engines	na	na	C	8,760	NOX	1.36	5.97	1.36	5.97	gas	Vendor	
								CO	0.62	2.70	0.62	2.70	gas	Vendor	
								VOC	0.21	0.90	0.21	0.90	gas	Vendor	
								SO2	4.3E-04	1.9E-03	4.3E-04	1.9E-03	gas	AP-42	
								PM10/2.5	0.04	0.15	0.04	0.15	solid/gas	AP-42	
								HCHO	0.08	0.34	0.08	0.34	gas	Vendor	
								n-Hexane	3.2E-04	1.4E-03	3.2E-04	1.4E-03	gas	AP-42	
								Benzene	1.4E-03	0.01	1.4E-03	0.01	gas	AP-42	
								Toluene	7.0E-04	3.1E-03	7.0E-04	3.1E-03	gas	AP-42	
								E-benzene	7.9E-05	3.4E-04	7.9E-05	3.4E-04	gas	AP-42	
								Xylenes	2.0E-04	8.6E-04	2.0E-04	8.6E-04	gas	AP-42	
								Total HAP	0.10	0.42	0.10	0.42	gas	AP-42	
								CO2e	138	605	138	605	gas	Vendor	
CE-02	Upward Vertical Stack	2E	Comp-ressor Engines	01-NSCR	NSCR	C	8,760	NOX	6.00	26.29	0.50	2.17	gas	Vendor	
								CO	1.44	6.30	0.99	4.35	gas	Vendor	
								VOC	0.17	0.73	0.17	0.73	gas	Vendor	
								SO2	1.2E-03	0.01	1.2E-03	0.01	gas	AP-42	
								PM10/2.5	0.04	0.18	0.04	0.18	solid/gas	AP-42	
								HCHO	0.04	0.19	0.04	0.19	gas	Vendor	
								n-Hexane	---	---	---	---	gas	AP-42	
								Benzene	3.3E-03	0.01	3.3E-03	0.01	gas	AP-42	
								Toluene	1.2E-03	0.01	1.2E-03	0.01	gas	AP-42	
								E-benzene	5.3E-05	2.3E-04	5.3E-05	2.3E-04	gas	AP-42	
								Xylenes	4.1E-04	1.8E-03	4.1E-04	1.8E-03	gas	AP-42	
								Total HAP	0.07	0.30	0.07	0.30	gas	AP-42	
								CO2e	324	1,420	85	1,420	gas	Vendor	
RPC	na	3E	Comp-ressors and Engines	na	na	C	8,760	VOC	1.78	7.81	1.78	7.81	gas	EE	
								HCHO	9.7E-04	4.2E-03	9.7E-04	4.2E-03	gas	EE	
								n-Hexane	0.01	2.7E-02	0.01	2.7E-02	gas	EE	
								Benzene	0.01	2.8E-02	0.01	2.8E-02	gas	EE	
								Toluene	0.01	2.8E-02	0.01	2.8E-02	gas	EE	
								E-benzene	0.01	2.8E-02	0.01	2.8E-02	gas	EE	
								Xylenes	0.01	2.8E-02	0.01	2.8E-02	gas	EE	
								Total HAP	0.03	0.14	0.03	0.14	gas	EE	
								CO2e	153	671	153	671	gas	EE	
SSM	na	4E	Comp-ressors and Piping	na	na	Ave 3.0 BD/wk @ 30 Min/BD	Approx. 78	VOC	---	4.40	---	4.40	gas	MB	
								n-Hexane	---	0.06	---	0.06	gas	MB	
								Benzene	---	1.7E-03	---	1.7E-03	gas	MB	
								Toluene	---	3.4E-03	---	3.4E-03	gas	MB	
								E-benzene	---	1.7E-03	---	1.7E-03	gas	MB	
								Xylenes	---	0.01	---	0.01	gas	MB	
								Total HAP	---	0.08	---	0.08	gas	MB	
								CO2e	---	361	---	361	gas	MB	
DFT-01	Upward Vertical Stack	5E	TEG Dehy Flash Tank	na	na	C	8,760	VOC	2.89	12.65	2.89	12.65	gas	GLYCalc	
								n-Hexane	0.06	0.24	0.06	0.24	gas	GLYCalc	
								Benzene	4.7E-03	0.02	4.7E-03	2.1E-02	gas	GLYCalc	
								Toluene	0.01	0.05	1.2E-02	5.2E-02	gas	GLYCalc	
								E-benzene	2.3E-03	1.0E-02	2.3E-03	1.0E-02	gas	GLYCalc	
								Xylenes	2.2E-02	0.10	2.2E-02	9.7E-02	gas	GLYCalc	
								Total HAP	0.10	0.43	0.10	0.43	gas	GLYCalc	
								CO2e	147	646	147	646	gas	GLYCalc	

ATTACHMENT J - EMISSION POINTS DATA SUMMARY SHEET - Continued

Table 1: Emissions Data

Unit ID	Type[1]	Emission Unit		Control Device		Vent Time		Pollutant[3]	Pre-Controlled[4]		Controlled[5]		Emission Phase	Est. Method[6]	Concen-tration[7]
		Point	Source	ID	Type	Term[2]	hr/yr		lb/hr	ton/yr	lb/hr	ton/yr			
DSV-01	5.0 MMscfd TEG Dehydrator Regenerator/Still Vent							VOC	1.55	6.80	1.55	6.80	gas	GLYCalc	
								n-Hexane	0.02	0.09	0.02	0.09	gas	GLYCalc	
								Benzene	0.05	0.20	0.05	0.20	gas	GLYCalc	
								Toluene	0.18	0.77	0.18	0.77	gas	GLYCalc	
	Upward Vertical Stack	6E	TEG Dehy Still Vent	na	na	C	8,760	E-benzene	0.01	0.03	0.01	0.03	gas	GLYCalc	
								Xylenes	0.79	3.47	0.79	3.47	gas	GLYCalc	
								Total HAP	1.04	4.56	1.04	4.56	gas	GLYCalc	
								CO2e	1.59	6.96	1.59	6.96	gas	GLYCalc	
RBV-01	0.22 MMBtu/hr TEG Reboiler							NOX	0.02	0.10	0.02	0.10	gas	AP-42	
								CO	0.02	0.08	0.02	0.08	gas	AP-42	
								VOC	1.2E-03	0.01	1.2E-03	0.01	gas	AP-42	
								SO2	1.3E-04	5.7E-04	1.3E-04	5.7E-04	gas	AP-42	
	Upward Vertical Stack	7E	TEG Reboiler	na	na	C	8,760	PM10/2.5	1.7E-03	0.01	1.7E-03	0.01	solid/gas	AP-42	
								HCHO	1.6E-05	7.2E-05	1.6E-05	7.2E-05	gas	AP-42	
								n-Hexane	3.9E-04	1.7E-03	3.9E-04	1.7E-03	gas	AP-42	
								Benzene	4.6E-07	2.0E-06	4.6E-07	2.0E-06	gas	AP-42	
								Toluene	7.4E-07	3.2E-06	7.4E-07	3.2E-06	gas	AP-42	
								Total HAP	4.1E-04	1.8E-03	4.1E-04	1.8E-03	gas	AP-42	
								CO2e	26	114	26	114	gas	40CFR98	
TK-01	210 bbl Produced Water and Condensate Storage Tank							VOC	1.1E-02	1.3E-01	1.1E-02	1.3E-01	gas	EE	
								n-Hexane	5.6E-04	2.7E-03	5.6E-04	2.7E-03	gas	EE	
								Benzene	5.6E-04	2.7E-03	5.6E-04	2.7E-03	gas	EE	
								Toluene	5.6E-04	2.7E-03	5.6E-04	2.7E-03	gas	EE	
	Upward Vertical Stack	8E	Tank	na	na	C	8,760	E-benzene	5.6E-04	2.7E-03	5.6E-04	2.7E-03	gas	EE	
								Xylenes	5.6E-04	2.7E-03	5.6E-04	2.7E-03	gas	EE	
								Total HAP	2.8E-03	1.4E-02	2.8E-03	1.4E-02	gas	EE	
TLO	Produced Water and Condensate Truck Load-Out							VOC	---	0.26	---	0.26	gas	AP-42	
								n-Hexane	---	0.01	---	0.01	gas	AP-42	
								Benzene	---	0.01	---	0.01	gas	AP-42	
								Toluene	---	0.01	---	0.01	gas	AP-42	
	Upward Vertical Stack	9E	Load-Out	na	na	Ave 1.0 TLO/wk @ 15 Min/TLO	Approx. 13	E-benzene	---	0.01	---	0.01	gas	AP-42	
								Xylenes	---	0.01	---	0.01	gas	AP-42	
								Total HAP	---	0.06	---	0.01	gas	AP-42	

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

1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk)

.

3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.

4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

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

7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv). If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

ATTACHMENT J - EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Unit ID	Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
			Temp. (oF)	Volumetric Flow[1] (acfm) (*At operating conditions)*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height[2] *(Release height of emissions above ground level)*	Northing	Easting
CE-01	**1E**	**0.8**	**545**	**610**	**19**	**1,160**	**15**	**4,423.53 km N**	**524.18 km E**
CE-02	**2E**	**1.0**	**1,304**	**945**	**50**	**1,160**	**15**	**4,423.53 km N**	**524.18 km E**
RPC	**3E**	**na**	**AMBIENT**	**na**	**na**	**1,160**	**4**	**4,423.53 km N**	**524.18 km E**
SSM	**4E**	**0.5**	**AMBIENT**	**100**	**na**	**1,160**	**12**	**4,423.53 km N**	**524.18 km E**
DFT-01	**5E**	**0.3**	**140**	**10**	**na**	**1,160**	**12**	**4,423.53 km N**	**524.18 km E**
DSV-01	**6E**	**0.3**	**212**	**10**	**na**	**1,160**	**12**	**4,423.53 km N**	**524.18 km E**
RBV-01	**7E**	**0.3**	**600**	**na**	**na**	**1,160**	**12**	**4,423.53 km N**	**524.18 km E**
TK-01	**8E**	**na**	**AMBIENT**	**na**	**na**	**1,160**	**12**	**4,423.53 km N**	**524.18 km E**
TLO	**9E**	**0.3**	**AMBIENT**	**30**	**na**	**1,160**	**12**	**4,423.53 km N**	**524.18 km E**

[1] Give at operating conditions. Include inerts.

[2] Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

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

- Table 1 – Emissions Data
- Application Forms Checklist
- Fugitive Emissions Summary

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Application for 45CSR13 NSR Modification Permit

ATTACHMENT K - FUGITIVE EMISSIONS SUMMARY SHEET

Table 1: Emissions Data

Unit ID	Type[1]	Emission Unit		Control Device		Vent Time		Pollutant[3]	Pre-Controlled[4]		Controlled[5]		Emission Phase	Est. Method[6]	Concen-tration[7]
		Point	Source	ID	Type	Term[2]	hr/yr		lb/hr	ton/yr	lb/hr	ton/yr			
FUG	Process Piping and Equipment Fugitives - GAS + WATER/OIL							VOC	2.12	9.28	2.12	9.28	gas	AP-42	
								n-Hexane	0.10	0.46	0.10	0.46	gas	AP-42	
								Benzene	0.10	0.46	1.0E-01	4.6E-01	gas	AP-42	
								Toluene	0.10	0.46	1.0E-01	4.6E-01	gas	AP-42	
	Fugitive (Gas+Water/Oil)	10E	Station Piping	na	na	C	8,760	E-benzene	0.10	0.46	1.0E-01	4.6E-01	gas	AP-42	
								Xylenes	0.10	0.46	1.0E-01	4.6E-01	gas	AP-42	
								Total HAP	0.24	1.05	0.24	1.05	gas	AP-42	
								CO2e	136	595	136	595	gas	AP-42	

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

1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk)

.

3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.

4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

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

7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv). If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

ATTACHMENT 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 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).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS

1.) Will there be haul road activities?

☐ Yes ☑ No

☐ If Yes, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.

2.) Will there be Storage Piles?

☐ Yes ☑ No

☐ If Yes, then complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.

3.) Will there be Liquid Loading/Unloading Operations?

☑ Yes ☐ No

☑ If Yes, then complete the If Yes, then complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.

4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?

☐ Yes ☑ No

☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.

5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?

☑ Yes ☐ No

☑ If Yes, then complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.

6.) Will there be General Clean-up VOC Operations?

☐ Yes ☑ No

☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET.

7.) Will there be any other activities that generate fugitive emissions?

☐ Yes ☑ No

☐ If Yes, then complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.

If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS 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**	**---**	**---**	**---**	**---**	**---**
Liquid Loading (TLO)	**VOC**	**---**	**0.26**	**---**	**0.26**	**AP**
	n-Hexane, BTEX (ea)	**---**	**0.01**	**---**	**0.01**	**AP**
	Total HAP	**---**	**0.06**	**---**	**0.06**	**AP**
Wastewater Treatment	**na**	**---**	**---**	**---**	**---**	**---**
Equipment Leaks - (FUG-G and FUG-W) (10E) (Note, the facility is NOT subject to LDAR)	**VOC**	**2.12**	**9.28**	**2.12**	**9.28**	**EE**
	n-Hexane	**0.10**	**0.46**	**0.10**	**0.46**	**EE**
	Benzene	**0.03**	**0.12**	**2.7E-02**	**1.2E-01**	**EE**
	Toluene	**0.03**	**0.12**	**2.7E-02**	**1.2E-01**	**EE**
	E-Benzene	**0.03**	**0.12**	**2.7E-02**	**1.2E-01**	**EE**
	Xylenes	**0.03**	**0.12**	**2.7E-02**	**0.12**	**EE**
	Total HAP	**0.24**	**1.05**	**0.24**	**1.05**	**EE**
	CO2e	**136**	**595**	**136**	**595**	**EE**
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 minutes (e.g. 5 lb VOC/20 minute batch).

3. Give 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).

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

ATTACHMENT L

Emissions Unit Data Sheet(s)

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

- Compressor/Generator Engine Data Sheet
  - Specs – 78 bhp Ajax DPC-81 Compressor Engine (CE-01)
  - Specs – 225 bhp Cummins GTA-855 Compressor Engine (CE-02)
- Natural Gas Glycol Dehydration Unit Data Sheets
  - TEG Dehydrator Flash Tank (DFT-01)
  - TEG Dehydrator Regenerator/Still Vent (DSV-01)
  - TEG Dehydrator Reboiler (RBV-01)
- 40 CFR Part 63; Subpart HH & HHH Registration Form
  - TEG Dehydrator (DFT-01 and DSV-01)
- Storage Tank Data Sheet
  - Emission Unit Data Sheet – Storage Tank (TK-01)
  - Emission Unit Data Sheet – Bulk Transfer Operations (TLO)
- Leak Source Data Sheet (FUG)

ATTACHMENT L - COMPRESSOR/GENERATOR ENGINE DATA SHEET

Compressor Station		**Hazlet CS**					
Source Identification Number[1]		**CE-01**		**CE-02**			
Engine Manufacturer and Model		**Ajax DPC-81**		**Cummins GTA855**			
Manufacturer's Rated bhp/rpm		**78 / 475**		**225 / 1,800**			
Source Status[2]		**ES**		**NS**			
Date Installed/Modified/Removed[3]		**2012**		**2015**			
Manufactured/Reconstruction Date[4]		**10/01/88**		**01/01/15**			
Certified Engine (NSPS JJJJ)[5]		**No**		**No**			
Engine, Fuel and Combustion Data	Engine Type[6]	**LB2S**		**RB4S**			
	APCD Type[7]	**None**		**NSCR**			
	Fuel Type[8]	**RG**		**RG**			
	H_2S (gr/100 scf)	**0.2**		**0.2**			
	Operating bhp/rpm	**78 / 475**		**225 / 1,800**			
	BSFC (Btu/bhp-hr)	**8,500**		**8,496**			
	Fuel (ft^3/hr)	**733**		**2,078**			
	Fuel ($MMft^3$/yr)	**6.42**		**18.20**			
	Operation (hrs/yr)	**8,760**		**8,760**			
Reference[9]	PTE[10]	lbs/hr	tons/yr	lbs/hr	tons/yr		
MD	NOX	**1.36**	**5.97**	**0.50**	**2.17**		
MD	CO	**0.62**	**2.70**	**0.99**	**4.35**		
MD	VOC	**0.21**	**0.90**	**0.17**	**0.73**		
AP	SO2	**4.3E-04**	**1.9E-03**	**1.2E-03**	**0.01**		
AP	PM10/2.5	**0.04**	**0.15**	**0.04**	**0.18**		
MD	HCHO	**0.08**	**0.34**	**0.04**	**0.19**		
MD/AP	Total HAP	**0.10**	**0.42**	**0.07**	**0.30**		

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

USA COMPRESSION

USA Compression Unit 1246 Ajax DPC81 Engine Emissions

Date of Manufacture	October 1, 1988	Package Serial Number	82572	Date Modified/Reconstructed	Not Any
Driver Rated HP	78	Rated Speed in RPM	475	Combustion Type	Spark Ignited 2 Stroke
Number of Cylinders	1	Compression Ratio	6.1:1	Combustion Setting	Lean Burn ~~Rich Burn~~
Displacement, in^3	N/A	Fuel Delivery Method	N/A	Combustion Air Treatment	Naturally Aspirated

Raw Engine Emissions (Pipeline Quality Fuel Gas with little to no H2S) Fuel Usage: 732.6 scf/hr

Fuel Consumption *8500 LHV BTU/bhp-hr* *or* *9350 HHV BTU/bhp-hr*
Altitude *1500 ft*
Maximum Air Inlet Temp *65 F*

	g/bhp-hr [1]		lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	6.6	* 1.20 = 7.92		1.13	4.97
Carbon Monoxide (CO)	1.1	* 3.26 = 3.59		0.19	0.83
Volatile Organic Compounds (VOC or NMNEHC)	0.5	* 1.50 = 0.75		0.09	0.38
Formaldehyde (CH2O)	0.3	* 1.50 = 0.45		0.05	0.23
Particulate Matter (PM) Filterable+Condensable			4.83E-02	3.52E-02	1.54E-01
Sulfur Dioxide (SO2)			5.88E-04	4.29E-04	1.88E-03

	g/bhp-hr [1]		lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	NA		NA	NA
Methane (CH4)	5.1	* 1.20 = 6.12	0.88	3.48

[1] g/bhp-hr are based on Cameron Specifications assuming pipeline quality fuel gas, < 1500 ft elevation, and 65 F Air Inlet Temperature.
Note that g/bhp-hr values are based on 100% Load Operation.
It is recommended to apply a safety factor to CO emissions of 3.26, VOC emissions of 1.5, and CH2O emisions of 1.5 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 amd Model: *None*
Number of Elements in Housing: *0*

	% Reduction	lb/hr	TPY
Nitrogen Oxides (NOx)	0	**1.13**	**4.97**
Carbon Monoxide (CO)	0	**0.19**	**0.83**
Volatile Organic Compounds (VOC or NMNEHC)	0	**0.09**	**0.38**
Formaldehyde (CH2O)	0	**0.05**	**0.23**
Particulate Matter (PM)	0	**3.52E-02**	**1.54E-01**
Sulfur Dioxide (SO2)	0	**4.29E-04**	**1.88E-03**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**NA**	**NA**
Methane (CH4)	0	**0.88**	**3.48**

CAMERON

AJAX

Estimated Exhaust Emissions Based On PLQNG, 1500 FASL Elevation and an average Ambient Temperature of 65 Degrees F

For Emissions Permits, please contact Ajax for emissions data based on specific site conditions

Ajax Engine Model	Emissions (Gm / Bhph)					BSFC	RPM	BHP	BMEP	Exhaust Stack						No. Of Cyl's	Bore	Stroke
	NOx	CO	NMHC	VOC	H2CO					Dia. (In.)	Height (In.)	Temp (Deg.F)	Flow (acfm)	Flow (lb/m)	Velocity (ft/m)			
EA-15	4.4	3.3	0.7	0.5	0.3	9900	900	14	49.6	4	31	500	140	5	1604	1	5	6.5
EA-22	4.4	3.3	0.7	0.5	0.3	9900	650	21	48.5	5	64	500	200	8	1467	1	6.5	8
EA-30	4.4	3.3	0.7	0.5	0.3	9900	650	29	53.1	5	80	500	250	10	1833	1	7.25	8
C-30	4.4	3.3	0.7	0.5	0.3	9400	525	29	49.2	5	101	450	260	11	1907	1	7.5	10
C-42	4.4	3.3	0.7	0.5	0.3	9900	525	40	53.6	6	137	565	380	14	1935	1	8.5	10
E-42	4.4	3.3	0.7	0.5	0.3	9900	525	40	53.6	6	137	565	380	14	1935	1	8.5	10
DP-60	4.4	1.7	0.6	0.5	0.3	9000	475	58	56.5	8	150	540	500	18	1432	1	9.5	12
DP-80	4.4	2.8	0.7	0.5	0.3	8900	400	77	57.1	10	164	470	610	24	1118	1	11.0	14
DP-81	6.6	1.1	0.5	0.5	0.3	8500	475	78	62.4	10	164	545	610	22	1118	1	10.5	12
DP-115	4.4	2.4	0.9	0.6	0.3	9000	360	110	55.0	12	190	440	880	36	1120	1	13.25	16
DP-125	5.0	2.7	0.8	0.6	0.3	8500	380	120	56.7	12	190	470	960	38	1222	1	13.25	16
DP-160	4.4	2.8	0.7	0.5	0.3	8900	400	154	57.1	10	164	470	1220	48	2237	2	11	14
DP-165	6.0	3.0	0.8	0.6	0.3	8500	380	158	58.4	13.25	260	450	1210	49	1264	1	15	16
DP-230	4.4	2.4	0.9	0.6	0.3	9000	360	221	55.0	12	190	440	1770	72	2254	2	13.25	16
DP-250	5.5	3.0	0.8	0.6	0.3	8500	380	240	56.7	12	190	460	1910	76	2432	2	13.25	16
DP-325	5.5	1.7	0.8	0.6	0.3	8400	380	312	57.5	13.25	260	450	2420	98	2527	2	15	16
DPC-60	4.4	1.7	0.6	0.5	0.3	9000	475	58	56.5	8	150	540	500	18	1432	1	9.5	12
DPC-80	4.4	2.8	0.7	0.5	0.3	8900	400	77	57.1	10	164	470	610	24	1118	1	11	14
DPC-81	6.6	1.1	0.5	0.5	0.3	8500	475	78	62.4	10	164	545	610	22	1118	1	10.5	12
DPC-105	4.4	2.8	0.6	0.5	0.3	8800	425	101	59.3	12	193	480	780	31	993	1	12	14
DPC-115	4.4	2.4	0.9	0.6	0.3	8700	360	110	55.0	12	190	440	870	36	1108	1	13.25	16
DPC-115 LE	2.0	2.2	0.7	0.5	0.3	8100	360	110	55.0	12	190	400	830	36	1057	1	13.25	16
DPC-120	5.5	1.7	0.6	0.5	0.3	9000	475	115	56.5	8	150	540	1000	37	2865	2	9.5	12
DPC-140	10.5	1.3	0.6	0.5	0.3	8200	400	134	60.3	12	190	490	1040	40	1324	1	13.25	16
DPC-140 LE	2.0	1.4	0.6	0.5	0.3	7800	400	134	60.3	12	190	450	1010	41	1286	1	13.25	16
DPC-160	4.4	2.7	0.7	0.5	0.3	8900	400	154	57.1	10	164	470	1220	48	2237	2	11	14
DPC-162	6.6	1.1	0.5	0.5	0.3	8500	475	156	62.4	10	164	545	1230	45	2255	2	10.5	12
DPC-180	6.3	1.4	0.9	0.6	0.3	8400	400	173	60.5	13.25	256	460	1290	52	1347	1	15	16
DPC-180 LE	2.0	1.1	0.6	0.5	0.3	7900	400	173	60.5	13.25	256	555	1450	53	1514	1	15	16

Site Altitude = 0 - 1500 FASL Date: March 2011

Site Fuel Composition = Pipeline Quality Natural Gas (PLQNG)

Ambient Temp For Defining Maximum Load = 100 Deg F

Ambient Temp For Defining Exhaust Emissions = 65 Deg F

NOx = Nitrogen Oxide

CO = Carbon Monoxide

H2CO = Formaldehyde

NMHC= Non-Methane Hydrocarbons reported as Propane

VOC = Non-Methane, Non-Ethane & Non-Formaldehyde reported as Propane

BSFC = Brake Specific Fuel Consumption Gm / Bhph = Gram / Brake Horse Power-Hour (Btu / Bhp-hr)

FASL = Feet Above Sea Level

ACFM = Actual Cubic Feet Per Minute

BMEP = Brake Mean Effective Pressure (Psi)

The above emissions and performance data is contingent on:

1.) Engine must be maintained in good working order.

2.) Engine modifications or upgrades from the original factory configuration must meet Ajax specifications and installation guidelines.

3.) Engine operating parameters must be consistent with those specified in the Ajax manual.

Fuel Composition (PLQNG):

Compound	Formula	% Volume
Nitrogen	N2	0.72
Carbon Dioxide	CO2	1.14
Methane	CH4	92.84
Ethane	C2H6	4.10
Propane	C3H8	1.20
	Total Volume % =	100.00

For additional information, please contact Application Engineering at (405) 670-4121
Cameron Compression Systems, 2101 SE 18th Street Oklahoma City, OK USA

Emissions Report

05/14/2015

USA Compression Unit 6737 GTA855/JGQ2

Engine Serial Number :	25398583	Engine Manufactured Date :	01/01/2015
Max HP :	225	Max RPM :	1800
Number of Engine Cylinders :	6	Total Displacement (in3) :	855
Combustion Type & Setting :	4 Stroke Rich Burn	Fuel Delivery Method:	Carburetor
Compression Ratio :	8.5:1	Combustion Air Treatment :	Turbocharged and Aftercooled
Engine Modified/Reconstructed? :	Tier 2 - EMD after 1/1/11		
Compressor Frame Serial # :	F49608	Unit Packaged Date :	03/31/2015
Compressor Frame Max RPM :	1800	# of Compressor Throws :	2

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Marshall WV

NSPS JJJJ	NOx	1.00	g/hp-hr	CO	2.0	g/hp-hr	VOC	0.7	g/hp-hr		
Ozone Non-Attainment / General Permit	NOx		g/hp-hr	CO		g/hp-hr	VOC		g/hp-hr	CH2O	g/hp-hr

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption : 9,420 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :	12.10		6.002	26.289
Carbon Monoxide (CO) :	2.90		1.438	6.298
Volatile Organic Compounds (NMNEHC excluding CH2O) :		0.03	0.063	0.276
Formaldehyde (CH2O) :		0.02	0.043	0.188
Particulate Matter (PM) Filterable+Condensable :		0.0194	0.041	0.180
Sulfur Dioxide (SO2) :		0.0006	0.001	0.005

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	524.00		259.92	1,032.61
Methane (CH4) :		0.23	0.49	1.94

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:	VXC-1610-05-HSG
Catalyst Element Type:	3-Way
Number of Catalyst Elements currently in Housing:	1
Air/Fuel Ratio Control :	Yes
Other Engine Emissions Control Equipment :	none

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	92	0.496	2.173
Carbon Monoxide (CO) :	31	0.992	4.345
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0	0.063	0.276
Formaldehyde (CH2O) :	0	0.043	0.188
Particulate Matter (PM) Filterable+Condensable :	0	0.041	0.180
Sulfur Dioxide (SO2) :	0	0.001	0.005

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0	259.92	1,032.61
Methane (CH4) :	0	0.49	1.94

1) g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition .

2) lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).

Engine Performance Data

Cummins Inc
Columbus, Indiana 47202-3005
http://www.cummins.com

Industrial

GTA855

FR10688

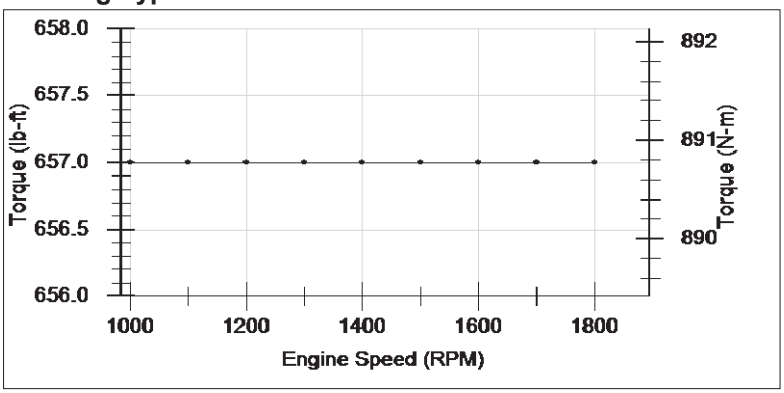
225 BHP (168 kW) @ 1800 RPM
657 lb-ft (891 N-m) @ 1800 RPM

Configuration	CPL Code	Revision
D253007CX02	10183	26-May-2011

Compression Ratio: **8.5:1**
Fuel System: **Field Gas, Dry Processed Nat Gas**
Emission Certification: **Non-certified, Catalyst**
Displacement: **855 in3 (14.0 L)**
Aspiration: **Turbocharged and Aftercooled**

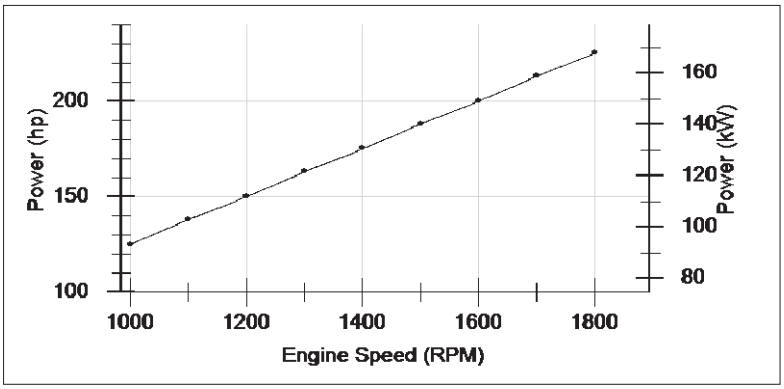
All data is based on the engine operating with fuel system, water pump, and 8 in H2O (1.99 kPa) inlet air restriction with 5 in (127 mm) inner diameter, and with 1.1 in Hg (4 kPa) exhaust restriction with 4 in (102 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Continuous/WMR



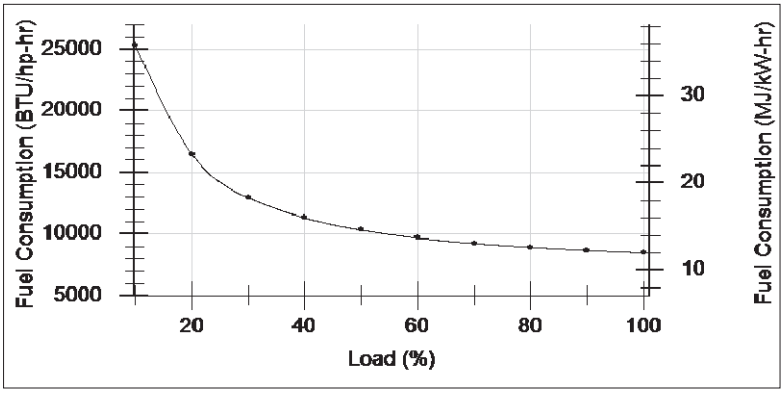
Torque Output

RPM	lb-ft	N-m
1,000	657	891
1,100	657	891
1,200	657	891
1,300	657	891
1,400	657	891
1,500	657	891
1,600	657	891
1,700	657	891
1,800	657	891



Power Output

RPM	hp	kW
1,000	125	93
1,100	138	103
1,200	150	112
1,300	163	122
1,400	175	130
1,500	188	140
1,600	200	149
1,700	213	159
1,800	225	168



Fuel Consumption @ 1,800 RPM

hp	kW	% Load	BTU/hp-hr	MJ/kW-hr
225	168	100	8,479	12
203	151	90	8,675	12.27
180	134	80	8,921	12.62
158	118	70	9,236	13.07
135	101	60	9,678	13.69
113	84	50	10,323	14.6
90	67	40	11,309	16
68	51	30	12,953	18.33
45	34	20	16,457	23.28
23	17	10	25,282	35.77

Data represents gross engine capabilities obtained and corrected in accordance with SAE J1995 using dry processed natural gas fuel with 930 BTU per standard cubic foot lower heating value. Deration may be required due to altitude, temperature and type of fuel. Consult Cummins Customer Engineering with operating questions.

STATUS FOR CURVES AND DATA: Beta-(Measured data)
Tolerance: Within +/- 5%

CHIEF ENGINEER:
Alfred S Weber

Bold entries revised after 1-Mar-2010

Intake Air System

Maximum allowable air temperature rise over ambient at Intake Manifold (Naturally Aspirated Engines) or Turbo Compressor inlet (Turbo-charged Engines): (This parameter impacts emissions, LAT and/or altitude capability)	15 delta deg F	8.3 delta deg C

Low Temperature Aftercooling System

Coolant temperature from the Aftercooler outlet @ Maximum engine coolant out temperature at Limiting Ambient Temperature		
Maximum coolant temperature into the Aftercooler @ 25C (77F) ambient		
Maximum coolant temperature into Aftercooler @ Limiting Ambient conditions	130 deg F	54 deg C
Maximum coolant temperature for engine protection controls	212 deg F	100 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	204 deg F	96 deg C

Exhaust System

Maximum exhaust back pressure:	2 in-Hg	7 kPa
Recommended exhaust piping size (inner diameter):	4 in	102 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	15 psi	103 kPa
@ maximum rated speed	60 psi	414 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	15 psi	103 kPa

Fuel System

Minimum fuel inlet pressure:	**0** psi	**2** kPa
Maximum fuel inlet pressure:	1 psi	5 kPa

Performance Data

Engine low idle speed:	900 RPM	
Maximum low idle speed:	1,980 RPM	
Minimum low idle speed:	850 RPM	
Engine high idle speed	1,800 RPM	
Governor break speed:		
Maximum torque available at closed throttle low idle speed:	0 lb-ft	0 N-m

	100% Load		75% Load		50% Load	
Engine Speed	1,800 RPM		1,800 RPM		1,800 RPM	
Output Power	225 hp	168 kW	169 hp	126 kW	113 hp	84 kW
Torque	657 lb-ft	891 N-m	493 lb-ft	668 N-m	330 lb-ft	447 N-m
Intake Manifold Pressure	9 in-Hg	30 kPa	2 in-Hg	7 kPa	-3 in-Hg	-11 kPa
Turbo Comp. Outlet Pressure	22 in-Hg	73 kPa	15 in-Hg	49 kPa	8 in-Hg	28 kPa
Turbo Comp. Outlet Temperature	235 deg F	113 deg C	196 deg F	91 deg C	159 deg F	71 deg C
Inlet Air Flow	411 ft3/min	194 L/s	329 ft3/min	155 L/s	236 ft3/min	111 L/s
Exhaust Gas Flow	945 ft3/min	446 L/s	757 ft3/min	357 L/s	553 ft3/min	261 L/s
Exhaust Gas Temperature	1,304 deg F	707 deg C	1,254 deg F	679 deg C	1,195 deg F	646 deg C
Heat Rejection to Coolant	11,445 BTU/min	201 kW	9,835 BTU/min	173 kW	8,237 BTU/min	145 kW
Heat Reject to Aftercooler Coolant	807 BTU/min	14 kW	584 BTU/min	10 kW	401 BTU/min	7 kW
Heat Rejection to Ambient	1,904 BTU/min	33 kW	1,707 BTU/min	30 kW	1,742 BTU/min	31 kW
Heat Rejection to Exhaust	8,137 BTU/min	143 kW	6,320 BTU/min	111 kW	4,287 BTU/min	75 kW
Fuel Consumption	8,478 BTU/hp-hr	12 MJ/kW-hr	9,077 BTU/hp-hr	13 MJ/kW-hr	10,323 BTU/hp-hr	15 MJ/kW-hr
Air Fuel Ratio (dry)	16.6 vol/vol		16.5 vol/vol		15.6 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	26 deg	26 deg
Total Hydrocarbons	1.43 g/hp-hr		1.35 g/hp-hr		1.49 g/hp-hr	
VOC ppm w/o Catalyst						
VOC ppm with Catalyst						
NOx	12.1 g/hp-hr	16.23 g/kW-hr	10.8 g/hp-hr	14.48 g/kW-hr	8.4 g/hp-hr	11.26 g/kW-hr
NOx ppm w/o Catalyst						
NOx ppm with Catalyst						
CO	2.9 g/hp-hr	3.89 g/kW-hr	4.4 g/hp-hr	5.9 g/kW-hr	4.5 g/hp-hr	6.03 g/kW-hr
CO ppm w/o Catalyst						
CO ppm with Catalyst						
CO2	524 g/hp-hr	703 g/kW-hr	555 g/hp-hr	744 g/kW-hr	588 g/hp-hr	789 g/kW-hr
O2	0.41 %		0.42 %		0.42 %	

Bold entries revised after 1-Mar-2010

Cranking System (Cold Starting Capability)

Unaided Cold Start:

Minimum cranking speed	150 RPM	
Breakaway torque at minimum unaided cold start temperature:	375 lb-ft	508 N-m
Cold starting aids available	**Block Heater, Oil Pan Heater**	
Maximum parasitic load at 10 deg F @		

Noise Emissions

Top	94.2 dBa
Right Side	91 dBa
Left Side	93.4 dBa
Front	92.9 dBa
Exhaust noise emissions	106.9 dBa

Estimated Free Field Sound Pressure Level at 3.28ft (1m) and Full-Load Governed Speed
(Excludes Noise from Intake, Exhaust, Cooling System and Driven Components)

Aftercooler Heat Rejection - Heat Load on Aftercooler
BTU/min (kW)

Ambient Temp deg F (deg C)

Altitude ft (m)	120 (49)	110 (43)	100 (38)	90 (32)	80 (27)	70 (21)
0 (0)	896 (15.8)	839 (14.8)	775 (13.6)	718 (12.6)	654 (11.5)	597 (10.5)
1000 (305)	944 (16.6)	880 (15.5)	823 (14.5)	759 (13.3)	702 (12.3)	638 (11.2)
2000 (610)	993 (17.5)	928 (16.3)	863 (15.2)	807 (14.2)	742 (13.0)	686 (12.1)
3000 (914)	1,041 (18.3)	976 (17.2)	912 (16.0)	855 (15.0)	791 (13.9)	726 (12.8)
4000 (1219)	1,081 (19.0)	1,025 (18.0)	960 (16.9)	896 (15.8)	831 (14.6)	767 (13.5)
5000 (1524)	1,138 (20.0)	1,073 (18.9)	1,009 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
6000 (1829)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
7000 (2134)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
8000 (2438)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
9000 (2743)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)
10000 (3048)	1,138 (20.0)	1,073 (18.9)	1,008 (17.7)	944 (16.6)	879 (15.5)	815 (14.3)

Change Log

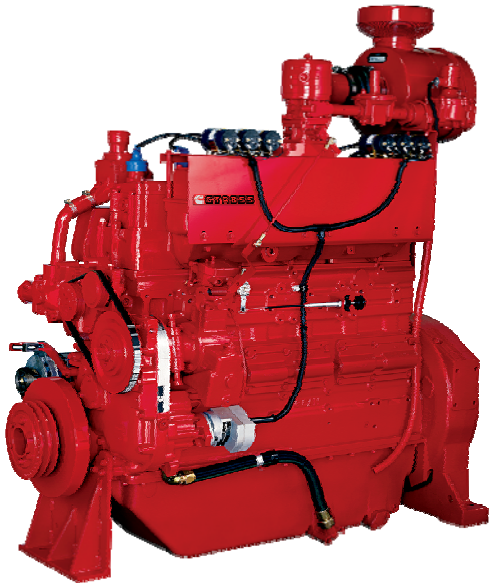
Date	Author	Change Description
7/3/2007	Cary A McFarden	Add noise data

End of Report

Bold entries revised after 1-Mar-2010

G855 & GTA855

Gas Compression Applications



The demands of wellhead and gathering compression applications require an engine that is reliable and durable. For dependable operations and world class support, you need the Cummins G855 and GTA855 – a high-performance natural gas engine that shares the proven heritage of the Cummins diesel engines and many of the same heavy-duty components. You can depend on Cummins engines to keep maintenance costs down and the gas flowing. Every day.

General Specifications
Inline 6-cylinder, 4-Cycle, Natural Gas

Bore	5.5 in (140 mm)
Stroke	6.0 in (152 mm)
Displacement	14.0 L (855 cubic in)
Engine Power*	157-286 hp (117-213 kW)
Compression Ratio	NA: 10:1 TA: 8.5:1
Aspiration	Naturally aspirated or turbocharged aftercooled
Exhaust Type	Watercooled manifold
Weight**	2970 lb (1347 kg)
Coolant Capacity	5.5 gal (20.8 L)
Lube Oil Capacity	15.0 gal (57.0 L)
Rotation	Counterclockwise

* Rating dependent
** Weight is approximate and varies with options.

Features

Designed for the oil and gas market, the G855 and GTA855 deliver exceptional dependability and low cost of operation.

Base Engine – Most major components, including block, crank, cam, gears and liners are common with the proven N series diesel.

Emissions – The G855 and GTA855 have catalyst ratings available to allow the engine to be operated as a rich burn engine and can be customer equipped with an AFR and catalyst to meet NSPS emissions requirements. The GTA855 also has export only ratings available.

Air Handling – The naturally aspirated G855 and turbocharged and aftercooled GTA855 deliver reliable performance and life.

Fuel System – Impco carburetor provides stable operation and fuel tracking through all load ranges.

Speed Control – Adjustable pressure-compensated hydraulic governor provides precise and stable rpm control under all load conditions.

Ignition System – Altronic V integral electronic ignition system with easily accessible spark plug location and single coil per cylinder for lower maintenance costs.

Lubrication System – High-capacity oil pan and combination full-flow and bypass oil filter reduces maintenance costs and extend service intervals.

Warranty – Cummins one year, unlimited hours. Backed by a worldwide distributor network.

Rating Details.

Model	Curve Number	Rating	Emissions	Combustion
G855	FR-10523	157 hp @ 1500 rpm	(1)	Rich
G855	FR-10526	188 hp @ 1800 rpm	(1)	Rich
GTA855	FR-10688	225 hp @ 1800 rpm	(1)	Rich
GTA855	FR-10533	256 hp @ 1800 rpm	Export Only	Standard
GTA855	FR-10531	281 hp @ 1800 rpm	Export Only	Standard
GTA855	FR-10529	286 hp @ 1800 rpm	Export Only	Standard
GTA855	FR-10539	213 hp @ 1500 rpm	Export Only	Standard
GTA855	FR-10537	234 hp @ 1500 rpm	Export Only	Standard
GTA855E	FR-10535	238 hp @ 1500 rpm	Export Only	Standard

(1) NSPS compliant with customer installed Air-fuel ratio (AFR) controller and catalyst.
* Requires EPA site validation testing.

Standard Equipment.

Air Inlet System
- Factory installed heavy duty air cleaner

Cooling System
- Two pump / two loop cooling system – GTA855
- Gear driven jacket water pump
- Gear driven auxiliary coolant pump – GTA855
- Thermostat controlled jacket water circuit
- Coolant filter for added corrosion protection
- Auxiliary coolant pump optional for compressor cooling - G855

Exhaust System
- Watercooled manifold

Fuel System
- Impco carburetor
- Maxitrol regulator

Speed Control System
- Gear driven Woodard hydraulic / mechanical governor
- Electronic governor optional

Ignition System
- Altronic V ignition system
- Altronic III ignition system optional
- Altronic V shielded ignition optional
- Altronic III shielded ignition optional

Lube Oil System
- Crankcase breather
- High capacity oil pan for extended oil drain intervals
- Combination full flow and bypass oil filter

Safety Shutoff Protection
- Electric fuel valve

Mounting Arrangement
- Front and rear engine mounting
- Lift provisions on engine

Flywheel and Flywheel Housing
- Flywheel SAE #1
- Flywheel housing – SAE #1 Cast-iron, machined to accommodate starter mounting

Electrical System
- 24-volt alternator

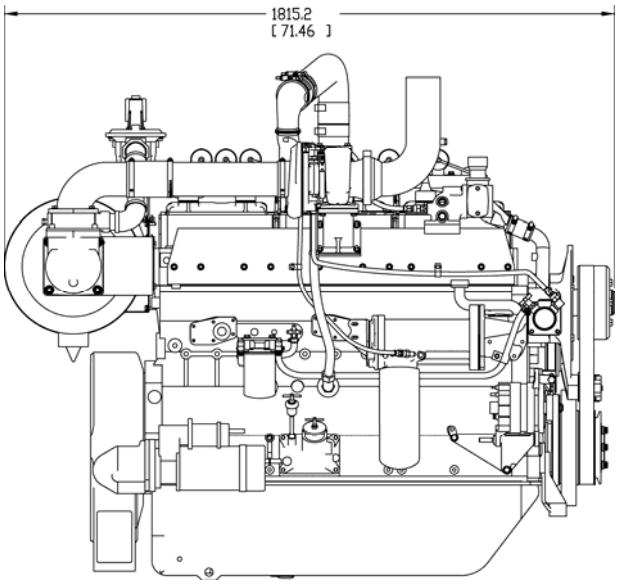
Starting System
- 24-volt starter
- Gas starter optional

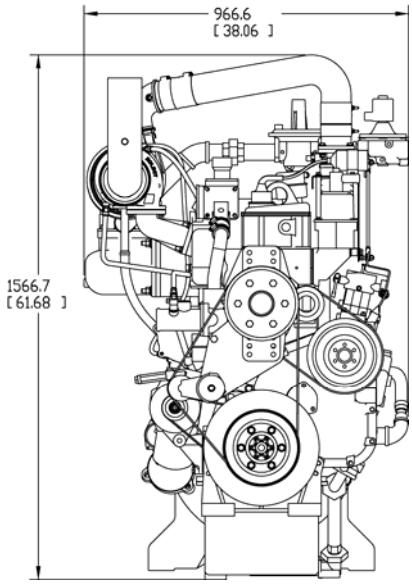
Power Take-Off
- Front crankshaft pulley

Engine Technical Data.

Model		G855	GTA855	GTA855
Curve Number		FR-10523 (2)	FR-10688 (2)	FR-10529 (2)
Exhaust Type		Dry Manifold	Wet Manifold	Wet Manifold
Output Power (1)				
100%	HP (kW)	188 (140)	225 (168)	286 (213)
75%	HP (kW)	141 (105)	169 (126)	215 (160)
Engine Speed				
100%	RPM	1800	1800	1800
Max Turn Down	RPM	1350	1350	1350
After-Cooler Water Inlet Temperature				
	°F (°C)	N/A	130 (54.4)	130 (54.4)
Compression Ratio		10:1	8.5:1	8.5:1
Emissions Data – Engine-Out Emissions (1)				
NOx	g/hp-hr (g-kW-hr)	5.9 (7.91)	12.1 (16.23)	7.6 (10.2)
CO	g/hp-hr (g-kW-hr)	26.7 (35.81)	2.9 (3.89)	1.1 (1.48)
NMHC	g/hp-hr			
THC	g/hp-hr	1.90	1.43	0.52
O_2	%	0.54	0.41	4.20
Fuel Consumption (1)				
100%	BTU/hp-hr (MJ/kW-hr)	8605 (12.2)	8478 (12.0)	8224 (11.6)
75%	BTU/hp-hr (MJ/kW-hr)	9870 (14.0)	9077 (12.8)	8631 (12.2)
Heat Rejection (1)				
Jacket Water	BTU/min (kW)	8154 (143.38)	11445 (201.3)	12677 (223)
After-cooler	BTU/min (kW)	N/A	807 (14.19)	1902 (33.5)
Exhaust	BTU/min (kW)	5674 (99.77)	8137 (143.08)	11792 (207.4)
Exhaust System (1)				
Flow Rate	ft^3/min (L/s)	866 (409)	945 (446)	1851 (874)
Stack temp	°F (°C)	1196 (647)	1304 (707)	1337 (725)
Max Back Pres.	in-Hg	2	2	2
Intake System (1)				
Flow Rate	ft^3/min (L/s)	260 (123)	411 (194)	605 (286)
Max Restriction	in-H2O	15	15	15
Gas Pressure				
Min - Max	psi	10-20	10-20	10-20

General Dimensions.





Turbocharged model pictured above

Dimensions*		NA	TA
Length	Inches (mm)	67.7 (1718)	71.5 (1815)
Width	Inches (mm)	35.9 (912)	38.1 (966)
Height	Inches (mm)	53.9 (1368)	61.7 (1567)

* Dimensions are approximate and vary with options.

Disclaimers.

(2) All data is based on the engine operating with fuel system, water pump, and 8 in H2O (1.991 kPa) inlet air restriction with 5 in (127 mm) inner diameter, and with 1.1 in Hg (4 kPa) exhaust restriction with 4 in (102 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

Phone: 1-800-343-7357
Fax: 1-812-232-6393
Internet: www.CumminsOilandGas.com

Rev 10/09

Williams Ohio Valley Midstream LLC (OVM)

HAZLET COMPRESSOR STATION (CS)

Application for 45CSR13 NSR Modification Permit

ATTACHMENT L - NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Compressor Station		**Hazlet CS**			
		Manufacturer and Model		**TBD**			
		Max Dry Gas Flow Rate (MMscfd)		**5.0**			
		Heat Input (MMBtu/hr) - HHV		**0.22**			
		Design Type (DEG or TEG)		**TEG**			
		Source Status[2]		**ES**			
		Date Installed/Modified/Removed[3]		**2012**			
		Regenerator Still Vent APCD[4]		**None**			
		Fuel HV (Btu/scf) - HHV		**1,020**			
		H_2S 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
DFT-01	Dehydrator 01 Flash Tank (50% "Recycle" as Fuel in the Reboiler)	GRI-GLYCalc	VOC	**2.89**	**12.65**		
		GRI-GLYCalc	n-Hexane	**0.06**	**0.24**		
		GRI-GLYCalc	Benzene	**4.7E-03**	**0.02**		
		GRI-GLYCalc	Toluene	**0.01**	**0.05**		
		GRI-GLYCalc	Ethylbenzene	**0.00**	**0.01**		
		GRI-GLYCalc	Xylenes	**0.02**	**0.10**		
		GRI-GLYCalc	Tot HAP	**0.10**	**0.43**		
		GRI-GLYCalc	CO2e	**147**	**646**		
DSV-01	Dehydrator 01 Glycol Regenerator Still Vent	GRI-GLYCalc	VOC	**1.55**	**6.80**		
		GRI-GLYCalc	n-Hexane	**0.02**	**0.09**		
		GRI-GLYCalc	Benzene	**0.05**	**0.20**		
		GRI-GLYCalc	Toluene	**0.18**	**0.77**		
		GRI-GLYCalc	Ethylbenzene	**6.0E-03**	**0.03**		
		GRI-GLYCalc	Xylenes	**0.79**	**3.47**		
		GRI-GLYCalc	Tot HAP	**1.04**	**4.56**		
		GRI-GLYCalc	CO2e	**2**	**7**		
RBV-01	Dehydrator 01 Reboiler Vent	AP	NOX	**0.02**	**0.10**		
		AP	CO	**0.02**	**0.08**		
		AP	VOC	**1.2E-03**	**0.01**		
		AP	SO2	**1.3E-04**	**5.7E-04**		
		AP	PM10/2.5	**1.7E-03**	**0.01**		
		AP	Tot HAP	**4.1E-04**	**1.8E-03**		
		40CFR98	CO2e	**26**	**114**		

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.**

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):	**5.0 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.	☒ Yes ☐ No
The affected facility processes, upgrades, or stores natural gas prior to the point at which natural gas (NG) enters the NG transmission and storage source category or is delivered to the end user.	☒ Yes ☐ No
The affected facility is: ☒ prior to a NG processing plant ☐ a NG processing plant ☐ prior to the point of custody transfer and there is no NG processing plant	
The affected facility transports or stores natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company).	☐ Yes ☒ No
The affected facility exclusively processes, stores, or transfers black oil .Initial producing gas-to-oil ratio (GOR): _____scf/bbl API gravity: _____degrees	☐ Yes ☒ No

Section B: Dehydration Unit (if applicable)[1]

Description: **5.0 MMscfd - TEG Dehy 01 (DFT-01 and DSV-01)**

Date of Installation: **2012**	Annual Operating Hours: **8,760**	Burner rating (MMbtu/hr): **0.22**
Exhaust Stack Height (ft): **na**	Stack Diameter (ft): **na**	Stack Temp. (°F): **na**

Glycol Type:	☒ TEG ☐ EG ☐ Other: **na**
Glycol Pump Type:	☐ Electric ☒ Gas If gas, what is the volume ratio?: **0.08 acfm/gpm**
Condenser installed?	☐ Yes ☒ No Exit Temp: **na** Condenser Pressure: **na**
Incinerator/flare installed?	☐ Yes ☒ No Destruction Eff.: **na**
Other controls installed?	☐ Yes ☒ No Describe: **na**
Wet Gas[2]: (Upstream of Contact Tower)	Gas Temp: **60 °F** Gas Pressure: **950 psig** Saturated Gas?: ☒ Yes ☐ No If no, water content?: **na**
Dry Gas: (Downstream of Contact Tower)	Gas Flowrate: Actual: **5.0 MMscfd** Design: **5.0 MMscfd** Water Content: **7.0 lb/MMscf**
Lean Glycol:	Circulation rate: Actual[3]: **0.67 gpm** Maximum[4]: **0.67 gpm** Pump make/model: **Kimray 4015**
Glycol Flash Tank (if applicable):	Temp: **140 °F** Pressure: **40 psig** Vented: ☒ Yes ☐ No If no, describe vapor control: **Recycle to Reboiler, Otherwise Vented**
Stripping Gas (if applicable):	Source of gas: **na** Rate: **na**

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 C_1-C_8, benzene, ethylbenzene, toluene, xylene and n-hexane, using Gas Processors Association (GPA) 2286 (or similar). A sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard 2166 reference method or a modified version of EPA Method TO-14, (or similar) should be used.
3. GRI-GLYCalc Ver. 3.0 aggregate report based on maximum Lean Glycol circulation rate and maximum throughput.
4. Detailed calculations of gas or hydrocarbon flow rate.

Section C: Facility NESHAPS Subpart HH/HHH status

Affected facility status: (choose only one)

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

☐ Subject to Subpart HHH

☐ Not Subject because:

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

STORAGE TANK DATA SHEET

Source ID #[1]	Status[2]	Content[3]	Volume[4] (gal)	Dia[5] (ft)	Throughput[6] (gal/yr)	Orientation[7]	Ave Liq Ht[8] (Ft)
TK-01		**Produced Water**	**8,820**	**10**	**106,000**	**VERT**	**8**
TK-02		**Lube Oil**	**500**	**4**	**6,000**	**HORZ**	**2**
TK-03		**Triethylene Glycol**	**500**	**4**	**6,000**	**HORZ**	**2**
TK-04		**Methanol**	**325**	**3**	**3,900**	**HORZ**	**2**

Notes to STORAGE TANK DATA SHEET

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

Attachment L
EMISSIONS UNIT DATA SHEET
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/tnn/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/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name HAZLET COMPRESSOR STATION (CS)	2. Tank Name 210 BBL PRODUCED WATER
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK-01	4. Emission Point Identification No. (as assigned on *Equipment List Form*) 8E
5. Date of Commencement of Construction (for existing tanks) na	
6. Type of change ☐ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 210 BBL	
9A. Tank Internal Diameter (ft) 10	9B. Tank Internal Height (or Length) (ft) 16
10A. Maximum Liquid Height (ft) 14	10B. Average Liquid Height (ft) 8
11A. Maximum Vapor Space Height (ft) 16	11B. Average Vapor Space Height (ft) 8
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 210 BBL	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
106,000 GAL/YR	8,000

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
12

15. Maximum tank fill rate (gal/min) 200 GAL/MIN

16. Tank fill method ☐ Submerged ☒ Splash ☐ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year
	CONTINUOUS

18. Type of tank (check all that apply):
☒ Fixed Roof X vertical ___ horizontal flat roof X cone roof ___ dome roof
___ other (describe)
☐ External Floating Roof ___ pontoon roof ___ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ___ vertical column support ___ self-supporting
☐ Variable Vapor Space ___ lifter roof ___ diaphragm
☐ Pressurized ___ spherical ___ cylindrical
☐ Underground
☐ Other (describe)

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

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) WELDED

20A. Shell Color GREEN	20B. Roof Color GREEN	20C. Year Last Painted na

21. Shell Condition (if metal and unlined):
☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F) NA

22C. If YES, please describe how heat is provided to tank. NA

23. Operating Pressure Range (psig): ATM to 0.7 PSIG

24. Complete the following section for **Vertical Fixed Roof Tanks** ☒ 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** ☒ Does Not Apply

25A. Year Internal Floaters Installed: NA

25B. Primary Seal Type: (check one)
☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal
☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ 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 ☒ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (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)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss Amount	Working Loss Units	Annual Loss (lb/yr)	Estimation Method[1]
Produced Water				268	HYSYS

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☐ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

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

Identification Number (as assigned on *Equipment List Form*): **TLO**

1. Loading Area Name: **HAZLET COMPRESSOR STATION (CS)**

2. Type of **cargo vessels** accommodated at this rack or transfer point (check as many as apply):

☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	1
Number of liquids loaded	1
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1

4. Does ballasting of **marine vessels** occur at this loading area?

☐ Yes ☐ No ☒ **Does not apply**

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:
NA

6. Are cargo vessels **pressure tested** for leaks at this or any other location? **NA**

☐ Yes ☐ No ☒ **Does not apply**

If YES, describe:
NA

7. **Projected Maximum Operating Schedule** (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7
weeks/quarter	13	13	13	13

8. **Bulk Liquid Data** *(add pages as necessary):*							
Pump ID No.		1					
Liquid Name		Prod. H2O					
Max. daily throughput (1000 gal/day)		8					
Max. annual throughput (1000 gal/yr)		106					
Loading Method [1]		SP					
Max. Fill Rate (gal/min)		200					
Average Fill Time (min/loading)		60					
Max. Bulk Liquid Temperature (^{o}F)		60					
True Vapor Pressure [2]		1.5					
Cargo Vessel Condition [3]		U					
Control Equipment or Method [4]		None					
Minimum control efficiency (%)		N/A					
Maximum Emission Rate (VOC)	Loading (lb/hr)	---					
	Annual (lb/yr)	520					
Estimation Method [5]		EPA					

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit *Air Pollution Control Device Sheets*):
CA = Carbon Adsorption, LOA = Lean Oil Adsorption, CO = Condensation, SC = Scrubber (Absorption), CRA = Compressor-Refrigeration-Absorption, TO = Thermal Oxidation or Incineration, CRC = Compression-Refrigeration-Condensation, VB = Dedicated Vapor Balance (closed system), O = other (describe)

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

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

MONITORING	RECORDKEEPING
REPORTING	TESTING

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

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

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

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

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

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]				
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC				
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves[11]	Gas VOC				
	Non VOC				
Open-ended Lines[12]	VOC				
	Non-VOC				
Sampling Connections[13]	VOC				
	Non-VOC				
Compressors	VOC				
	Non-VOC				
Flanges	VOC				
	Non-VOC				
Other	VOC				
	Non-VOC				

See Attachment N for Emissions Summary.

ATTACHMENT M

Air Pollution Control Device Sheet(s)

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

- NSCR on 225 bhp Cummins GTA-855 Compressor Engine (CE-02)

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): 01-NSCR

Equipment Information

1. Manufacturer: Miratech Model No. VXC-1610-05 HSG (or equiv.)	2. Control Device Name: Catalytic Converter Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: NOx (≥92%) and CO (≥31%)	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: SCFM	10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal.	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☐ No
Are particulates present?	☐ Yes	☐ No
Are metals present?	☐ Yes	☐ No

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):		
Heat Content (BTU/scf):		
Oxygen Content (%):		
Moisture Content (%):		
Relative Humidity (%):		

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☐ Particulate (type): ☒ Other NOx and CO

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
945 ACFM @ 1304°F and PSIA

20. Gas stream temperature:
Inlet: 1304 °F
Outlet: °F

21. Gas flow rate:
Design Maximum: 945 ACFM
Average Expected: 945 ACFM

22. Particulate Grain Loading in grains/scf:
Inlet:
Outlet:

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	g/bhp-hr	grains/acf		g/bhp-hr	grains/acf	
NOx	12.10		100	1.00		92%
CO	2.90		100	2.00		31%

24. Dimensions of stack: Height ft. Diameter ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

Particulate Distribution

26. Complete the table:	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

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

28. Describe the collection material disposal system:

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet?

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

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

NOx (≥92%) and CO (≥31%)

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

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

ATTACHMENT N

Supporting Emissions Calculations

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

Emission Summary Spreadsheets

- Potential to Emit (PTE)
- Greenhouse Gas (GHG)

Unit-Specific Emission Spreadsheets

- Compressor Engine – 78 bhp Ajax DPC-81
- Compressor Engine – 225 bhp Cummins GTA-855
- Rod Packing/Crankcase (RPC)
- Startup, Shutdown and Maintenance (SSM)
- Dehydrator – 5.0 MMscfd
- Reboiler – 0.22 MMBtu/hr
- Produced Water Storage Tank – 210 bbl
- Produced Water Truck Load-Out – 2,520 bbl/yr
- Process Piping Fugitives – GAS/VAPOR and WATER/OIL

GRI-GLYCalc Analysis

- Dehydrator – 5.0 MMscfd

HYSYS Model Output

- Produced Water Storage Tank – 210 bbl

Facility Total – Potential to Emit (PTE)

Unit ID	Point ID	Control ID	Description	NOX		CO		VOC		SO2		PM10/2.5	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	na	78 bhp Ajax DPC-81 Compressor Engine	1.36	5.97	0.62	2.70	0.21	0.90	4.3E-04	1.9E-03	0.04	0.15
CE-02	2E	01-NSCR	225 bhp Cummins GTA-855 Compressor Engine	0.50	2.17	0.99	4.35	0.17	0.73	1.2E-03	5.5E-03	0.04	0.18
RPC	3E	na	Rod Packing/Crankcase Leaks	---	---	---	---	1.78	7.81	---	---	---	---
SSM	4E	na	Startup/Shutdown/Maintenance (Blowdown (BD))	---	---	---	---	---	4.40	---	---	---	---
DFT-01	5E	na	5.0 MMscfd Dehydrator - Flash Tank	---	---	---	---	2.89	12.65	---	---	---	---
DSV-01	6E	na	5.0 MMscfd Dehydrator - Regenerator/Still Vent	---	---	---	---	1.55	6.80	---	---	---	---
RBV-01	7E	na	0.22 MMBtu/hr Reboiler Vent	0.02	0.10	0.02	0.08	1.2E-03	0.01	1.3E-04	5.7E-04	1.7E-03	0.01
TK-01	8E	na	Produced Water - Storage Tank	---	---	---	---	0.01	0.13	---	---	---	---
TLO	9E	na	Produced Water - Truck Load-Out	---	---	---	---	---	0.26	---	---	---	---
			TOTAL PTE (w/o FUG):	**1.88**	**8.23**	**1.63**	**7.13**	**6.61**	**33.69**	**1.8E-03**	**0.01**	**0.08**	**0.34**
			WV-DEP NSR Permit Threshold:	**6 lb/hr *AND* 10 tpy**		**6 lb/hr *AND* 10 tpy**		**6 lb/hr *AND* 10 tpy**		6 lb/hr *AND* 10 tpy		6 lb/hr *AND* 10 tpy	
			Title V Permit Threshold:	**---**	**100**	**---**	**100**	**---**	**100**	**---**	**100**	**---**	**100**
FUG	10E	na	Piping and Equipment Fugitives	---	---	---	---	2.12	9.28	---	---	---	---
			TOTAL PTE (w/FUG):	**1.88**	**8.23**	**1.63**	**7.13**	**8.73**	**42.97**	**1.8E-03**	**0.01**	**0.08**	**0.34**

Unit ID	Point ID	Control ID	HCHO		n-Hexane		Benzene		Toluene		Ethylbenzene		Xylenes		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
CE-01	1E	na	0.08	0.34	3.2E-04	1.4E-03	1.4E-03	0.01	7.0E-04	3.1E-03	7.9E-05	3.4E-04	2.0E-04	8.6E-04	0.10	0.42
CE-02	2E	01-NSCR	0.04	0.19	---	---	3.3E-03	0.01	1.2E-03	0.01	5.3E-05	2.3E-04	4.1E-04	1.8E-03	0.07	0.30
RPC	3E	na	9.7E-04	4.2E-03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.03	0.14
SSM	4E	na	---	---	---	0.06	---	1.7E-03	---	3.4E-03	---	1.7E-03	---	0.01	---	0.08
DFT-01	5E	na	---	---	0.06	0.24	4.7E-03	2.1E-02	0.01	0.05	2.3E-03	1.0E-02	0.02	0.10	0.10	0.43
DSV-01	6E	na	---	---	0.02	0.09	0.05	0.20	0.18	0.77	6.0E-03	2.6E-02	0.79	3.47	1.04	4.56
RBV-01	7E	na	1.6E-05	7.2E-05	3.9E-04	1.7E-03	4.6E-07	2.0E-06	7.4E-07	3.2E-06	---	---	---	---	4.1E-04	1.8E-03
TK-01	8E	na	---	---	5.6E-04	2.7E-03	5.6E-04	2.7E-03	5.6E-04	2.7E-03	5.6E-04	2.7E-03	2.7E-03	2.7E-03	1.4E-02	0.01
TLO	9E	na	---	---	---	0.01	---	0.01	---	0.01	---	0.01	---	0.01	---	0.06
		PTE (w/o FUG):	**0.12**	**0.53**	**0.08**	**0.44**	**0.06**	**0.29**	**0.20**	**0.88**	**0.02**	**0.08**	**0.82**	**3.62**	**1.35**	**6.01**
		WV-DEP:	**2 lb/hr *OR* 0.5 tpy**		2 lb/hr *OR* 5 tpy		**2 lb/hr *OR* 0.5 tpy**		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		2 lb/hr *OR* 5 tpy		**2 lb/hr *OR* 5 tpy**	
		Title V:	---	10	---	10	---	10	---	10	---	10	---	10	---	25
FUG	10E	na	---	---	0.10	0.46	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.24	1.05
		PTE (w/FUG):	**0.12**	**0.53**	**0.19**	**0.90**	**0.09**	**0.40**	**0.22**	**1.00**	**0.04**	**0.20**	**0.85**	**3.74**	**1.59**	**7.06**

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

Greenhouse Gas (GHG) Potential-to-Emit (PTE)

Unit ID	Point ID	Control ID	Description	Heat Input MMBtu/hr (HHV)	Hours of Operation hr/yr	kg/MMBtu: GWP: CO2 tpy	53.06 1 CO2e tpy	kg/MMBtu: GWP: CH4 tpy	1.00E-03 25 CO2e tpy	kg/MMBtu: GWP: N2O tpy	1.00E-04 298 CO2e tpy	TOTAL CO2e tpy
CE-01	1E	na	78 bhp Ajax DPC-81 Compressor Engine	0.73	8,760	490	490	5	115	7.0E-04	0.2	605
CE-02	2E	01-NSCR	225 bhp Cummins GTA-855 Compressor Engine	2.12	8,760	1,366	1,366	2	53	2.0E-03	1	1,420
RPC	3E	na	Rod Packing/Crankcase Leaks	---	8,760	31	31	26	640	---	---	671
SSM	4E	na	Startup/Shutdown/Maintenance (Blowdown (BD))	---	8,760	---	---	14	361	---	---	361
DFT-01	5E	na	5.0 MMscfd Dehydrator - Flash Tank	---	8,760	---	---	26	646	---	---	646
DSV-01	6E	na	5.0 MMscfd Dehydrator - Regenerator/Still Vent	---	8,760	---	---	0.3	7	---	---	7
RBV-01	7E	na	0.22 MMBtu/hr Reboiler Vent	0.22	8,760	114	114	0.00	0.1	2.1E-04	0.1	114
TK-01	8E	na	Produced Water - Storage Tank	---	8,760	---	---	---	---	---	---	---
TLO	9E	na	Produced Water - Truck Load-Out	---	---	---	---	---	---	---	---	---
			TOTAL FACILITY-WIDE PTE (w/o FUG):			**2,000**		**73**		**0.00**		**3,824**
			NSR/PSD Threshold: (			**250**	**- OR -**	**250**	**- OR -**	**250**	**) - AND -**	**100,000**
			Title V Major Source Threshold:			**na**		**na**		**na**		**100,000**
FUG	10E	na	Piping and Equipment Fugitives	---	8,760	---	---	24	595	---	---	595
			TOTAL FACILITY-WIDE PTE (w/ FUG):			**2,000**		**97**		**0.00**		**4,418**

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

Compressor Engine – 78 bhp Ajax DPC-81

Unit ID	Description	Reference	Pollutant	Pre-Controlled Emissions			Control Efficiency	Controlled Emissions		
				g/bhp-hr	lb/hr	tpy		g/bhp-hr	lb/hr	tpy
CE-01	**Engine 01** **Ajax** **DPC-81 (2SLB)** **78 bhp** 475 rpm (AFRC) **8,760 hr/yr** Manufactured: 10/01/88 Pre-NSPS JJJJ "Existing" NESHAP ZZZZ 920 Btu/scf (LHV) 1,020 Btu/scf (HHV) **8,500 Btu/bhp-hr (LHV)** 9,350 Btu/bhp-hr (HHV) 0.66 MMBtu/hr (LHV) 0.73 MMBtu/hr (HHV) 733 scf/hr 6.42 MMscf/yr	Vendor Data (+20% sf)	NOX	7.92	1.36	5.97	0.0%	**7.92**	**1.36**	**5.97**
		Vendor Data (+226%)	CO	3.59	0.62	2.70	0.0%	**3.59**	**0.62**	**2.70**
		NMHC+CH4	THC	6.72	1.16	5.06	0.0%	**6.72**	**1.16**	**5.06**
		Vendor Data (+20% sf)	NMHC	0.60	0.10	0.45	0.0%	**0.60**	**0.10**	**0.45**
		Vendor Data (+50% sf)	NMNEHC	0.75	0.13	0.56	0.0%	**0.75**	**0.13**	**0.56**
		NMNEHC+HCHO	VOC	1.20	0.21	0.90	0.0%	**1.20**	**0.21**	**0.90**
		AP-42 Table 3.2-1	SO2	2.5E-03	4.3E-04	1.9E-03	0.0%	**2.5E-03**	**4.3E-04**	**1.8783E-03**
		AP-42 Table 3.2-1	PM10/2.5	0.20	0.04	0.15	0.0%	**0.20**	**0.04**	**0.15**
		Vendor Data (+50% sf)	HCHO	0.45	0.08	0.34	0.0%	**0.45**	**0.08**	**0.34**
		AP-42 Table 3.2-1	n-Hexane	1.9E-03	3.2E-04	1.4E-03	0.0%	**1.9E-03**	**3.2E-04**	**1.4E-03**
		AP-42 Table 3.2-1	Benzene	0.01	1.4E-03	0.01	0.0%	**0.01**	**1.4E-03**	**0.01**
		AP-42 Table 3.2-1	Toluene	4.1E-03	7.0E-04	3.1E-03	0.0%	**4.1E-03**	**7.0E-04**	**3.1E-03**
		AP-42 Table 3.2-1	Ethylbenzene	4.6E-04	7.9E-05	3.4E-04	0.0%	**4.6E-04**	**7.9E-05**	**3.4E-04**
		AP-42 Table 3.2-1	Xylenes	1.1E-03	2.0E-04	8.6E-04	0.0%	**1.1E-03**	**2.0E-04**	**8.6E-04**
		AP-42 Table 3.2-1	2,2,4-TMP	3.6E-03	6.2E-04	2.7E-03	0.0%	**3.6E-03**	**6.2E-04**	**2.7E-03**
		AP-42 Table 3.2-1	Other HAP	0.08	0.01	0.06	0.0%	**0.08**	**0.01**	**0.06**
		Sum	Total HAP	0.55	0.10	0.42	0.0%	**0.55**	**0.10**	**0.42**
		AP-42 Table 3.2-1	CO2	650	112	490	0.0%	**650**	**112**	**490**
		Vendor Data (+20% sf)	CH4	6.12	1.05	4.61	0.0%	**6.12**	**1.05**	**4.61**
		40CFR98 - Table C-2	N2O	9.3E-04	1.6E-04	7.0E-04	0.0%	**9.3E-04**	**1.6E-04**	**7.0E-04**
		40CFR98 - Table A-1	CO2e	803	138	605	0.0%	**803**	**138**	**605**

Notes:
1 - The emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
2 - As per vendor specifications, THC, NMHC, and NMNEHC (non-methane/non-ethane hydrocarbon) do not include HCHO. VOC is the sum of NMNEHC and HCHO.
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5
4 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP, acetaldehyde, acrolein, and MeOH.
5 - 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.
6 - **Vendor data are not representative of Not-to-Exceed values**. The vendor recommends a "nominal percentage" be added to the emissions factors to allow for operational flexibility and variation in fuel gas composition.
7 - **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.

Compressor Engine – 225 bhp Cummins GTA-855

Unit ID	Description	Reference	Pollutant	Pre-Controlled Emissions			Control Efficiency	Controlled Emissions		
				g/bhp-hr	lb/hr	tpy		g/bhp-hr	lb/hr	tpy
CE-02	**Engine 02** **Cummins** **GTA-855 (4SRB)** **225 bhp** 1,800 rpm NSCR **8,760 hr/yr** Manufactured: 01/01/2015 NSPS JJJJ "New" NESHAP ZZZZ 920 Btu/scf (LHV) 1,020 Btu/scf (HHV) **8,496 Btu/bhp-hr (LHV)** 9,420 Btu/bhp-hr (HHV) 1.91 MMBtu/hr (LHV) 2.12 MMBtu/hr (HHV) 2,078 scf/hr 18.20 MMscf/yr	Vendor Data	NOX	12.10	6.00	26.29	92%	**1.00**	**0.50**	**2.17**
		Vendor Data	CO	2.90	1.44	6.30	31%	**2.00**	**0.99**	**4.35**
		Vendor Data	THC	1.43	0.71	3.11	0%	**1.43**	**0.71**	**3.11**
		AP-42 Table 3.2-3	NMHC	0.55	0.27	1.19	0%	**0.55**	**0.27**	**1.19**
		AP-42 Table 3.2-3	NMNEHC	0.25	0.12	0.53	0%	**0.25**	**0.12**	**0.53**
		NMNEHC + HCHO	VOC	0.33	0.17	0.73	0%	**0.33**	**0.17**	**0.73**
		AP-42 Table 3.2-3	SO2	2.5E-03	1.2E-03	5.5E-03	0%	**2.5E-03**	**1.2E-03**	**0.01**
		AP-42 Table 3.2-3	PM10/2.5	8.3E-02	0.04	0.18	0%	**0.08**	**0.04**	**0.18**
		AP-42 Table 3.2-3	HCHO	0.09	0.04	0.19	0%	**0.09**	**0.04**	**0.19**
		AP-42 Table 3.2-3	n-Hexane	---	---	---	0%	**---**	**---**	**---**
		AP-42 Table 3.2-3	Benzene	0.01	3.3E-03	0.01	0%	**0.01**	**3.3E-03**	**0.01**
		AP-42 Table 3.2-3	Toluene	2.4E-03	1.2E-03	0.01	0%	**2.4E-03**	**1.2E-03**	**0.01**
		AP-42 Table 3.2-3	Ethylbenzene	1.1E-04	5.3E-05	2.3E-04	0%	**1.1E-04**	**5.3E-05**	**2.3E-04**
		AP-42 Table 3.2-3	Xylenes	8.3E-04	4.1E-04	1.8E-03	0%	**8.3E-04**	**4.1E-04**	**1.8E-03**
		AP-42 Table 3.2-3	2,2,4-TMP	---	---	---	---	**---**	**---**	**---**
		AP-42 Table 3.2-3	Other HAP	0.04	0.02	0.09	0%	**0.04**	**0.02**	**0.09**
		Sum	Total HAP	0.14	0.07	0.30	0%	**0.14**	**0.07**	**0.30**
		Vendor Data	CO2	629	312	1,366	0%	**629**	**312**	**1,366**
		AP-42 Table 3.2-3	CH4	0.98	0.49	2.14	0%	**0.98**	**0.49**	**2.14**
		40CFR98 - Table C-2	N2O	9.4E-04	4.7E-04	0.00	0%	**9.4E-04**	**4.7E-04**	**2.0E-03**
		40CFR98 - Table A-1	CO2e	525	324	1,420	0%	**525**	**324**	**1,420**

Notes:
1 - The emissions are based on operation at 100% of rated load for 8,760 hrs/yr.
2 - As per vendor specifications, THC, NMHC, and NMNEHC (non-methane/non-ethane hydrocarbon) do not include HCHO. VOC is the sum of NMNEHC and HCHO.
3 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5
4 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP, acetaldehyde, acrolein, and MeOH.
5 - 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.
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.

Rod Packing/Crankcase (RPC)

Unit Description	Number of Comp-ressors	Cylinders per Comp-ressor	scfh per Cylinder	Contin-gency	Total Fugitive Leak Rate	VOC 12,900 lb/MMscf		HCHO na lb/MMscf		n-Hex, BTEX (Each) 45 lb/MMscf		Total HAP 225 lb/MMscf		CO2 170 lb/MMscf		CH4 42,275 lb/MMscf		CO2e 1,057,045 lb/MMscf	
					MMscf/yr	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Rod Packing Emissions (Gas)	2	4	15	15%	1.21	1.78	7.80	na	na	6.2E-03	0.03	0.03	0.14	0.02	0.1	6	26	146	639

Unit Description	Total Effective (Prorated for hr/yr) Horsepower (bhp)	Crankcase Leak Rate 0.50 scf/bhp-hr MMscf/yr	Safety Factor	VOC 9.75 lb/MMscf		HCHO 2.56 lb/MMscf		n-Hex, BTEX (Each) 0.29 lb/MMscf		Total HAP 4.03 lb/MMscf		CO2 18,379 lb/MMscf		CH4 29 lb/MMscf		CO2e 19,097 lb/MMscf	
				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Crankcase Emissions (Exhaust)	303	1.33	250%	3.7E-03	0.02	9.7E-04	4.2E-03	1.1E-04	4.9E-04	1.5E-03	0.01	7	30	0.01	0.05	7	32		

	VOC		HCHO		n-Hex, BTEX (Each)		Total HAP		CO2		CH4		CO2e	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Total RPC Emissions:	**1.78**	**7.81**	**9.7E-04**	**4.2E-03**	**6.3E-03**	**0.03**	**0.03**	**0.14**	**7**	**31**	**6**	**26**	**153**	**671**

Notes:

1 - Fugitive equipment leaks from misc.equipment is a broad category covering leaks of natural gas from sealed surfaces, such as packing and gaskets, resulting from the wear of mechanical joints, seals, and rotating surfaces over time.

2 - Emission are based upon 40CFR98, Subpart W and manufacturer's data.

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

Pollutant	Representative Gas Analysis	Worst-Case Assumption
CO2	141 lb/MMscf	170 lb/MMscf
CH4	31,020 lb/MMscf	42,275 lb/MMscf
VOC	10,697 lb/MMscf	12,900 lb/MMscf
n-Hex, BTEX (ea)	34 lb/MMscf	45 lb/MMscf
Total HAP	168 lb/MMscf	225 lb/MMscf

4 - Total Facility-Wide bhp is determined as follows:

Unit ID	BHP	Hr/Yr	Prorated
CE-01	78	8,760	78
CE-02	225	8,760	225
TOTAL	**303**	**---**	**303**

5 - Total Rod Packing Emissions (Gas) Leak Rate (scf/yr)
= No. of Compresors * Cylinders/Compressor * scfh/Cylinder * **8,760 hr/yr** * (1 + Contingency)

6 - Engine crankcase emissions are based on vendor data: "As a general rule, blow-by (i.e., crankcase emissions) on a *new* engine is approximately 0.5 scf/bhp-hr." A "safety factor" is used to account for increasing blow-by as the engines "wear".

7 - Crankcase emissions are estimated as follows:

(Data from **Cummins GTA855** Data Sheet and Emissions Calculation Spreadsheet.)

Total Engine Exhaust (TEEx) (Volume) 945 ft3/min (acf/min) 148.67 MMscf/yr TEEx*

Pollutant	Cummins GTA855	Crankcase Emission Factor**
Crankcase THC emissions (Mass)	3.11 tpy THC	41.80 lb THC / MMscf TEEx
Crankcase VOC emissions (Mass)	0.73 tpy VOC	9.75 lb VOC / MMscf TEEx
Crankcase HCHO emissions (Mass)	0.19 tpy HCHO	2.56 lb HCHO / MMscf TEEx
Crankcase n-Hex, BTEX (ea) emissions (Mass)	0.02 tpy n-Hex, BTEX (ea)	0.29 lb n-Hex, BTEX (ea) / MMscf TEEx
Crankcase HAP emissions (Mass)	0.30 tpy HAP	4.03 lb HAP / MMscf TEEx
Crankcase CO2 emissions (Mass)	1,366 tpy CO2	18,379 lb CO2 / MMscf TEEx
Crankcase CH4 emissions (Mass)	2.14 tpy CH4	28.72 lb CH4 / MMscf TEEx
Crankcase CO2e emissions (Mass)	1,420 tpy CO2e	19,105 lb CO2e / MMscf TEEx

* Conversion from acf/min to scf/yr based on **8,760 hr/yr**, **1,304 oF** exhaust temp, and 68 oF std temp.

** Crankcase Emission Factor = PTE (tpy) from a **Cummins GTA855** Engine ÷ Total Engine Exhaust (TEEx) (MMsfy/yr).

Startup, Shutdown and Maintenance (SSM)

Unit ID	Description	No of Units	Total bhp	a. "Cold-Start" Gas		b. Blowdown Gas		Site-Wide SSM Events	Total Gas Vented
				scf/Unit	scf/SSM	scf/bhp	scf/SSM	SSM/yr	MMscf/yr
SSM	a. Cold-Start Engine	2	na	700	1,400	na	na	208	0.29
	b. Compressor Blowdown	2	303	na	na	6.22	1,883	208	0.39

Unit ID	Description	CH4 42,275 lb/MMscf tpy	CO2e 1,056,875 lb/MMscf tpy	VOC 12,900 lb/MMscf tpy	n-Hexane 180.00 lb/MMscf tpy	Benzene 5.00 lb/MMscf tpy	Toluene 10.00 lb/MMscf tpy	E-benzene 5.00 lb/MMscf tpy	Xylenes 20.00 lb/MMscf tpy	Total HAP 225.00 lb/MMscf tpy
SSM	a. Cold-Start Engine	6	154	1.88	0.03	7.3E-04	1.5E-03	7.3E-04	2.9E-03	0.03
	b. Compressor Blowdown	8	207	2.53	0.04	9.8E-04	2.0E-03	9.8E-04	3.9E-03	0.04
TOTAL FACILITY-WIDE SSM EMISSIONS:		**14**	**361**	**4.40**	**0.06**	**1.7E-03**	**3.4E-03**	**1.7E-03**	**0.01**	**0.08**

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

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

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

Pollutant	Analysis	Assumed
CH4	31,020 lb/MMscf	42,275 lb/MMscf
VOC	10,697 lb/MMscf	12,900 lb/MMscf
n-Hexane	148.06 lb/MMscf	180.00 lb/MMscf
Benzene	1.85 lb/MMscf	5.00 lb/MMscf

Pollutant	Analysis	Assumed
Toluene	5.10 lb/MMscf	10.00 lb/MMscf
E-benzene	0.14 lb/MMscf	5.00 lb/MMscf
Xylenes	13.15 lb/MMscf	20.00 lb/MMscf
Total HAP	168.45 lb/MMscf	225.00 lb/MMscf

4 - To be conservative, these SSM estimates are based on **4.0** facility-wide blowdowns each week.

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

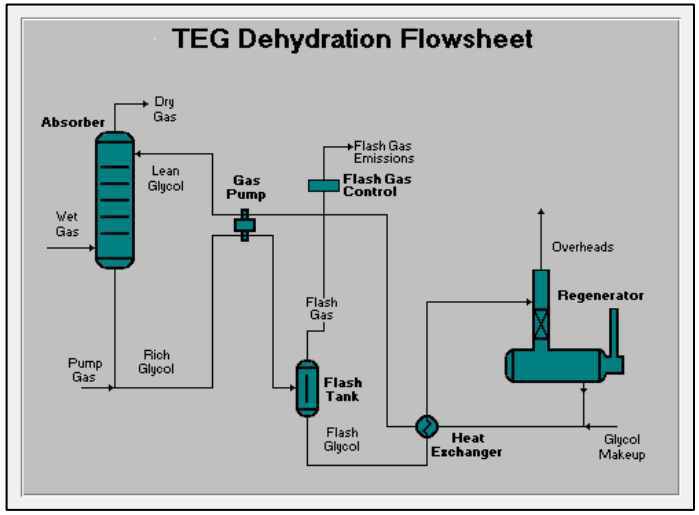
Tri-Ethylene Glycol (TEG) Dehydrator – 5.0 MMscfd

Unit ID	Description	Capacity	Reference	Pollutant	GRI-GLYCalc Pre-Control Emission		"Worst-Case" Pre-Control Emissions		Control Efficiency	Controlled Emissions	
					lb/hr	tpy	lb/hr	tpy	%	lb/hr	tpy
DFT-01	**Tri-Ethylene Glycol (TEG) Dehydrator 01** **Flash Tank Vent** (≥ 50% Recycle)	Flow Rate **5.0** MMscfd **8,760** hr/yr	GRI-GLYCalc 4.0	VOC	2.41	10.54	2.89	12.65	0.0%	**2.89**	**12.65**
			GRI-GLYCalc 4.0	n-Hexane	0.05	0.20	0.06	0.24	0.0%	**0.06**	**0.24**
			GRI-GLYCalc 4.0	Benzene	3.9E-03	0.02	4.7E-03	0.02	0.0%	**4.7E-03**	**0.02**
			GRI-GLYCalc 4.0	Toluene	0.01	0.04	0.01	0.05	0.0%	**0.01**	**0.05**
			GRI-GLYCalc 4.0	Ethylbenzene	2.1E-04	9.0E-04	2.3E-03	0.01	0.0%	**2.3E-03**	**0.01**
			GRI-GLYCalc 4.0	Xylenes	0.02	0.08	0.02	0.10	0.0%	**0.02**	**0.10**
			GRI-GLYCalc 4.0	2,2,4-TMP	4.6E-05	2.0E-04	2.3E-03	0.01	0.0%	**2.3E-03**	**0.01**
			GRI-GLYCalc 4.0	Tot HAP	0.08	0.35	0.10	0.43	0.0%	**0.10**	**0.43**
			GRI-GLYCalc 4.0	CH4	4.92	21.53	5.90	25.84	0.0%	**5.90**	**25.84**
			40CFR98 - Table A-1	CO2e	123	538	147	646	0.0%	**147**	**646**
DSV-01	**Tri-Ethylene Glycol (TEG) Dehydrator 01** **Regenerator/Still Vent**	Flow Rate **5.0** MMscfd **8,760** hr/yr	GRI-GLYCalc 4.0	VOC	1.29	5.66	1.55	6.80	0.0%	**1.55**	**6.80**
			GRI-GLYCalc 4.0	n-Hexane	0.02	0.07	0.02	0.09	0.0%	**0.02**	**0.09**
			GRI-GLYCalc 4.0	Benzene	0.04	0.17	0.05	0.20	0.0%	**0.05**	**0.20**
			GRI-GLYCalc 4.0	Toluene	0.15	0.65	0.18	0.77	0.0%	**0.18**	**0.77**
			GRI-GLYCalc 4.0	Ethylbenzene	0.01	0.02	6.0E-03	0.03	0.0%	**6.0E-03**	**0.03**
			GRI-GLYCalc 4.0	Xylenes	0.66	2.89	0.79	3.47	0.0%	**0.79**	**3.47**
			GRI-GLYCalc 4.0	2,2,4-TMP	2.3E-05	1.0E-04	2.3E-03	0.01	0.0%	**2.3E-03**	**0.01**
			GRI-GLYCalc 4.0	Tot HAP	0.87	3.80	1.04	4.56	0.0%	**1.04**	**4.56**
			GRI-GLYCalc 4.0	CH4	0.05	0.23	0.06	0.28	0.0%	**0.06**	**0.28**
			40CFR98 - Table A-1	CO2e	1	6	2	7	na	**2**	**7**

Notes:
1 - Used GRI-GLYCalc V4.0 to calculate combined regenerator vent/flash gas emissions.
2 - GRI-GLYCalc 4.0 Model Results are based on the following input:

Wet Gas:	60 oF and 950 psig, H2O Saturated (17.59 lb-H2O/MMscf)
Gas Analysis:	See Attachment I
Dry Gas:	5.0 MMscfd, 7.0 lb-H2O/MMscf
Lean Glycol:	1.5 wt% H2O, 0.67 gpm (11.38 gal/lb-H2O)
Glycol Pump:	Gas Injection, Kimray 4015
Flash Tank:	140 oF, 40 psig, 50% Recycle (338 scfh)
Stripping Gas:	None
Regen Control:	None

3 - Total HAP includes n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), and other components.
4 - A 20% contingency has been added to the GRI-GLYCalc model results to account for potential future changes in gas quality.



Reboiler – 0.22 MMBtu/hr

Unit ID	Description	Reference	Pollutant	Emission Factor		Pre-Controlled Emissions		Control Efficiency	Controlled Emissions	
				lb/MMscf	lb/MMBtu	lb/hr	tpy	%	lb/hr	tpy
		EPA AP-42 Table 1.4-1	NOX	100.00	0.10	0.02	0.10	na	**0.02**	**0.10**
	Reboiler 01	EPA AP-42 Table 1.4-1	CO	84.00	0.08	0.02	0.08	na	**0.02**	**0.08**
		EPA AP-42 Table 1.4-2	VOC	5.50	0.01	0.00	0.01	na	**0.00**	**0.01**
	8,760 hr/yr	EPA AP-42 Table 1.4-2	SO2	0.60	5.9E-04	1.3E-04	5.7E-04	na	**1.3E-04**	**5.7255E-04**
		EPA AP-42 Table 1.4-2	PM10/2.5	7.60	0.01	0.00	0.01	na	**0.00**	**0.01**
		EPA AP-42 Table 1.4-3	HCHO	0.08	7.4E-05	1.6E-05	7.2E-05	na	**1.6E-05**	**7.2E-05**
		EPA AP-42 Table 1.4-3	n-Hexane	1.80	1.8E-03	3.9E-04	1.72E-03	na	**3.9E-04**	**1.7E-03**
	0.20 MMBtu/hr (LHV)	EPA AP-42 Table 1.4-3	Benzene	2.1E-03	2.1E-06	4.6E-07	2.0E-06	na	**4.6E-07**	**2.0E-06**
RBV-01	**0.22 MMBtu/hr (HHV)**	EPA AP-42 Table 1.4-3	Toluene	3.4E-03	3.3E-06	7.4E-07	3.2E-06	na	**7.4E-07**	**3.2E-06**
		EPA AP-42 Table 1.4-3	Ethylbenzene	---	---	---	---	---	**---**	**---**
	920 Btu/scf (LHV)	EPA AP-42 Table 1.4-3	Xylenes	---	---	---	---	---	**---**	**---**
	1,020 Btu/scf (HHV)	EPA AP-42 Table 1.4-3	2,2,4-TMP	---	---	---	---	---	**---**	**---**
		EPA AP-42 Table 1.4-3	Other HAP	1.9E-03	1.9E-06	4.1E-07	1.8E-06	na	**4.1E-07**	**1.8E-06**
	1,752 MMBtu/yr (LHV)	EPA AP-42 Table 1.4-3	Tot HAP	1.88	1.8E-03	4.1E-04	1.8E-03	na	**4.1E-04**	**1.8E-03**
	1,947 MMBtu/yr (HHV)	40CFR98 - Table C-1	CO2	119,317	117	26	114	na	**26**	**114**
	218 scf/hr	40CFR98 - Table C-2	CH4	2.25	2.2E-03	4.9E-04	2.1E-03	na	**4.9E-04**	**2.1E-03**
	1.91 MMscf/yr	40CFR98 - Table C-2	N2O	0.22	2.2E-04	4.9E-05	2.1E-04	na	**4.9E-05**	**2.1E-04**
		40CFR98 - Table A-1	CO2e	119,440	117	26	114	na	**26**	**114**

Notes:
1 - The combustion emission factors are based on a default fuel heat content of 1,020 Btu/scf (HHV).
2 - PM10/2.5 is filterable and condensable particulate matter; including PM10 and PM2.5.
3 - HCHO is formaldehyde; Total HAP includes, but not limited to, HCHO, n-hexane, BTEX (benzene, toluene, ethylbenzene, xylene), 2,2,4-TMP, acetaldehyde, acrolein, and MeOH.
4 - **Emission factors in AP-42 are NOT EPA-recommended emission limits.** Because emission factors essentially represent an average of a range of emission rates, a permit limit using an AP-42 emission factor would result in half of the sources being in noncompliance.

Produced Water Storage Tank

Storage Tank PTE Calculations - Working, Breathing and Flashing Emissions

Unit ID	Tank ID	Material Stored	Capacity		Turn-overs per Year	Throughput		EPA-450/3-85-001a VOC Emission Factor (Working and Breathing Losses)	HYSYS VOC Emission Factor (Flashing Losses)	VOC		n-Hex, BTEX (Ea) 5.00% of VOC		Total HAP 25.00% of VOC	
			gal	bbl		gal/yr	bbl/yr			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
T01	Tank 01	Produced Water	8,820	210	12	105,840	2,520	0.03889 lb/bbl	0.000 lb/bbl	0.01	0.05	5.6E-04	2.5E-03	2.8E-03	0.01

Storage Tank PTE Calculations - Blanket Gas Emissions

Unit ID	Tank ID	Material Stored	Capacity		Turnovers per Year	Storage Tank Volume	Storage Tank Blanket Gas Volume	Methane (CH4) 42,275 lb/MMscf		VOC 12,900 lb/MMscf		n-Hex, BTEX (Ea) 45 lb/MMscf		Total HAP 225 lb/MMscf	
			gal	bbl				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
T01	Tank 01	Produced Water	8,820	210	12	1,100 scf	13,195 scf	---	0.28	---	0.09	---	3.0E-04	---	1.5E-03

	Methane (CH4)		VOC		n-Hex, BTEX (Ea)		Total HAP	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TOTAL TANK EMISSIONS:	**---**	**0.28**	**0.01**	**0.13**	**5.6E-04**	**2.7E-03**	**2.8E-03**	**0.01**

Notes:

1 - EPA-450/3-85-001a – "Volatile Organic Compound Emissions from Petroleum Refinery Wastewater Systems - Background Information for Proposed Standards" is a reasonable protocol for estimating potential produced water storage tank working and breathing losses. EPA-450/3-85-001a, page 3-39, gives a VOC emission factor of 420 kg/MMgal wastewater produced in an oil-water separator. (0.420 g/gal * 0.0022 lb/g * 42 gal/bbl = 0.03889 lb/bbl)

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

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

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

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

4 - The HYSYS Simulation software was used to estimate flashing losses from the produced water storage tank. Results were 0.000 lb-VOC/bbl.

5 - A natural gas blanket will be used on the produced water tank to prevent air from entering the tank and causing an explosion. Field natural gas will be used as the blanket gas.

Produced Water/Condensate – Truck Load-Out

Unit ID	Description	S sat. fac.	P psia	MW lb/lb-mol	T ^{o}R	CE %	L_L lb/kgal	T-Put kgal/yr	VOC AP-42 Sect 5.2 tpy	n-Hex, BTEX (ea) 5.00% of VOC tpy	Total HAP 25.00% of VOC tpy
TLO	Truck Load-Out	1.45	1.5	92	510	0.0%	4.90	106	0.26	0.01	0.06
							bbl/yr:	**2,520**			

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).

3 - It is estimated that each tank will be emptied up to: **12** times per year.

4 - The total storage tank capacity at the facility is: **210** bbl.

5 - **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.

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)		VOC 22.87 Wgt%		n-Hexane 0.32 Wgt%		BTEX, TMP-ea 0.02 Wgt%		Total HAP 0.40 Wgt%		CO2 0.30 Wgt%		CH4 100.00 Wgt%		CO2e GWP = 25	
						lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG-G (10E)	Process Piping Fugitives (Gas)	Valves	386	0.00992	0%	3.82	16.75	0.87	3.83	0.01	0.05	6.1E-04	0.00	0.02	0.07	0.01	0.05	3.82	16.75	96	419
		Pump Seals	0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
		Other	45	0.01940	0%	0.87	3.82	0.20	0.87	2.8E-03	0.01	1.4E-04	6.1E-04	3.5E-03	0.02	2.6E-03	0.01	0.87	3.82	22	96
		Connectors	1,106	0.00044	0%	0.49	2.13	0.11	0.49	1.6E-03	0.01	7.8E-05	3.4E-04	1.9E-03	0.01	1.5E-03	0.01	0.49	2.13	12	53
		Flanges	180	0.00086	0%	0.15	0.68	0.04	0.15	4.9E-04	2.2E-03	2.5E-05	1.1E-04	6.2E-04	2.7E-03	4.7E-04	2.0E-03	0.15	0.68	4	17
		Open-ended	21	0.00441	0%	0.09	0.41	0.02	0.09	3.0E-04	1.3E-03	1.5E-05	6.5E-05	3.7E-04	1.6E-03	2.8E-04	1.2E-03	0.09	0.41	2	10
			1,737	**Pre-Control:**		5.43	23.79	1.24	5.44	0.02	0.08	8.7E-04	3.8E-03	0.02	0.09	0.02	0.07	5.43	23.79	136	595
				Controlled:		**5.43**	**23.79**	**1.24**	**5.44**	**0.02**	**0.08**	**8.7E-04**	**3.8E-03**	**0.02**	**0.09**	**0.02**	**0.07**	**5.43**	**23.79**	**136**	**595**

Unit ID (Point ID)	Description	Component (Unit) Type (Water/Oil)	Unit Count	THC Factor lb/hr/Unit	LDAR Control Credit	Hydrocarbons (THC)		VOC 100.00 Wgt%		n-Hexane 10.00 Wgt%		BTEX, TMP-ea 3.00 Wgt%		Total HAP 25.00 Wgt%		CO2 --- Wgt%		CH4 --- Wgt%		CO2e GWP = 25	
						lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
FUG-W (10E)	Process Piping Fugitives (Water/Oil)	Valves	193	0.00022	0%	0.04	0.18	0.04	0.18	4.2E-03	1.8E-02	1.2E-03	5.5E-03	1.0E-02	4.6E-02	---	---	---	---	---	---
		Pump Seals	4	0.00005	0%	2.1E-04	9.3E-04	2.1E-04	9.3E-04	2.1E-05	9.3E-05	6.3E-06	2.8E-05	5.3E-05	2.3E-04	---	---	---	---	---	---
		Other	23	0.03086	0%	0.69	3.04	0.69	3.04	6.9E-02	3.0E-01	2.1E-02	9.1E-02	1.7E-01	7.6E-01	---	---	---	---	---	---
		Connectors	553	0.00024	0%	0.13	0.59	0.13	0.59	1.3E-02	5.9E-02	4.0E-03	1.8E-02	3.4E-02	0.15	---	---	---	---	---	---
		Flanges	90	0.00001	0%	5.8E-04	2.5E-03	5.8E-04	2.5E-03	5.8E-05	2.5E-04	1.7E-05	7.6E-05	1.4E-04	6.3E-04	---	---	---	---	---	---
		Open-ended	11	0.00055	0%	5.8E-03	0.03	5.8E-03	0.03	5.8E-04	2.5E-03	1.7E-04	7.6E-04	1.4E-03	6.3E-03	---	---	---	---	---	---
			873	**Pre-Control:**		0.88	3.84	0.88	3.84	8.8E-02	3.8E-01	2.6E-02	0.12	0.22	0.96	---	---	---	---	---	---
				Controlled:		**0.88**	**3.84**	**0.88**	**3.84**	**8.8E-02**	**0.38**	**0.03**	**0.12**	**0.22**	**0.96**	**---**	**---**	**---**	**---**	**---**	**---**

TOTAL PRE-CONTROL FUGITIVE EMISSIONS:						**6.31**	**27.63**	**2.12**	**9.28**	**0.10**	**0.46**	**0.03**	**0.12**	**0.24**	**1.05**	**0.02**	**0.07**	**5.43**	**23.79**	**136**	**595**
TOTAL CONTROLLED FUGITIVE EMISSIONS:						**6.31**	**27.63**	**2.12**	**9.28**	**0.10**	**0.46**	**0.03**	**0.12**	**0.24**	**1.05**	**0.02**	**0.07**	**5.43**	**23.79**	**136**	**595**

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.

TABLE 2.4 O&G PROD (AVE)	Gas		Water/Oil	
	kg/hr	lb/hr	kg/hr	lb/hr
Valves	4.5E-03	0.00992	9.8E-05	0.00022
Pump Seals	na	na	2.4E-05	0.00005
Others	8.8E-03	0.01940	1.4E-02	0.03086
Connectors	2.0E-04	0.00044	1.1E-04	0.00024
Flanges	3.9E-04	0.00086	2.9E-06	0.00001
Open-Ended Lines	2.0E-03	0.00441	2.5E-04	0.00055

3 - Component in Gas Service are based on GRI-HAPCalc estimates, plus a **50%** margin

4 - Component in Water/Oil Service are based on Gas Component count, times a **50%** reduction

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

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

Pollutant	Gas		Water/Oil	
	Analysis	Estimated	Analysis	Estimated
Carbon Dioxide	0.25 Wgt%	0.30 Wgt%	--- Wgt%	--- Wgt%
Methane	54.98 Wgt%	100.00 Wgt%	--- Wgt%	--- Wgt%
VOC	18.96 Wgt%	22.87 Wgt%	--- Wgt%	100.00 Wgt%
n-Hexane	0.26 Wgt%	0.32 Wgt%	--- Wgt%	10.00 Wgt%
BTEX, TMP-ea	0.01 Wgt%	0.02 Wgt%	--- Wgt%	3.00 Wgt%
Total HAP	0.30 Wgt%	0.40 Wgt%	--- Wgt%	25.00 Wgt%

Potentially Applicable

AP-42 and GHG EMISSION FACTORS

(Preferentially use test data or vendor data where available)

	Pollutant	GAS-FIRED ENGINES			GAS-FIRED TURBINES		
		AP-42 Table 3.2-1; 3.2-2; 3.2-3 07/00			AP-42 Table 3.1-1; 3.1-2a; 3.1-3 04/00		
		2SLB lb/MMBtu	4SLB lb/MMBtu	4SRB lb/MMBtu	Uncontrolled lb/MMBtu	Water Injection lb/MMBtu	Lean Pre-Mix# lb/MMBtu
CRITERIA	NOX (≥ 90% Load)	3.17E+00	4.08E+00	2.21E+00	3.20E-01	1.30E-01	9.90E-02
	CO (≥ 90% Load)	3.86E-01	3.17E-01	3.72E+00	8.20E-02	3.00E-02	1.50E-02
	THC (TOC)	1.64E+00	1.47E+00	3.58E-01	1.10E-02	1.10E-02	1.10E-02
	NMHC (THC-CH4)	1.90E-01	2.20E-01	1.28E-01	2.40E-03	2.40E-03	2.40E-03
	NMNEHC (NMHC-C2H6)	1.19E-01	1.15E-01	5.76E-02	2.10E-03	2.10E-03	2.10E-03
	VOC	1.20E-01	1.18E-01	2.96E-02	2.10E-03	2.10E-03	2.10E-03
	SO2*** (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04	5.88E-04
	PM10/2.5 (Filter+Cond)	4.83E-02	9.99E-03	1.94E-02	6.60E-03	6.60E-03	6.60E-03
HAPs	Benzene	1.94E-03	4.40E-04	1.58E-03	1.20E-05	1.20E-05	9.10E-07
	Ethylbenzene	1.08E-04	3.97E-05	2.48E-05	3.20E-05	3.20E-05	3.20E-05
	Formaldehyde (HCHO)	5.52E-02	5.28E-02	2.05E-02	7.10E-04	7.10E-04	2.00E-05
	n-Hexane	4.45E-04	1.11E-03	---	---	---	---
	Toluene	9.63E-04	4.08E-04	5.58E-04	1.30E-04	1.30E-04	1.30E-04
	TMP, 2,2,4- (i-Octane)	8.46E-04	2.50E-04	---	---	---	---
	Xylenes	2.68E-04	1.84E-04	1.95E-04	6.40E-05	6.40E-05	6.40E-05
	Other HAPs	1.96E-02	1.69E-02	9.42E-03	1.06E-04	1.06E-04	1.06E-04
GHG	CO2**** (GWP=1)	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02	1.17E+02
	CH4 (GWP=25)	1.45E+00	1.25E+00	2.30E-01	8.60E-03	8.60E-03	8.60E-03
	N2O (GWP=298)	*2.20E-04*	*2.20E-04*	*2.20E-04*	3.00E-03	3.00E-03	3.00E-03
	CO2e	*1.53E+02*	*1.48E+02*	*1.23E+02*	*1.18E+02*	*1.18E+02*	*1.18E+02*

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

	Pollutant	GAS-FIRED EXTERNAL COMBUSTION			FLARES	DIESEL ENGINES
		AP-42 Table 1.4-1; 1.4-2; 1.4-3 (<100 MMBtu/hr) 07/98			13.5-1 01/95	3.3-1; 3.3-2 10/96
		Uncontrolled lb/MMBtu	LoNOX Burners lb/MMBtu	Flue Gas Recirc lb/MMBtu	(Combustion) lb/MMBtu	Uncontrolled lb/MMBtu
CRITERIA	NOX	9.80E-02	4.90E-02	3.14E-02	6.80E-02	4.41E+00
	CO	8.24E-02	8.24E-02	8.24E-02	3.70E-01	9.50E-01
	THC (TOC)	1.08E-02	1.08E-02	1.08E-02	1.40E-01	3.60E-01
	NMHC (THC-CH4)	8.53E-03	8.53E-03	8.53E-03	1.38E-01	3.53E-01
	NMNEHC (NMHC-C2H6)	5.49E-03	5.49E-03	5.49E-03	*5.49E-03*	3.50E-01
	VOC	5.39E-03	5.39E-03	5.39E-03	*5.39E-03*	3.60E-01
	SO2 (2,000 gr-S/MMscf)	5.88E-04	5.88E-04	5.88E-04	*5.88E-04*	2.90E-01
	PM10/2.5 (Filter+Condense)	7.45E-03	7.45E-03	7.45E-03	*7.45E-03*	3.10E-01
HAPs	Benzene	2.06E-06	2.06E-06	2.06E-06	*2.06E-06*	9.33E-04
	Ethylbenzene	---	---	---	---	---
	HCHO (Formaldehyde)	7.35E-05	7.35E-05	7.35E-05	*7.35E-05*	1.18E-03
	n-Hexane	1.76E-03	1.76E-03	1.76E-03	*1.76E-03*	---
	Toluene	3.33E-06	3.33E-06	3.33E-06	*3.33E-06*	4.09E-04
	2,2,4-TMP (i-Octane)	---	---	---	---	---
	Xylenes	---	---	---	---	2.85E-04
	Other HAPs	1.86E-06	1.86E-06	1.86E-06	*1.86E-06*	1.05E-03
GHG	CO2 (GWP=1)	1.18E+02	1.18E+02	1.18E+02	*1.18E+02*	1.64E+02
	CH4 (GWP=25)	2.25E-03	2.25E-03	2.25E-03	*2.25E-03*	*6.61E-03*
	N2O (GWP=298)	2.16E-03	6.27E-04	6.27E-04	*2.16E-03*	*1.32E-03*
	CO2e	*1.18E+02*	*1.18E+02*	*1.18E+02*	*1.18E+02*	*1.65E+02*

40 CFR 98 - DEFAULT EMISSION FACTORS				
		Table C-1 to Subpart C of Part 98	Table C-2 to Subpart C of Part 98	
Fuel Type	Default HHV	Carbon Dioxide lb CO2/MMBtu	Methane lb CH4/MMBtu	Nitrous Oxide lb N2O/MMBtu
Fuel Oil No. 2 (Diesel)	0.138 MMBtu/gal	1.61E+02	6.61E-03	1.32E-03
Natural Gas	1,026 Btu/scf	1.17E+02	2.20E-03	2.20E-04

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

#Revised by EPA on 11/29/13

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

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

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

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

Conversion Factors

http://www.onlineconversion.com/

1.0 lb	=	453.5924 g
1.0 kg	=	2.2046 lb
1.0 hp	=	2,544.4332 Btu/hr
1.0 hp	=	745.6999 Watt
1.0 kW	=	3,412.1416 Btu/hr
1.0 kW-hr	=	1.3400 hp-hr
1.0 cf	=	7.4805 gal
1.0 gal H2O	=	8.3378 lb
1.0 cf H2O	=	62.3711 lb
1.0 m	=	3.2808 ft
1.0 km	=	0.6214 mi
1.0 acre	=	43,560.1742 ft2
1.0 ^{o}F	=	(^{o}C*9/5)+32
1.0 ^{o}R	=	^{o}F+459.67
1.0 %	=	10,000 ppm
UGC (stp)	=	379.48 scf/lb-mol

Rev 03/01/14

GRI-GLYCalc VERSION 4.0 - EMISSIONS SUMMARY

Case Name: OVM Hazlet TEG Dehydrator
File Name: C:\Users\Clyde Rhodes\Desktop\000 - EcoLogic LLC\10.513 - OVM - Hazlet CS - NSR - 06.19.14\00 - Att-Nb - Hazlet CS - NSR - Dehy-01 - 06.22.14.ddf
Date: June 24, 2014

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0530	1.271	0.2319
Ethane	0.0980	2.352	0.4292
Propane	0.1066	2.558	0.4668
Isobutane	0.0164	0.394	0.0718
n-Butane	0.0664	1.593	0.2907
Isopentane	0.0117	0.281	0.0513
n-Pentane	0.0243	0.584	0.1066
n-Hexane	0.0168	0.404	0.0737
Cyclohexane	0.0340	0.815	0.1488
Other Hexanes	0.0111	0.267	0.0486
Heptanes	0.0386	0.926	0.1691
Methylcyclohexane	0.0298	0.716	0.1306
2,2,4-Trimethylpentane	<0.0001	<0.001	0.0001
Benzene	0.0379	0.910	0.1660
Toluene	0.1474	3.538	0.6457
Ethylbenzene	0.0050	0.121	0.0220
Xylenes	0.6601	15.842	2.8912
C8+ Heavies	0.0867	2.081	0.3798
Total Emissions	1.4438	34.652	6.3240
Total Hydrocarbon Emissions	1.4438	34.652	6.3240
Total VOC Emissions	1.2929	31.029	5.6628
Total HAP Emissions	0.8673	20.815	3.7987
Total BTEX Emissions	0.8504	20.411	3.7250

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.9163	117.992	21.5336
Ethane	2.6168	62.804	11.4618
Propane	1.3959	33.500	6.1138
Isobutane	0.1444	3.465	0.6324
n-Butane	0.4517	10.840	1.9784
Isopentane	0.0715	1.716	0.3132
n-Pentane	0.1198	2.876	0.5249
n-Hexane	0.0463	1.112	0.2029
Cyclohexane	0.0233	0.559	0.1021
Other Hexanes	0.0406	0.974	0.1778
Heptanes	0.0522	1.254	0.2288
Methylcyclohexane	0.0162	0.388	0.0708
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.0039	0.094	0.0172
Toluene	0.0100	0.239	0.0437
Ethylbenzene	0.0002	0.005	0.0009
Xylenes	0.0184	0.442	0.0806
C8+ Heavies	0.0122	0.293	0.0534

Total Emissions	9.9398	238.556	43.5365
Total Hydrocarbon Emissions	9.9398	238.556	43.5365
Total VOC Emissions	2.4066	57.759	10.5411
Total HAP Emissions	0.0789	1.893	0.3455
Total BTEX Emissions	0.0325	0.780	0.1424

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.8327	235.984	43.0671
Ethane	5.2337	125.608	22.9235
Propane	2.7917	67.001	12.2277
Isobutane	0.2888	6.931	1.2649
n-Butane	0.9034	21.681	3.9568
Isopentane	0.1430	3.433	0.6264
n-Pentane	0.2397	5.753	1.0499
n-Hexane	0.0926	2.223	0.4057
Cyclohexane	0.0466	1.119	0.2042
Other Hexanes	0.0812	1.948	0.3555
Heptanes	0.1045	2.507	0.4575
Methylcyclohexane	0.0323	0.776	0.1416
2,2,4-Trimethylpentane	0.0001	0.002	0.0003
Benzene	0.0079	0.189	0.0345
Toluene	0.0199	0.479	0.0874
Ethylbenzene	0.0004	0.010	0.0017
Xylenes	0.0368	0.884	0.1613
C8+ Heavies	0.0244	0.585	0.1068
Total Emissions	19.8797	477.112	87.0729
Total Hydrocarbon Emissions	19.8797	477.112	87.0729
Total VOC Emissions	4.8133	115.519	21.0822
Total HAP Emissions	0.1577	3.786	0.6909
Total BTEX Emissions	0.0650	1.561	0.2848

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.9693	119.263	21.7655
Ethane	2.7148	65.156	11.8910
Propane	1.5024	36.059	6.5807
Isobutane	0.1608	3.859	0.7043
n-Butane	0.5181	12.434	2.2691
Isopentane	0.0832	1.997	0.3645
n-Pentane	0.1442	3.460	0.6315
n-Hexane	0.0631	1.515	0.2766
Cyclohexane	0.0573	1.375	0.2508
Other Hexanes	0.0517	1.241	0.2264
Heptanes	0.0908	2.180	0.3979
Methylcyclohexane	0.0460	1.104	0.2014
2,2,4-Trimethylpentane	0.0001	0.001	0.0002
Benzene	0.0418	1.004	0.1833
Toluene	0.1574	3.777	0.6894
Ethylbenzene	0.0052	0.126	0.0229
Xylenes	0.6785	16.284	2.9718
C8+ Heavies	0.0989	2.374	0.4332

Total Emissions	11.3837	273.208	49.8605
Total Hydrocarbon Emissions	11.3837	273.208	49.8605
Total VOC Emissions	3.6995	88.789	16.2040
Total HAP Emissions	0.9462	22.708	4.1442
Total BTEX Emissions	0.8830	21.191	3.8674

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: OVM Hazlet TEG Dehydrator
File Name: C:\Users\Clyde Rhodes\Desktop\000 - EcoLogic LLC\10.513 - OVM - Hazlet CS - NSR - 06.19.14\00 - Att-Nb - Hazlet CS - NSR - Dehy-01 - 06.22.14.ddf
Date: June 24, 2014

DESCRIPTION:

Description: 5.0 MMscfd TEG Dehydrator
60 oF, 950 psig, 0.67 gpm
Gas Sample 07/02/13.
Flash tank with 50% Recycle.
No still vent controls.

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 60.00 deg. F
Pressure: 950.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1213
Nitrogen	0.5986
Methane	73.3754
Ethane	17.7370
Propane	5.9032
Isobutane	0.4266
n-Butane	1.1989
Isopentane	0.1589
n-Pentane	0.2378
n-Hexane	0.0652
Cyclohexane	0.0145
Other Hexanes	0.0644
Heptanes	0.0503
Methylcyclohexane	0.0095
2,2,4-Trimethylpentane	0.0000
Benzene	0.0009
Toluene	0.0021
Ethylbenzene	0.0000
Xylenes	0.0047
C8+ Heavies	0.0307

DRY GAS:

Flow Rate: 5.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

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

PUMP:

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

FLASH TANK:

Flash Control: Combustion device
Flash Control Efficiency: 50.00 %
Temperature: 140.0 deg. F
Pressure: 40.0 psig

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: OVM Hazlet TEG Dehydrator
File Name: C:\Users\Clyde Rhodes\Desktop\000 - EcoLogic LLC\10.513 - OVM - Hazlet CS - NSR - 06.19.14\00 - Att-Nb - Hazlet CS - NSR - Dehy-01 - 06.22.14.ddf
Date: June 24, 2014

DESCRIPTION:

Description: 5.0 MMscfd TEG Dehydrator
60 oF, 950 psig, 0.67 gpm
Gas Sample 07/02/13.
Flash tank with 50% Recycle.
No still vent controls.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0530	1.271	0.2319
Ethane	0.0980	2.352	0.4292
Propane	0.1066	2.558	0.4668
Isobutane	0.0164	0.394	0.0718
n-Butane	0.0664	1.593	0.2907
Isopentane	0.0117	0.281	0.0513
n-Pentane	0.0243	0.584	0.1066
n-Hexane	0.0168	0.404	0.0737
Cyclohexane	0.0340	0.815	0.1488
Other Hexanes	0.0111	0.267	0.0486
Heptanes	0.0386	0.926	0.1691
Methylcyclohexane	0.0298	0.716	0.1306
2,2,4-Trimethylpentane	<0.0001	<0.001	0.0001
Benzene	0.0379	0.910	0.1660
Toluene	0.1474	3.538	0.6457
Ethylbenzene	0.0050	0.121	0.0220
Xylenes	0.6601	15.842	2.8912
C8+ Heavies	0.0867	2.081	0.3798
Total Emissions	1.4438	34.652	6.3240
Total Hydrocarbon Emissions	1.4438	34.652	6.3240
Total VOC Emissions	1.2929	31.029	5.6628
Total HAP Emissions	0.8673	20.815	3.7987
Total BTEX Emissions	0.8504	20.411	3.7250

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.9163	117.992	21.5336
Ethane	2.6168	62.804	11.4618
Propane	1.3959	33.500	6.1138
Isobutane	0.1444	3.465	0.6324
n-Butane	0.4517	10.840	1.9784
Isopentane	0.0715	1.716	0.3132

n-Pentane	0.1198	2.876	0.5249
n-Hexane	0.0463	1.112	0.2029
Cyclohexane	0.0233	0.559	0.1021
Other Hexanes	0.0406	0.974	0.1778
Heptanes	0.0522	1.254	0.2288
Methylcyclohexane	0.0162	0.388	0.0708
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.0039	0.094	0.0172
Toluene	0.0100	0.239	0.0437
Ethylbenzene	0.0002	0.005	0.0009
Xylenes	0.0184	0.442	0.0806
C8+ Heavies	0.0122	0.293	0.0534
Total Emissions	9.9398	238.556	43.5365
Total Hydrocarbon Emissions	9.9398	238.556	43.5365
Total VOC Emissions	2.4066	57.759	10.5411
Total HAP Emissions	0.0789	1.893	0.3455
Total BTEX Emissions	0.0325	0.780	0.1424

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	9.8327	235.984	43.0671
Ethane	5.2337	125.608	22.9235
Propane	2.7917	67.001	12.2277
Isobutane	0.2888	6.931	1.2649
n-Butane	0.9034	21.681	3.9568
Isopentane	0.1430	3.433	0.6264
n-Pentane	0.2397	5.753	1.0499
n-Hexane	0.0926	2.223	0.4057
Cyclohexane	0.0466	1.119	0.2042
Other Hexanes	0.0812	1.948	0.3555
Heptanes	0.1045	2.507	0.4575
Methylcyclohexane	0.0323	0.776	0.1416
2,2,4-Trimethylpentane	0.0001	0.002	0.0003
Benzene	0.0079	0.189	0.0345
Toluene	0.0199	0.479	0.0874
Ethylbenzene	0.0004	0.010	0.0017
Xylenes	0.0368	0.884	0.1613
C8+ Heavies	0.0244	0.585	0.1068
Total Emissions	19.8797	477.112	87.0729
Total Hydrocarbon Emissions	19.8797	477.112	87.0729
Total VOC Emissions	4.8133	115.519	21.0822
Total HAP Emissions	0.1577	3.786	0.6909
Total BTEX Emissions	0.0650	1.561	0.2848

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.9693	119.263	21.7655
Ethane	2.7148	65.156	11.8910
Propane	1.5024	36.059	6.5807
Isobutane	0.1608	3.859	0.7043
n-Butane	0.5181	12.434	2.2691
Isopentane	0.0832	1.997	0.3645

n-Pentane	0.1442	3.460	0.6315
n-Hexane	0.0631	1.515	0.2766
Cyclohexane	0.0573	1.375	0.2508
Other Hexanes	0.0517	1.241	0.2264
Heptanes	0.0908	2.180	0.3979
Methylcyclohexane	0.0460	1.104	0.2014
2,2,4-Trimethylpentane	0.0001	0.001	0.0002
Benzene	0.0418	1.004	0.1833
Toluene	0.1574	3.777	0.6894
Ethylbenzene	0.0052	0.126	0.0229
Xylenes	0.6785	16.284	2.9718
C8+ Heavies	0.0989	2.374	0.4332
Total Emissions	11.3837	273.208	49.8605
Total Hydrocarbon Emissions	11.3837	273.208	49.8605
Total VOC Emissions	3.6995	88.789	16.2040
Total HAP Emissions	0.9462	22.708	4.1442
Total BTEX Emissions	0.8830	21.191	3.8674

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	43.2991	21.7655	49.73
Ethane	23.3528	11.8910	49.08
Propane	12.6945	6.5807	48.16
Isobutane	1.3367	0.7043	47.31
n-Butane	4.2475	2.2691	46.58
Isopentane	0.6777	0.3645	46.22
n-Pentane	1.1565	0.6315	45.39
n-Hexane	0.4794	0.2766	42.31
Cyclohexane	0.3529	0.2508	28.93
Other Hexanes	0.4042	0.2264	43.98
Heptanes	0.6266	0.3979	36.51
Methylcyclohexane	0.2722	0.2014	26.01
2,2,4-Trimethylpentane	0.0004	0.0002	42.17
Benzene	0.2005	0.1833	8.60
Toluene	0.7331	0.6894	5.96
Ethylbenzene	0.0238	0.0229	3.66
Xylenes	3.0524	2.9718	2.64
C8+ Heavies	0.4866	0.4332	10.98
Total Emissions	93.3969	49.8605	46.61
Total Hydrocarbon Emissions	93.3969	49.8605	46.61
Total VOC Emissions	26.7451	16.2040	39.41
Total HAP Emissions	4.4896	4.1442	7.69
Total BTEX Emissions	4.0098	3.8674	3.55

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:	0.64	lbs. H2O/MMSCF
Temperature:	60.0	deg. F
Pressure:	950.0	psig
Dry Gas Flow Rate:	5.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0294	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	17.59	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	11.38	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.66%	96.34%
Carbon Dioxide	99.75%	0.25%
Nitrogen	99.98%	0.02%
Methane	99.99%	0.01%
Ethane	99.96%	0.04%
Propane	99.94%	0.06%
Isobutane	99.91%	0.09%
n-Butane	99.88%	0.12%
Isopentane	99.89%	0.11%
n-Pentane	99.86%	0.14%
n-Hexane	99.78%	0.22%
Cyclohexane	98.94%	1.06%
Other Hexanes	99.84%	0.16%
Heptanes	99.62%	0.38%
Methylcyclohexane	98.93%	1.07%
2,2,4-Trimethylpentane	99.86%	0.14%
Benzene	88.28%	11.72%
Toluene	84.39%	15.61%
Ethylbenzene	81.51%	18.49%
Xylenes	74.70%	25.30%
C8+ Heavies	99.75%	0.25%

FLASH TANK

Flash Control:	Combustion device	
Flash Control Efficiency:	50.00	%
Flash Temperature:	140.0	deg. F
Flash Pressure:	40.0	psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.47%	0.53%
Carbon Dioxide	5.49%	94.51%
Nitrogen	0.53%	99.47%
Methane	0.54%	99.46%
Ethane	1.84%	98.16%
Propane	3.68%	96.32%
Isobutane	5.37%	94.63%
n-Butane	6.84%	93.16%
Isopentane	7.77%	92.23%
n-Pentane	9.45%	90.55%

n-Hexane	15.63%	84.37%
Cyclohexane	43.79%	56.21%
Other Hexanes	12.51%	87.49%
Heptanes	27.25%	72.75%
Methylcyclohexane	49.84%	50.16%
2,2,4-Trimethylpentane	16.32%	83.68%
Benzene	83.66%	16.34%
Toluene	89.02%	10.98%
Ethylbenzene	93.43%	6.57%
Xylenes	95.40%	4.60%
C8+ Heavies	79.82%	20.18%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	61.84%	38.16%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	2.83%	97.17%
n-Pentane	2.69%	97.31%
n-Hexane	1.96%	98.04%
Cyclohexane	6.49%	93.51%
Other Hexanes	4.36%	95.64%
Heptanes	1.35%	98.65%
Methylcyclohexane	7.14%	92.86%
2,2,4-Trimethylpentane	4.73%	95.27%
Benzene	5.91%	94.09%
Toluene	8.81%	91.19%
Ethylbenzene	11.07%	88.93%
Xylenes	13.48%	86.52%
C8+ Heavies	10.11%	89.89%

STREAM REPORTS:

WET GAS STREAM

Temperature: 60.00 deg. F
Pressure: 964.70 psia
Flow Rate: 2.08e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.71e-002	3.67e+000
Carbon Dioxide	1.21e-001	2.93e+001

Nitrogen	5.98e-001	9.21e+001
Methane	7.33e+001	6.46e+003
Ethane	1.77e+001	2.93e+003
Propane	5.90e+000	1.43e+003
Isobutane	4.26e-001	1.36e+002
n-Butane	1.20e+000	3.83e+002
Isopentane	1.59e-001	6.30e+001
n-Pentane	2.38e-001	9.42e+001
n-Hexane	6.52e-002	3.09e+001
Cyclohexane	1.45e-002	6.70e+000
Other Hexanes	6.44e-002	3.05e+001
Heptanes	5.03e-002	2.77e+001
Methylcyclohexane	9.50e-003	5.12e+000
2,2,4-Trimethylpentane	5.00e-005	3.14e-002
Benzene	9.00e-004	3.86e-001
Toluene	2.10e-003	1.06e+000
Ethylbenzene	5.00e-005	2.92e-002
Xylenes	4.70e-003	2.74e+000
C8+ Heavies	3.07e-002	2.87e+001
Total Components	100.00	1.18e+004

DRY GAS STREAM

Temperature: 60.00 deg. F
Pressure: 964.70 psia
Flow Rate: 2.08e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.36e-003	1.34e-001
Carbon Dioxide	1.21e-001	2.92e+001
Nitrogen	5.99e-001	9.21e+001
Methane	7.34e+001	6.46e+003
Ethane	1.77e+001	2.93e+003
Propane	5.90e+000	1.43e+003
Isobutane	4.26e-001	1.36e+002
n-Butane	1.20e+000	3.82e+002
Isopentane	1.59e-001	6.29e+001
n-Pentane	2.38e-001	9.41e+001
n-Hexane	6.51e-002	3.08e+001
Cyclohexane	1.43e-002	6.63e+000
Other Hexanes	6.43e-002	3.04e+001
Heptanes	5.01e-002	2.76e+001
Methylcyclohexane	9.40e-003	5.07e+000
2,2,4-Trimethylpentane	4.99e-005	3.13e-002
Benzene	7.95e-004	3.41e-001
Toluene	1.77e-003	8.97e-001
Ethylbenzene	4.08e-005	2.38e-002
Xylenes	3.51e-003	2.05e+000
C8+ Heavies	3.06e-002	2.86e+001
Total Components	100.00	1.17e+004

LEAN GLYCOL STREAM

Temperature: 60.00 deg. F

Flow Rate: 6.70e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	3.71e+002
Water	1.50e+000	5.66e+000
Carbon Dioxide	1.91e-012	7.19e-012
Nitrogen	4.49e-013	1.69e-012
Methane	8.52e-018	3.21e-017
Ethane	1.61e-007	6.06e-007
Propane	9.96e-009	3.76e-008
Isobutane	9.31e-010	3.51e-009
n-Butane	2.90e-009	1.09e-008
Isopentane	9.03e-005	3.40e-004
n-Pentane	1.78e-004	6.73e-004
n-Hexane	8.91e-005	3.36e-004
Cyclohexane	6.25e-004	2.36e-003
Other Hexanes	1.34e-004	5.07e-004
Heptanes	1.40e-004	5.27e-004
Methylcyclohexane	6.09e-004	2.29e-003
2,2,4-Trimethylpentane	1.83e-007	6.89e-007
Benzene	6.32e-004	2.38e-003
Toluene	3.78e-003	1.42e-002
Ethylbenzene	1.66e-004	6.26e-004
Xylenes	2.73e-002	1.03e-001
C8+ Heavies	2.59e-003	9.75e-003
Total Components	100.00	3.77e+002

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 60.00 deg. F
Pressure: 964.70 psia
Flow Rate: 7.24e-001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.23e+001	3.71e+002
Water	2.29e+000	9.19e+000
Carbon Dioxide	2.80e-002	1.12e-001
Nitrogen	3.59e-002	1.44e-001
Methane	2.46e+000	9.89e+000
Ethane	1.33e+000	5.33e+000
Propane	7.21e-001	2.90e+000
Isobutane	7.59e-002	3.05e-001
n-Butane	2.41e-001	9.70e-001
Isopentane	3.86e-002	1.55e-001
n-Pentane	6.58e-002	2.65e-001
n-Hexane	2.73e-002	1.10e-001
Cyclohexane	2.06e-002	8.29e-002
Other Hexanes	2.31e-002	9.28e-002
Heptanes	3.57e-002	1.44e-001
Methylcyclohexane	1.60e-002	6.44e-002
2,2,4-Trimethylpentane	2.22e-005	8.92e-005
Benzene	1.20e-002	4.82e-002
Toluene	4.52e-002	1.82e-001
Ethylbenzene	1.51e-003	6.06e-003

Xylenes	1.99e-001	8.00e-001
C8+ Heavies	3.01e-002	1.21e-001
Total Components	100.00	4.02e+002

FLASH TANK OFF GAS STREAM

Temperature: 140.00 deg. F
Pressure: 54.70 psia
Flow Rate: 3.38e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.06e-001	4.91e-002
Carbon Dioxide	2.71e-001	1.06e-001
Nitrogen	5.75e-001	1.43e-001
Methane	6.88e+001	9.83e+000
Ethane	1.95e+001	5.23e+000
Propane	7.10e+000	2.79e+000
Isobutane	5.58e-001	2.89e-001
n-Butane	1.74e+000	9.03e-001
Isopentane	2.22e-001	1.43e-001
n-Pentane	3.73e-001	2.40e-001
n-Hexane	1.21e-001	9.26e-002
Cyclohexane	6.22e-002	4.66e-002
Other Hexanes	1.06e-001	8.12e-002
Heptanes	1.17e-001	1.04e-001
Methylcyclohexane	3.69e-002	3.23e-002
2,2,4-Trimethylpentane	7.34e-005	7.47e-005
Benzene	1.13e-002	7.87e-003
Toluene	2.43e-002	1.99e-002
Ethylbenzene	4.20e-004	3.98e-004
Xylenes	3.89e-002	3.68e-002
C8+ Heavies	1.61e-002	2.44e-002
Total Components	100.00	2.02e+001

FLASH TANK GLYCOL STREAM

Temperature: 140.00 deg. F
Flow Rate: 6.80e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.72e+001	3.71e+002
Water	2.39e+000	9.15e+000
Carbon Dioxide	1.61e-003	6.17e-003
Nitrogen	1.98e-004	7.57e-004
Methane	1.39e-002	5.30e-002
Ethane	2.57e-002	9.80e-002
Propane	2.79e-002	1.07e-001
Isobutane	4.29e-003	1.64e-002
n-Butane	1.74e-002	6.64e-002
Isopentane	3.15e-003	1.20e-002
n-Pentane	6.55e-003	2.50e-002
n-Hexane	4.49e-003	1.72e-002
Cyclohexane	9.51e-003	3.63e-002
Other Hexanes	3.04e-003	1.16e-002

Heptanes	1.02e-002	3.91e-002
Methylcyclohexane	8.41e-003	3.21e-002
2,2,4-Trimethylpentane	3.81e-006	1.46e-005
Benzene	1.05e-002	4.03e-002
Toluene	4.23e-002	1.62e-001
Ethylbenzene	1.48e-003	5.66e-003
Xylenes	2.00e-001	7.63e-001
C8+ Heavies	2.53e-002	9.65e-002
Total Components	100.00	3.82e+002

FLASH GAS EMISSIONS

Flow Rate: 8.27e+002 scfh
Control Method: Combustion Device
Control Efficiency: 50.00

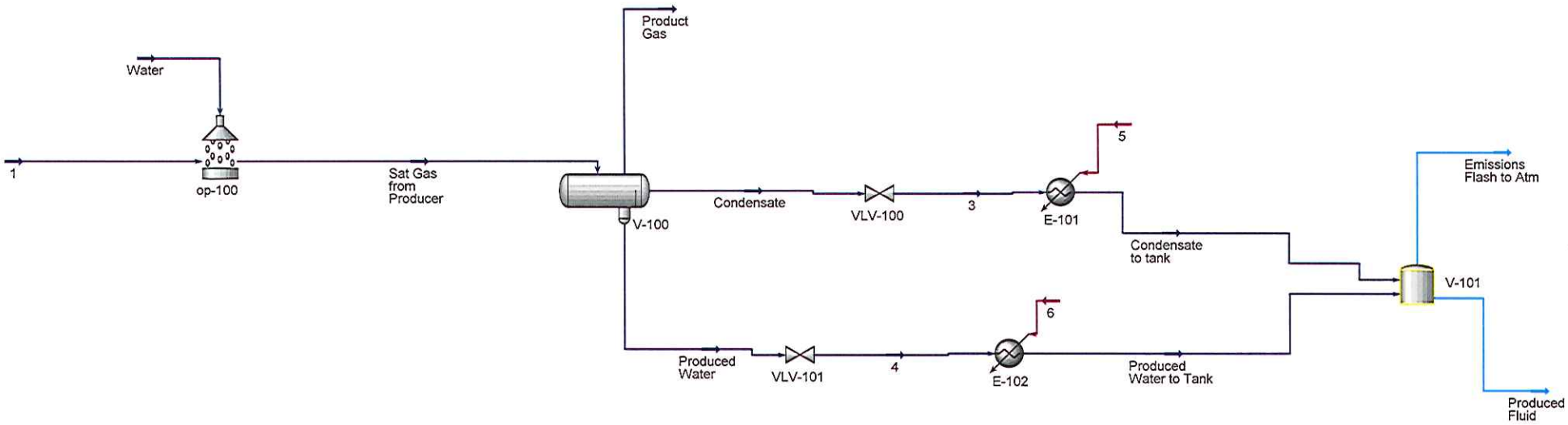
Component	Conc. (vol%)	Loading (lb/hr)
Water	4.98e+001	1.96e+001
Carbon Dioxide	2.97e+001	2.85e+001
Nitrogen	2.35e-001	1.43e-001
Methane	1.41e+001	4.92e+000
Ethane	3.99e+000	2.62e+000
Propane	1.45e+000	1.40e+000
Isobutane	1.14e-001	1.44e-001
n-Butane	3.56e-001	4.52e-001
Isopentane	4.55e-002	7.15e-002
n-Pentane	7.62e-002	1.20e-001
n-Hexane	2.46e-002	4.63e-002
Cyclohexane	1.27e-002	2.33e-002
Other Hexanes	2.16e-002	4.06e-002
Heptanes	2.39e-002	5.22e-002
Methylcyclohexane	7.55e-003	1.62e-002
2,2,4-Trimethylpentane	1.50e-005	3.73e-005
Benzene	2.31e-003	3.94e-003
Toluene	4.96e-003	9.97e-003
Ethylbenzene	8.59e-005	1.99e-004
Xylenes	7.95e-003	1.84e-002
C8+ Heavies	3.28e-003	1.22e-002
Total Components	100.00	5.82e+001

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.16e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.01e+001	3.49e+000
Carbon Dioxide	6.51e-002	6.17e-003
Nitrogen	1.26e-002	7.57e-004
Methane	1.53e+000	5.30e-002
Ethane	1.52e+000	9.80e-002
Propane	1.12e+000	1.07e-001

Isobutane	1.31e-001	1.64e-002
n-Butane	5.31e-001	6.64e-002
Isopentane	7.54e-002	1.17e-002
n-Pentane	1.57e-001	2.43e-002
n-Hexane	9.08e-002	1.68e-002
Cyclohexane	1.88e-001	3.40e-002
Other Hexanes	5.99e-002	1.11e-002
Heptanes	1.79e-001	3.86e-002
Methylcyclohexane	1.41e-001	2.98e-002
2,2,4-Trimethylpentane	5.65e-005	1.39e-005
Benzene	2.26e-001	3.79e-002
Toluene	7.44e-001	1.47e-001
Ethylbenzene	2.20e-002	5.03e-003
Xylenes	2.89e+000	6.60e-001
C8+ Heavies	2.37e-001	8.67e-002
Total Components	100.00	4.94e+000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J-W MEASUREMENT COMPANY

Shreveport, LA Tyler, TX Fairfield, TX Victoria, TX
Godley, TX Broussard, LA Zapata, TX
WWW.JWOPERATING.COM
888-226-9110

J-WMC Number	: 20744201111117	**Date Sampled**	: 09/01/2011
Customer	: CAIMAN ENERGY LLC	**Date Analyzed**	: 09/06/2011
Station ID	: 1111117	**Effective Date**	: 09/01/2011
Station Name	: WITZGALL 1H	**Pressure**	: 645.0
Area	: MOUNDSVILLE	**Temperature (F)**	: 70.0
County/Parish	: MARSHALL	**Cylinder ID**	: 3104
State	: WV	**Sampled by**	: DB
Property Cd	:		

COMPONENT	MOL %	GPM @ 14.73(PSIA)
Methane	75.9917	0.000
Ethane	15.5466	4.157
Propane	5.4225	1.494
Iso-Butane	0.4637	0.152
Normal-Butane	1.1854	0.374
Iso-Pentane	0.1943	0.071
Normal-Pentane	0.2479	0.090
Hexanes++	0.2540	0.110
Nitrogen	0.5653	0.000
Carbon-Dioxide	0.1265	0.000
Oxygen	0.0020	0.000
Hydrogen Sulfide	0.0002	0.000
TOTAL	**100.0000**	**6.447**

Compressibility Factor (Z) @ 14.696 PSIA @ 60 DEG. F = 0.9964

Real Gravity: 0.727 **Ideal Gravity:** 0.725

BTU @ (PSIA)	@14.65	@14.696	@14.73	@15.025
GPM	6.412	6.432	6.447	6.576
Ideal BTU Dry	1259.61	1263.57	1266.49	1291.86
Ideal BTU Sat	1237.57	1241.53	1244.45	1269.82
Real BTU Dry	1264.17	1268.16	1271.10	1296.65
Real BTU Sat	1242.46	1246.45	1249.39	1274.95

Comments:

METHOD: GPA 2261-00

Note: Calibration, Standards, and testing procedures are archieved pursuant to GPA regulations.

This Analysis Report is not intended for submission to Lousiana Department of Environmental Quality.

Deborah Murphy
J-W ANALYST

aspentech

WILLIAMS ENERGY SERVICES
Burlington, MA
USA

Case Name: Hazlett Hysys.hsc
Unit Set: Field
Date/Time: Fri Mar 15 10:02:38 2013

Workbook: Case (Main)

Material Streams

Fluid Pkg: All

Name		1	Water	Sat Gas from Produc	Produced Water	Condensate
Vapour Fraction		1.0000	0.0000	1.0000	0.0000	0.0000
Temperature	(F)	50.00 *	40.00 *	50.00	50.00	50.00
Pressure	(psia)	1115 *	119.7 *	1115	1115	1115
Molar Flow	(lbmole/hr)	549.0 *	0.1267	549.2	0.0000	0.0000
Mass Flow	(lb/hr)	1.151e+004	2.282	1.151e+004	0.0000	0.0000
Liquid Volume Flow	(barrel/day)	2306	0.1566	2306	0.0000	0.0000
Heat Flow	(Btu/hr)	-1.957e+007	-1.567e+004	-1.958e+007	-0.0000	-0.0000
Name		Product Gas	3	4	Condensate to tank	Produced Water to T.
Vapour Fraction		1.0000	0.6794	0.0000	1.0000	0.0000
Temperature	(F)	50.00	-78.63	53.05	75.00 *	75.00 *
Pressure	(psia)	1115	14.70 *	14.70 *	14.70	14.70
Molar Flow	(lbmole/hr)	549.2	0.0000	0.0000	0.0000	0.0000
Mass Flow	(lb/hr)	1.151e+004	0.0000	0.0000	0.0000	0.0000
Liquid Volume Flow	(barrel/day)	2306	0.0000	0.0000	0.0000	0.0000
Heat Flow	(Btu/hr)	-1.958e+007	-0.0000	-0.0000	-0.0000	-0.0000
Name		Produced Fluid	Emissions Flash to A			
Vapour Fraction		0.0000	1.0000			
Temperature	(F)	---	---			
Pressure	(psia)	14.70	14.70			
Molar Flow	(lbmole/hr)	---	---			
Mass Flow	(lb/hr)	---	---			
Liquid Volume Flow	(barrel/day)	---	---			
Heat Flow	(Btu/hr)	---	---			

Compositions

Fluid Pkg: All

Name	1	Water	Sat Gas from Produc	Produced Water	Condensate
Master Comp Mass Flow (Methane) (lb/hr)	6693.4085 *	0.0000	6693.4085	0.0000	0.0000
Master Comp Mass Flow (H2O) (lb/hr)	0.0000 *	2.2820	2.2820	0.0000	0.0000
Master Comp Mass Flow (Nitrogen) (lb/hr)	86.9435 *	0.0000	86.9435	0.0000	0.0000
Master Comp Mass Flow (CO2) (lb/hr)	30.5659 *	0.0000	30.5659	0.0000	0.0000
Master Comp Mass Flow (n-Hexane) (lb/hr)	120.1788 *	0.0000	120.1788	0.0000	0.0000
Master Comp Mass Flow (n-Pentane) (lb/hr)	98.2013 *	0.0000	98.2013	0.0000	0.0000
Master Comp Mass Flow (i-Pentane) (lb/hr)	76.9686 *	0.0000	76.9686	0.0000	0.0000
Master Comp Mass Flow (n-Butane) (lb/hr)	378.2846 *	0.0000	378.2846	0.0000	0.0000
Master Comp Mass Flow (i-Butane) (lb/hr)	147.9759 *	0.0000	147.9759	0.0000	0.0000
Master Comp Mass Flow (Propane) (lb/hr)	1312.8252 *	0.0000	1312.8252	0.0000	0.0000
Master Comp Mass Flow (Ethane) (lb/hr)	2566.6444 *	0.0000	2566.6444	0.0000	0.0000
Master Comp Mass Flow (H2S) (lb/hr)	0.0374 *	0.0000	0.0374	0.0000	0.0000
Master Comp Mass Flow (Oxygen) (lb/hr)	0.0351 *	0.0000	0.0351	0.0000	0.0000
Name	Product Gas	3	4	Condensate to tank	Produced Water to T.
Master Comp Mass Flow (Methane) (lb/hr)	6693.4085	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (H2O) (lb/hr)	2.2820	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (Nitrogen) (lb/hr)	86.9435	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (CO2) (lb/hr)	30.5659	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (n-Hexane) (lb/hr)	120.1788	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (n-Pentane) (lb/hr)	98.2013	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (i-Pentane) (lb/hr)	76.9686	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (n-Butane) (lb/hr)	378.2846	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (i-Butane) (lb/hr)	147.9759	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (Propane) (lb/hr)	1312.8252	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (Ethane) (lb/hr)	2566.6444	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (H2S) (lb/hr)	0.0374	0.0000	0.0000	0.0000	0.0000
Master Comp Mass Flow (Oxygen) (lb/hr)	0.0351	0.0000	0.0000	0.0000	0.0000

* Specified by user

aspentech

WILLIAMS ENERGY SERVICES
Burlington, MA
USA

Case Name: Hazlett Hysys.hsc
Unit Set: Field
Date/Time: Fri Mar 15 10:02:38 2013

Workbook: Case (Main) (continued)

Compositions (continued)

Fluid Pkg: All

Name	Produced Fluid	Emissions Flash to A			
Master Comp Mass Flow (Methane) (lb/hr)	---	---			
Master Comp Mass Flow (H2O) (lb/hr)	---	---			
Master Comp Mass Flow (Nitrogen) (lb/hr)	---	---			
Master Comp Mass Flow (CO2) (lb/hr)	---	---			
Master Comp Mass Flow (n-Hexane) (lb/hr)	---	---			
Master Comp Mass Flow (n-Pentane) (lb/hr)	---	---			
Master Comp Mass Flow (i-Pentane) (lb/hr)	---	---			
Master Comp Mass Flow (n-Butane) (lb/hr)	---	---			
Master Comp Mass Flow (i-Butane) (lb/hr)	---	---			
Master Comp Mass Flow (Propane) (lb/hr)	---	---			
Master Comp Mass Flow (Ethane) (lb/hr)	---	---			
Master Comp Mass Flow (H2S) (lb/hr)	---	---			
Master Comp Mass Flow (Oxygen) (lb/hr)	---	---			

Energy Streams

Fluid Pkg: All

Name	5	6			
Heat Flow (Btu/hr)	-0.0000	-0.0000			

Unit Ops

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

* Specified by user

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 and Recordkeeping
  B. Notification and Reporting
  C. Testing

ATTACHMENT O
Monitoring/Recordkeeping/Reporting/Testing Plans

Williams Ohio Valley Midstream LLC (OVM)
HAZLET COMPRESSOR STATION (CS)
Application for 45CSR13 NSR Modification Permit

Williams Ohio Valley Midstream LLC (OVM) proposes the following monitoring, recordkeeping, reporting and testing requirements at the Hazlet CS.

Monitoring

1. Monitor and record quantity of natural gas combusted in the engines.
2. Monitor and record quantity of natural gas treated in the TEG dehydrator.
3. Monitor and record quantity of produced water transferred from the storage tank.

Recordkeeping

1. Maintain records of the amount of natural gas consumed and hours of operation for the compressor engines.
2. Maintain records of the amount of natural gas treated in the TEG dehydrator.
3. Maintain records of the amount of produced water transferred from the storage tanks.
4. 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.
5. The records shall be maintained on site or in a readily available off-site location for a period of five (5) years.

Testing

No testing is required.

ATTACHMENT P
Public Notice

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

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

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

- Legal Advertisement (as shown) will be placed in a newspaper of general circulation in the area where the source is located (See 45CSR§13-8.3 thru 45CSR§13-8.5).

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

ATTACHMENT P
Public Notice

AIR QUALITY PUBLIC NOTICE
Notice of Application

Notice is given that Williams Ohio Valley Midstream LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 NSR Modification Permit for an existing natural gas compressor station off Markey Lane, 2.0 mi E-NE of Glen Dale, in Marshall County, West Virginia.

The latitude and longitude coordinates are 39.9615 degrees North and -80.7169 degrees West.

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

(29.38)	tons of nitrogen oxides per year
(3.21)	tons of carbon monoxide per year
5.76	tons of volatile organic compounds per year
0.00	tons of sulfur dioxide per year
0.00	tons of particulate matter per year
0.00	tons of formaldehyde per year
0.12	tons of xylenes per year
0.99	tons of total hazardous air pollutants per year
209	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)

APPLICATION FEE

NSR Construction Permit

- Include a check payable to WVDEP – Division of Air Quality.
- As per WV Rule 22 (45CSR22) filed on May 6, 1991, a **minimum fee of $1,000** must be submitted for each 45CSR13 permit application filed with the WVDEP-DAQ.
- Additional 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 (JJJJ and OOOO)**

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

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

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

COMPANY NUMBER: 4000

CHECK NUMBER: 4000109017

PAY DATE	SUPPLIER NO.	SUPPLIER NAME	CHECK TOTAL
21-MAY-15	401733	STATE OF WEST VIRGINIA	2,500.00

Invoice Date	Invoice Or Credit Memo / Invoice Description	Gross	Discount	Net
19-MAY-15	19-MAY-2015 / AIR PERMIT APPLICATION FEE FOR GROV	2,500.00	0.00	2,500.00
		Page Totals	0.00	2,500.00

Supplier Support 1-866-778-2665

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

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

Check Number: 4000109017
Check Date: 21-MAY-15

Two Thousand Five Hundred Dollars And Zero Cents

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

PAY (USD)	$2,500.00

Authorized Signature

MA1353 (6/11)

⑈4000109017⑈ ⑆071923226⑆ 00940116 7⑈

From: (412) 787-4197
Daniell Zawaski
WILLIAMS
2000 Commerce Drive
Park Place 2
Pittsburgh, PA 15275

Origin ID: OILA

FedEx Express

J151215022300JV

Ship Date: 27MAY15
ActWgt: 1.0 LB
CAD: 104269589/INET3610

Delivery Address Bar Code

Ref # 6000000620006003 4.6228.8325
Invoice #
PO #
Dept #

SHIP TO: (304) 926-0499 X 1260 BILL SENDER

Beverly McKeone
WV Div of Air Quality – Permitting
601 57th Street, SE

Charleston, WV 25304

FRI - 29 MAY AA
** 2DAY **

TRK# 0201 7736 9186 8563

SH CRWA

25304
WV-US
HTS

537J3/0913/EE43

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