Andrews
13-2831E
051-00130

Appalachia
MIDSTREAM SERVICES

March 26, 2015

RECEIVED
APR - 1 2015
WV DEP / DIV OF AIR QUALITY

VIA UPS

Mr. John Benedict, Director
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street
Charleston, WV 25304

Re: Appalachia Midstream Services, L.L.C.
Miller Station
R13 Permit Modification Application
Permit No. R13-2831D
Plant ID No. 051-00130

Dear Mr. Benedict:

Appalachia Midstream Services, L.L.C. (AMS), is authorization to operate the Miller Station in Marshall County under the above-referenced permit. With this application and in accordance with the West Virginia Air Pollution Control Act and Title 45 Series 13 (45CSR13), AMS requests to modify the current permit as follows:

- Remove one (1) 1,380-hp Waukesha L5794 GSI compressor engine (EPCE-1)
- Replace three (3) 1,380-hp Caterpillar G3516B compressor engines (EPCE-9, EPCE-10, and EPCE-11) with like-kind engines
- Add (1) one 1,380-hp Caterpillar G3516B compressor engine (EPCE-12)
- Add compressor blowdown emissions (EP-BD)
- Revise facility emissions from miscellaneous sources (EPCE-2 – EPCE-11, EPDHY-1 – EPDHY-3, EPREBL-1 – EPREBL-3, EPOH-1, and EP-FUG) using an updated gas analysis
- Revise greenhouse gas emissions using the current Global Warming Potential multipliers.

Appalachia Midstream Services, L.L.C.
P.O. Box 54382
Oklahoma City, OK 73154-1382

The enclosed package contains the required application forms, emissions calculations and supporting documentation for the referenced project. A check in the amount $2,000 is also enclosed for the application and 45CSR22 fees. The public notice for the proposed construction will be published in *Moundsville Daily Echo*. AMS will forward the Affidavit of Publication to your attention once it is received from the publisher.

Should you have any questions or require further information, please feel free to contact me at 405-727-1245 or by e-mail at AirGroup@Williams.com.

Sincerely,

Kijun Hong
Specialist – Air

Enclosure(s) – Original + Two Copies

APPALACHIA MIDSTREAM SERVICES
PO BOX 54382
OKLAHOMA CITY, OK 73154-1382
855-452-9072

WV DEP-DIVISION OF AIR QUALITY
601 57TH STREET SE

CHARLESTON, WV 25304

Date:	3/25/2015
Check #:	3390055076
Payment Amount:	2,000.00
Vendor #:	3000009819

Remittance Advice

Invoice Date	Invoice #	Related PO#	Invoice Net Amt
3/19/2015 MILLER CF PERMIT FEE	03192015		$2,000.00

PLEASE DETACH BEFORE DEPOSITING CHECK

THE FACE OF THIS DOCUMENT HAS A COLORED BACKGROUND

APPALACHIA MIDSTREAM SERVICES
PO BOX 54382
OKLAHOMA CITY, OK 73154-1382

Date: 3/25/2015
Check#: 3390055076

Pay Exactly Two thousand and zero/100 US Dollars

Amount
$2,000.00

TO THE ORDER OF

WV DEP-DIVISION OF AIR QUALITY
601 57TH STREET SE

CHARLESTON, WV 25304

Void After 90 Days

WELLS FARGO BANK, N.A.

Authorized Signer

THIS DOCUMENT HAS A THERMOCHROMIC INK WITH A TRUE WATERMARK. HOLD TO LIGHT TO VIEW.

⑈3390055076⑈ ⑆041203824⑆ 9600132823⑈

APPALACHIA MIDSTREAM SERVICES, L.L.C.

MILLER COMPRESSOR STATION

MODIFICATION APPLICATION

SUBMITTED TO WVDEP DIVISION OF AIR QUALITY
MARCH 2015

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INTRODUCTION

Appalachia Midstream Services, L.L.C. (AMS) owns and operates the Miller Compressor Station in Marshall County. The facility operates under Permit No. R13-2831D issued September 24, 2012. With this application AMS requests a Modification to remove one (1) 1,380-hp Waukesha L5794 GSI compressor engine (EPCE-1), replace three (3) 1,380-hp Caterpillar G3516B compressor engines (EPCE-9, EPCE-10, and EPCE-11) with like-kind engines, add (1) one 1,380-hp Caterpillar G3516B compressor engine (EPCE-12), add compressor blowdown emissions (EP-BD), revise facility emissions from miscellaneous sources (EPCE-2 – EPCE-11, EPDHY-1 – EPDHY-3, EPREBL-1 – EPREBL-3, EPOH-1, and EP-FUG) using an updated gas analysis, and revise greenhouse gas emissions using the current Global Warming Potential multipliers.

Project Description

The current permit authorizes construction and operation of six (6) 1,380-hp natural gas-fired Waukesha L5794 GSI compressor engines, each equipped with a nonselective catalytic reduction (NSCR) catalytic converter (EPCE-1 – EPCE-6), five (5) 1,380-hp natural gas-fired Caterpillar G3516B compressor engines, each equipped with an oxidation catalyst (EPCE-7 – EPCE-11), two (2) 805-hp Capstone C600 microturbine generators (EPGEN-1 – EPGEN-2), three (3) 53.8-MMSCFD triethylene glycol (TEG) dehydration units (EPDHY-1 – EPDHY-3) with still vents (EPSTL-1 – EPSTL-3), each controlled by an air-cooled condenser (APCCOND-1 - APCCOND-3), and 1.0-mmBtu/hr reboilers (EPREBL-1 - EPREBL-3), one (1) condensate stabilizer system including 3.35-mmBtu/hr hot oil heater (EPOH-1), ten (10) 400-bbl storage tanks containing stabilized condensate (EPTK-1 - EPTK-10) and two (2) 400-bbl storage tanks containing pipeline fluids/water (EPTK-11 - EPTK-12), all controlled by a vapor recovery unit, one (1) flare (APCFLARE), condensate truck loading facilities (EP-LOAD), and associated fugitive emissions (EP-FUG).

Note that other storage tanks may be present on site (i.e., methanol, TEG, lube oil) but are considered de minimis sources per Table 45-13B and are not addressed further in this application.

Proposed Emissions

Emissions calculations for the project are presented in Attachment N.

Each rich-burn natural gas-fired compressor engine is equipped with an NSCR catalyst. Potential emissions were calculated using engine manufacturer data and NSCR catalyst control efficiencies for pollutants affected by the NSCR catalyst. Pollutant emissions for which no manufacturer data was available were calculated using the latest AP-42/EPA emission factors.

Each lean-burn natural gas-fired compressor engine is equipped with an oxidation catalyst. Potential emissions were calculated using engine manufacturer data and oxidation catalyst control efficiencies for pollutants affected by the oxidation catalyst. Pollutant emissions for which no manufacturer data was available were calculated using the latest AP-42/EPA emission factors.

Each TEG dehydration unit is equipped with a primary electric glycol pump with a maximum capacity of 15 gallons per minute. In addition, each dehydration unit has two gas injection glycol pumps, each with a maximum capacity of 7.5 gallons per minute. Potential volatile organic compound (VOC) emissions were based on the GRI-GLYCalc™ results for the electric pumps since the emissions were higher than those using the backup gas pumps. Potential greenhouse gas (GHG) emissions were based on the GRI-GLYCalc™ results for the gas pumps since those emissions were higher than using the electric pump. Still vent vapors from the dehydration units are controlled by an air-cooled condenser. Non-condensables from the still column overheads are routed to the reboiler and burned with 95% destruction efficiency. Under normal operating circumstances, flash tank overhead vapors are routed to the reboiler to be burned as fuel. Any excess vapors not burned as fuel are routed to the flash gas suction scrubber for 100% control efficiency. During upset conditions, excess flash gas may be routed to the flare and combusted with 98% control efficiency. Upset conditions include loss of both permanent and backup power or compressor malfunction of the primary and secondary flash gas compressors. GRI-GLYCalc™ reports for both the electric and gas pump scenarios are enclosed.

TEG reboiler and hot oil heater emissions were calculated using AP-42/EPA emission factors for natural gas combustion adjusted using the fuel HHV.

Truck loading emissions were calculated using AP-42 Section 5.2-4 Equation 1 (6/2008) for Petroleum Liquid Loading Losses and the physical properties of the liquids loaded obtained from a site-specific liquids analysis. Per AP-42 5.2-6, 70% capture efficiency was assumed for trucks not subject to a New Source Performance Standard (NSPS), and per manufacturer data, 95% control efficiency was assumed for the carbon canister control, for an overall control efficiency of 66.5%.

Compressor blowdown emissions were based on an estimated 60 blowdowns per compressor per year, an estimated 6,500 scf per blowdown and a representative gas analysis.

Documentation supporting the emissions calculations, including a manufacturer specification sheet, a catalyst specification sheet, GLYCALC reports, and an extended inlet gas analysis are included in Appendix A.

WVDEP APPLICATION FOR NSR 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** 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)*: **Appalachia Midstream Services, L.L.C.**	2. Federal Employer ID No. ***(FEIN)***: **26-3678972**
3. Name of facility *(if different from above)*: **Miller Compressor Station**	4. The applicant is the: ☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**
5A. Applicant's mailing address: **P.O. Box 18312** **Oklahoma City, OK 73154-0312**	5B. Facility's present physical address: **On the border of the Marshall/Wetzel County line near Bannen, WV**

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

7. If applicant is a subsidiary corporation, please provide the name of parent corporation:

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: **The site is owned by the applicant.**
- 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 Compressor Station**	10. North American Industry Classification System **(NAICS)** code for the facility: **211111**
11A. DAQ Plant ID No. (for existing facilities only): **051-00130**	11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): **R13-2831D**

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

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B.**

- **From Bannen, head southwest on Amos Hollow Road/County Road 89 toward Clark Hill for 1.1 miles.**
- **Turn left at Laurel Run. In 0.8 miles, turn right to stay on Laurel Run.**
- **In 0.4 miles, take slight left at Johnson Hill.**
- **Take the first left onto County Road 1/22/Johnson Ridge.**

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
N/A	**Bannen**	**Marshall**
12.E. UTM Northing (KM): **4396.730**	12F. UTM Easting (KM): **532.478**	12G. UTM Zone: **17**

13. Briefly describe the proposed change(s) at the facility:
AMS requests to remove one (1) 1,380-hp Waukesha L5794 GSI compressor engine (EPCE-1), replace three (3) 1,380-hp Caterpillar G3516B compressor engines (EPCE-9, EPCE-10, and EPCE-11) with like-kind engines, add (1) one 1,380-hp Caterpillar G3516B compressor engine (EPCE-12), add compressor blowdown emissions (BD), revise facility emissions from miscellaneous sources (EPCE-2 – EPCE-11, EPDHY-1 – EPDHY-3, EPREBL-1 – EPREBL-3, EPOH-1, and EP-FUG) using an updated gas analysis, and revise greenhouse gas emissions using the current Global Warming Potential multipliers.

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

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:
Facility: Hours Per Day **24** Days Per Week **7** Weeks Per Year **52**

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

Submit completed and signed **Authority Form** as **Attachment R.**

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE Randy C DeLaune *(Please use blue ink)* DATE: 3/24/15 *(Please use blue ink)*

35B. Printed name of signee: **Randy DeLaune**		35C. Title: **General Manager**
35D. E-mail: **Randy.Delaune@williams.com**	36E. Phone: **405-727-1235**	36F. FAX: **405-727-3235**
36A. Printed name of contact person (if different from above): **Kijun Hong**		36B. Title: **Specialist - Air**
36C. E-mail: **airgroup@williams.com**	36D. Phone: **405-727-1245**	36E. FAX: **405-727-3245**

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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

ATTACHMENT A: BUSINESS REGISTRATION CERTIFICATE

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
APPALACHIA MIDSTREAM SERVICES, L.L.C.
900 PENNSYLVANIA AVE
CHARLESTON, WV 25302-3548

BUSINESS REGISTRATION ACCOUNT NUMBER: **2222-3681**

This certificate is issued on: **06/30/2010**

This certificate is issued by the West Virginia State Tax Commissioner in accordance with W.Va. Code § 11-12.

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued.

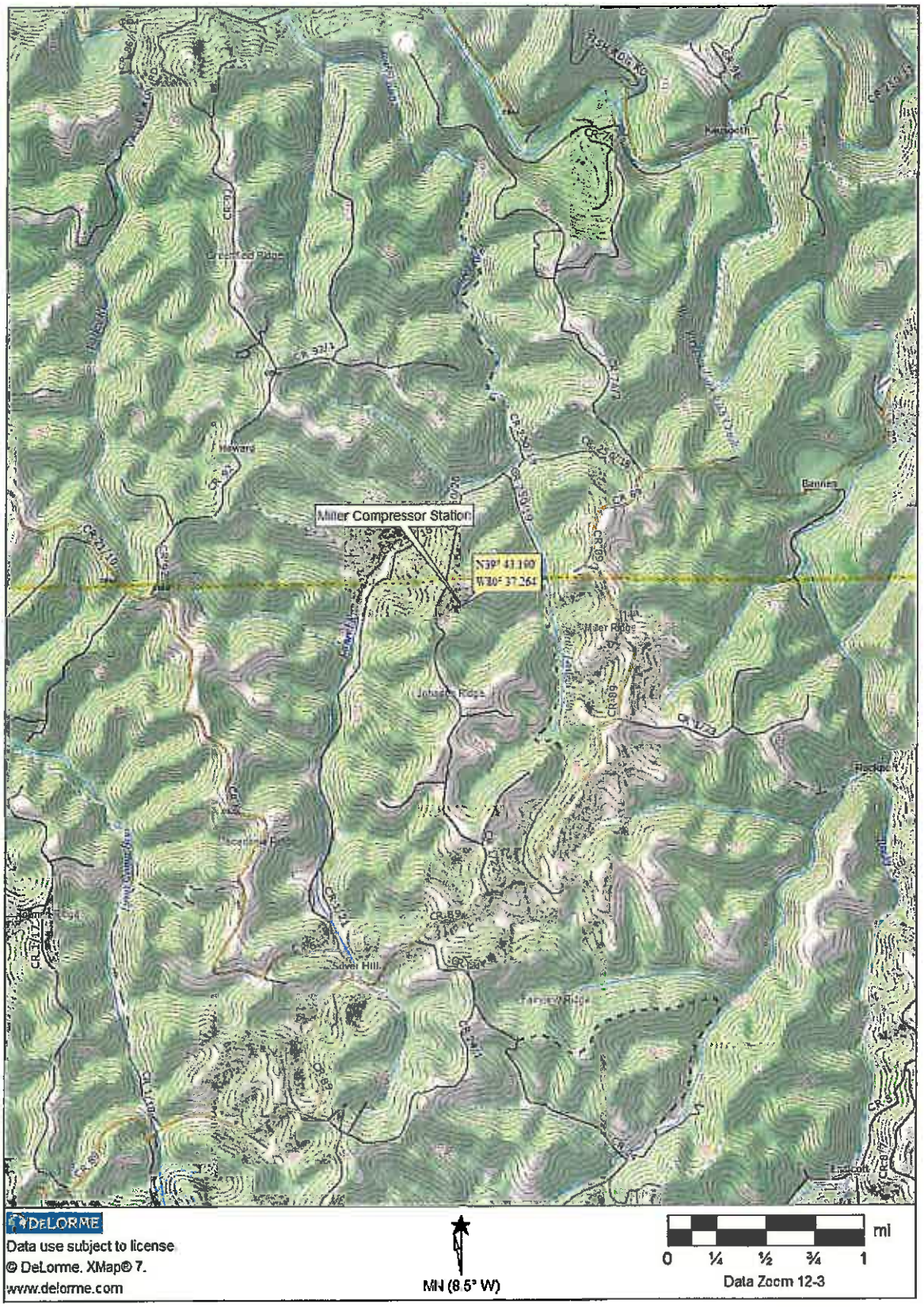
This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them. CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

atL006 v.1
L0250854144

ATTACHMENT B: MAP



Miller Compressor Station
Figure 1: Area Map
Marshall County, WV
March 2015

ATTACHMENT C: INSTALLATION/START-UP SCHEDULE

The final dates of installation and start-up of the proposed equipment are contingent upon the permit issuance date.

ATTACHMENT D: REGULATORY DISCUSSION

STATE

45 CSR 13 - 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:

The change in potential emissions associated with the proposed project are more than the minor source construction permit thresholds of 6 pounds per hour (pph) AND 10 tons per year (tpy) of any regulated air pollutant OR 144 pounds per day (ppd) of any regulated air pollutant OR 2 pph OR 5 tpy of aggregated hazardous air pollutants (HAP) OR 45 CSR 27 toxic air pollutant (TAP) (10% increase if above BAT triggers or increase to Best Available Technology (BAT) triggers) OR subject to applicable Standard or Rule.

45 CSR 22 - AIR QUALITY MANAGEMENT FEE PROGRAM:

The facility is required to maintain a valid Certificate to Operate on the premises.

45 CSR 30 - REQUIREMENTS FOR OPERATING PERMITS:

Emissions from the facility do not exceed major source thresholds; therefore, this rule does not apply.

FEDERAL

40 CFR PART 60 SUBPART KB—STANDARDS OF PERFORMANCE FOR VOLATILE ORGANIC LIQUID STORAGE VESSELS (INCLUDING PETROLEUM LIQUID STORAGE VESSELS) FOR WHICH CONSTRUCTION, RECONSTRUCTION, OR MODIFICATION COMMENCED AFTER JULY 23, 1984

The affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. The 400-bbl tanks at this facility were constructed after the effective date of this subpart but are less than 75 m^3 (which equals approximately 471 bbl); therefore, this subpart does not apply.

40 CFR PART 60 SUBPART KKK - STANDARDS OF PERFORMANCE FOR STATIONARY FOR EQUIPMENT LEAKS OF VOC FROM ONSHORE NATURAL GAS PROCESSING PLANTS:

This subpart sets standards for natural gas processing plants, which are defined as any site engaged in the extraction of natural gas liquids from field gas, fractionation of natural gas liquids, or both. This facility was subject to this subpart based on the Joule-Thomson (JT) system; however, the system has been removed and this subpart no longer applies.

40 CFR PART 60 SUBPART IIII - STANDARDS OF PERFORMANCE FOR STATIONARY COMPRESSION IGNITION INTERNAL COMBUSTION ENGINES:

The facility does not contain the affected source (diesel-fired engine) and is therefore not subject to this Subpart.

40 CFR PART 60 SUBPART JJJJ - STANDARDS OF PERFORMANCE FOR STATIONARY SPARK IGNITION INTERNAL COMBUSTION ENGINES:

The 1,380-hp Waukesha L5794 GSI units are four-stroke, rich-burn natural gas-fired compressor engines that were manufactured after July 1, 2007 and are therefore subject to Stage 1 emissions standards in this subpart. The 1,380-hp Caterpillar G3516B units are four-stroke, lean-burn natural gas-fired compressor engines that were manufactured after July 1, 2010 and are therefore subject to Stage 2 emissions standards in this subpart. AMS will comply with all applicable requirements.

40 CFR PART 60 SUBPART KKKK - STANDARDS OF PERFORMANCE FOR STATIONARY COMBUSTION TURBINES:

This subpart establishes emission standards and compliance schedules for the control of emissions from stationary combustion turbines 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, that commenced construction, modification, or reconstruction after February 18, 2005. The 805-hp Capstone C600 Microturbine generators have a heat input less than 10 mmBtu/hr and are therefore not subject to this subpart.

40 CFR PART 60 SUBPART OOOO – STANDARDS OF PERFORMANCE FOR THE OIL AND GAS SECTOR:

This subpart regulates VOC and SO_2 emissions for certain parts of oil and gas operations, including pneumatic controllers, reciprocating compressors, centrifugal compressors, storage vessel, processing plants, and sweetening units. No centrifugal compressors, processing plants or sweetening units will be used at this site. The storage vessels will have controlled emissions less

than 6 tpy each and will not be subject. Pneumatic controllers and reciprocating compressors will comply with the manufacturer standards and workplace requirements as applicable.

40 CFR PART 63 SUBPART HH - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES FROM OIL AND NATURAL GAS PRODUCTION FACILITIES:

The site will remain a minor (area) source of hazardous air pollutants. Even though the TEG dehydration units at this facility are considered affected sources, they are exempt from the requirements of § 63.764(d)(2) since the actual average emissions of benzene from each glycol dehydration unit process vent to the atmosphere are less than 0.90 Mg (1.0 TPY), as determined by the procedures specified in § 63.772(b)(2). However, the facility must maintain records of the de minimis determination as required in § 63.774(d)(1).

40 CFR PART 63 SUBPART HHH - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES FROM NATURAL TRANSMISSION AND STORAGE FACILITIES:

The facility is not a natural gas transmission and storage facility and is therefore not subject to this Subpart.

40 CFR PART 63 SUBPART ZZZZ - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES FROM STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES - AREA SOURCE:

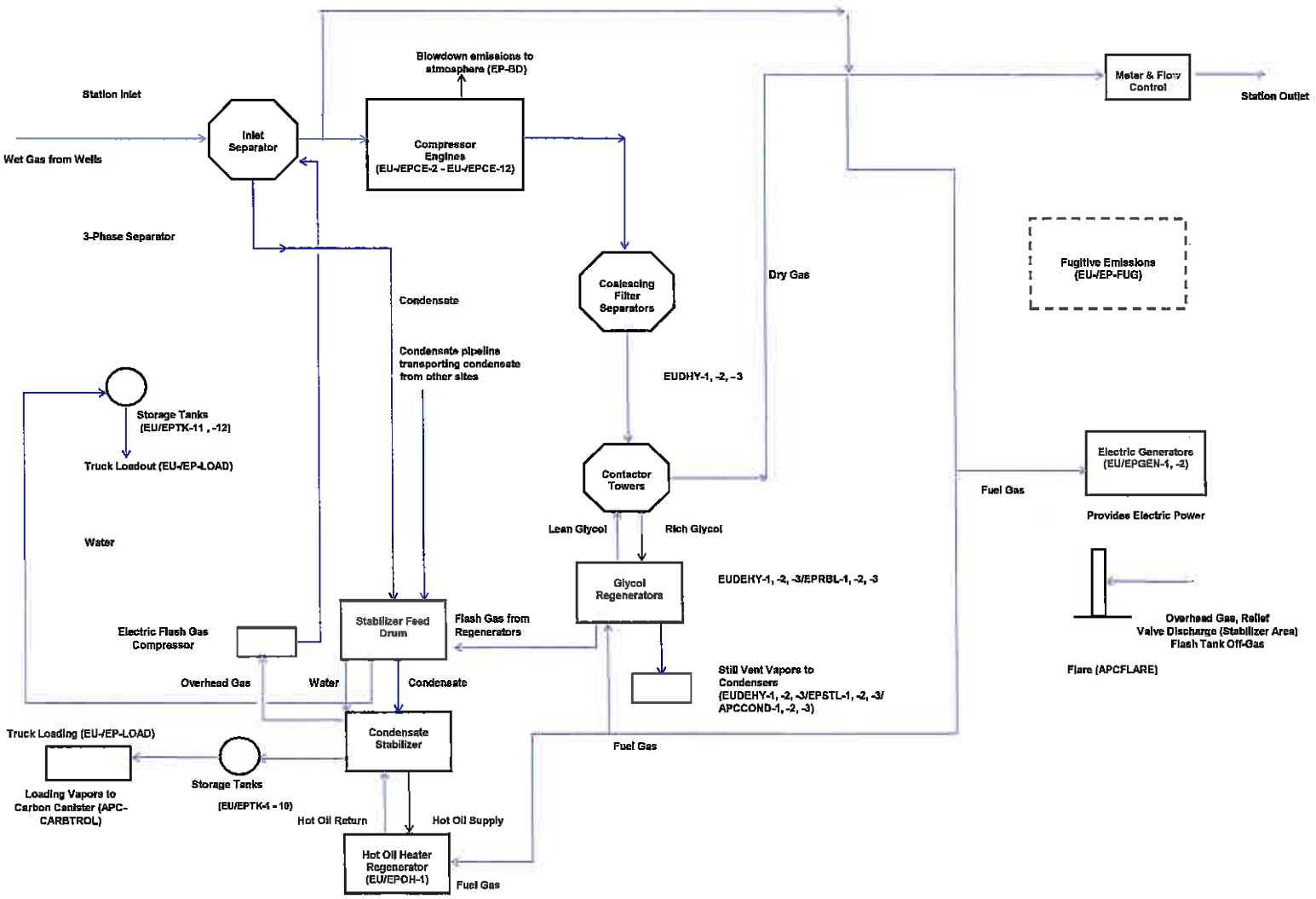
The original rule, published on February 26, 2004, initially affected new (constructed or reconstructed after December 19, 2002) reciprocating internal combustion engines (RICE) with a site-rating greater than 500 brake horsepower (HP) located at a major source of HAP emissions. On January 18, 2008, EPA published an amendment that promulgated standards for RICE constructed or reconstructed after June 12, 2006 with a site rating less than or equal to 500 HP located at major sources, and for engines constructed and reconstructed after June 12, 2006 located at area sources. On August 10, 2010, EPA published another amendment that promulgated standards for existing (constructed or reconstructed before June 12, 2006) RICE at area sources and existing RICE (constructed or reconstructed before June 12, 2006) with a site rating of less than or equal to 500 HP at major sources.

Owners and operators of new or reconstructed engines at area sources must meet the requirements of Subpart ZZZZ by complying with either 40 CFR Part 60 Subpart IIII (for CI engines) or 40 CFR Part 60 Subpart JJJJ (for SI engines). Based on emission calculations, this facility is a minor source of HAP. The 1,380-hp, four-stroke, rich-burn natural gas-fired compressor engines

commenced construction after the June 12, 2006 effective date for new stationary RICE at area sources and are therefore subject to this subpart. The 1,380-hp, four-stroke, lean-burn natural gas-fired compressor engines also commenced construction after the June 12, 2006 effective date for new stationary RICE at area sources and are also subject to this subpart. The engines will meet requirements by compliance with Subpart JJJJ. No further requirements apply for these engines under this subpart.

ATTACHMENT F: PROCESS FLOW DIAGRAM

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Figure 2. Process Flow Diagram



Attachment F

ATTACHMENT G: PROCESS DESCRIPTION

A description of the facility process is as follows: The natural gas inlet stream from surrounding area wells enters the facility through an inlet suction separator prior to the gas being compressed. After the inlet gas passes through compressors powered by natural gas-fired compressor engines, it goes through the dehydration process before exiting the facility. Triethylene glycol (TEG) dehydration units are used to remove water from the gas. In the dehydration process, gas passes through a contactor vessel where water is absorbed by the glycol. The "rich" glycol containing water goes to the glycol reboiler where heat is used to boil off the water. The heat is supplied by a natural gas-fired reboiler that exhausts to the atmosphere. Overhead still column emissions are controlled by an air-cooled condenser. The non-condensables from the still column overheads are routed to the reboiler and burned with 95% destruction efficiency. Under normal operating circumstances, flash tank off-gases will also be routed to the reboiler to be burned as fuel with 95% destruction efficiency. Any excess vapors not burned as fuel are routed to the flash gas suction scrubber for 100% control efficiency. During upset conditions, excess flash gas may be routed to the flare and combusted with 98% destruction efficiency. Upset conditions include loss of or malfunction of the flash gas compressors.

Collected liquids are stabilized to remove volatile components before being stored in the ten (10) 400-bbl condensate storage tanks and transported off-site by truck. Overhead vapors generated in the stabilizer are compressed by an electric-driven flash gas compressor and recycled to the inlet gas stream. The hot oil heater provides hot oil to the stabilizer. Condensate dropout from liquids dumps, produced water and other pipeline fluids are stored in the two (2) 400-bbl pipeline fluids/water storage tanks and transported offsite via truck. Emissions from condensate truck loading will be controlled by carbon canister, with 70% capture efficiency and 95% control efficiency, for an overall control efficiency of 66.5%.

The generators provide electric power to the flash gas compressor, glycol pumps, hot oil pumps and other electrical equipment. Gas glycol pumps may also be used in place of the electric glycol pumps. The flare is used to combust gas during upsets and may also be used to combust flash tank off-gas and condensate stabilizer overhead gas as needed during flash gas compressor shutdown or maintenance. Fugitive emissions and compressor blowdown emissions also occur.

A process flow diagram reflecting facility operations is shown in Figure 2, located in Attachment F.

ATTACHMENT H: MATERIAL SAFETY DATA SHEETS (MSDS)

Note: MSDS are representative of but not necessarily identical to materials used and/or processed at facility.

Material Safety Data Sheet

Material Name: Natural Gas

Health	1
Flammability	4
Reactivity	0
PPE	

*** Section 1 - Chemical Product and Company Identification ***

Product name: Natural Gas
Synonyms: Wellhead Gas; Petroleum Gas; Fuel Gas; Methane; Marsh Gas
Chemical Family: Petroleum Hydrocarbon
Formula: Gas mixture, primarily methane

Supplier: Chesapeake Energy Corporation and its subsidiaries
6100 N. Western Avenue
Oklahoma City, OK 73118

Other Information: Phone: 405-848-8000 Fax: 405-753-5468
Emergency Phone Number: Chemtrec – 800-424-9300

*** Section 2 - Hazards Identification ***

Emergency Overview
Flammable gas, simple asphyxiant, freeze burns can occur from liquid natural gas. Keep away from heat, sparks, flames, static electricity, or other sources of ignition.

Potential Health Effects: Eyes
Natural gas is generally non-irritating to the eyes. Liquid or expanding gas can cause severe freeze burns to the eye and surrounding tissue. Pressurized gas can cause mechanical injury to the eye.

Potential Health Effects: Skin
None for gas; liquid or expanding gas can cause severe freeze burns on the skin.

Potential Health Effects: Ingestion
This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Potential Health Effects: Inhalation
Drowsiness, excitation, or mild narcosis is produced at elevated concentrations and is an asphyxiant when the oxygen concentration falls below 18% at sea level.

HMIS Ratings: Health: 1 **Fire:** 4 **HMIS Reactivity** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

CAS #	Component	Percent Ranges
8006-14-2	Natural Gas	100
74-82-8	Methane	>90
74-84-0	Ethane	<5
74-98-6	Propane	<1
Mixture	C4-C6 Aliphatic Hydrocarbons	Trace amounts

This product may contain small amounts of heavier hydrocarbons. Components of this product are normally within the ranges listed above; however, depending on the geographical source, gas composition may vary.

*** Section 4 - First Aid Measures ***

First Aid: Eyes
Move away from exposure to vapors and into fresh air. If liquefied gas contacts the eye, flush with large amounts of tepid water for at least 15 minutes. Seek medical attention.

First Aid: Skin
Treat burned or frostbitten skin by immersing the affected area in tepid water. When sensation has returned to the frostbitten skin, keep the skin warm, dry, and clean. For burns, lay bulky, dry sterile bandages over affected area and seek prompt medical attention.

First Aid: Ingestion
Not considered likely since the product is a gas under normal conditions.

First Aid: Inhalation

If conditions are safe to do so, remove affected person to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration or cardiopulmonary resuscitation (CPR). Seek immediate medical attention.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards

See Section 9 for Flammability Properties.

This gas is extremely flammable and forms flammable mixtures with air. It will burn in the open or be explosive in confined spaces. Its vapors are lighter than air and will disperse. A hazard of re-ignition or explosion exists if flame is extinguished without stopping the flow of gas.

Hazardous Combustion Products

Combustion may yield carbon monoxide and/or carbon dioxide.

Extinguishing Media

Stop the gas flow if it can be done without risk. Dry chemical, carbon dioxide, or halon. Water can be used to cool the fire but may not extinguish the fire.

Fire Fighting Equipment/Instructions

Evacuate the area upwind of the source. If a leak or spill has not ignited, water spray can be used to disperse gas and to protect persons attempting to stop the leak. In the case of a fire, control the fire until the gas supply can be shut off. If the gas source cannot be shut off immediately, equipment and surfaces exposed to the fire should be cooled with water to prevent overheating and explosions. Firefighters should wear self-contained breathing apparatus and full protective clothing.

NFPA Ratings: Health: 1 **Fire:** 4 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Flammable Gas – Eliminate All Sources of Ignition. Stop release/spill if it can be done with minimal risk. Keep all sources of ignition and hot metal surfaces away from release/spill. The use of explosion-proof equipment is recommended.

Evacuation Procedures

Notify persons down wind of the release/spill, isolate the immediate hazard area and keep unauthorized personnel out. Contact fire authorities and appropriate state/local agencies.

Special Procedures

Eliminate sources of heat or ignition including internal combustion engines and power tools. Stay up wind and away from the release/spill. Wear appropriate protective equipment including respiratory protection as conditions warrant.

*** Section 7 - Handling and Storage ***

Store and use natural gas cylinders and tanks in well ventilated areas, away from direct sunlight and sources of ignition. Keep away from heat, sparks, open flames, and other sources of ignition. Rapid escape of gas may generate static charge. Electrically ground and bond all lines and equipment used with natural gas. Use only explosion-proof or intrinsically safe electrical equipment where product is stored or handled. Keep away from incompatible agents and from cylinders of oxygen.

*** Section 8 - Exposure Controls / Personal Protection ***

A: Component Exposure Limits

Natural Gas (8006-14-2)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases alkane C1-C4)

Methane (74-82-8)

ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases alkane C1-C4)

Ethane (74-84-0)
ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases alkane C1-C4)

Propane (74-98-6)
ACGIH: 1000 ppm TWA (listed under Aliphatic hydrocarbon gases alkane C1-C4)
OSHA: 1000 ppm TWA; 1800 mg/m^3 TWA
NIOSH: 1000 ppm TWA; 1800 mg/m^3 TWA

Engineering Controls
Local or general exhaust is required if used in an enclosed area in order to keep concentrations below the lower explosive limit.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face
Eye protection should be worn to safeguard against potential eye contact, irritation, or injury.

Personal Protective Equipment: Skin
Protect skin from contact. Impervious clothing should be worn as needed.

Personal Protective Equipment: Respiratory
Use approved respiratory protective equipment in the event of oxygen deficiency, when the product produces vapors that exceed permissible limits or when excessive vapors are generated. Self-contained breathing apparatus should be used for fire fighting.

Personal Protective Equipment: General
Do not smoke in areas where this product is stored or handled. A source of clean water should be available in the work area for flushing eyes and skin. Use explosion-proof equipment suitable for hazardous locations.

*** Section 9 - Physical & Chemical Properties ***

Appearance:	Colorless	**Odor:**	Odorless to slight hydrocarbon
Physical State:	Gas	**pH:**	Neutral
Vapor Pressure:	>760 @ 25°C	**Vapor Density:**	0.6 (estimate)
Boiling Point:	-258 to -43°F	**Melting Point:**	NA
Solubility (H2O):	Slight	**Specific Gravity:**	0.55 (estimate)
Evaporation Rate:	Gas under normal conditions	**VOC:**	100%
Octanol/H2O Coeff.:	NA	**Flash Point:**	Flammable gas
Flash Point Method:	NA	**Upper Flammability Limit (UFL):**	15.0
		Lower Flammability Limit (LFL):	4.0
		Burning Rate:	Flammable gas
		Auto Ignition:	900 – 1170 °F

Properties of this material will vary with actual composition.

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability
This material is stable under normal conditions of use.

Chemical Stability: Conditions to Avoid
Sources of heat or ignition.

Incompatibility
Strong oxidizers such as nitrates, chlorates, peroxides.

Hazardous Decomposition
Combustion produces carbon monoxide and carbon dioxide.

Possibility of Hazardous Reactions
Will not occur.

*** Section 11 - Toxicological Information ***

Acute Dose Effects

Component Analysis - LD50/LC50

Natural gas (8006-14-2)
Inhalation LC50 Rat: 658 mg/L/4H

Methane (74-82-8)
Inhalation LC50 Mouse: 326 g/m3/2H

Ethane (74-84-0)
Inhalation LC50 Rat: 658 mg/L/4H

Propane (74-98-6)
Inhalation LC50 Rat: 658 mg/L/4H

The major components of natural gas act as simple asphyxiant gases without significant potential for systemic toxicity. At high concentrations this material acts as an asphyxiant by diluting and displacing oxygen. Extremely high concentrations of this material can produce unconsciousness followed by death. Symptoms of persons exposed to oxygen deficient atmospheres include headache, dizziness, incoordination, cyanosis and narcosis.

*** Section 12 - Ecological Information ***

There is no information available on the ecotoxicological effects of petroleum gases. Because of their high volatility, these gases are unlikely to cause ground or water pollution. Petroleum gases released into the environment will rapidly disperse into the atmosphere and undergo photochemical degradation.

*** Section 13 - Disposal Considerations ***

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of in containers, it may meet the criteria of an "ignitable" waste. It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

*** Section 14 - Transportation Information ***

US DOT Information

Shipping Name: Natural Gas, Compressed
UN/NA #: 1271 **Hazard Class:** 2.1 **Packing Group:** Not applicable

Depending on the product's properties the shipper may elect to classify the material differently. Refer to 49 CFR 172 for further information and descriptions.

*** Section 15 - Regulatory Information ***

US Federal Regulations

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Natural gas	8006-14-2	No	Yes	No	No	Yes	No
Methane	74-82-8	No	Yes	Yes	Yes	Yes	Yes
Ethane	74-84-0	No	Yes	Yes	Yes	Yes	Yes
Propane	74-98-6	No	Yes	Yes	Yes	Yes	Yes

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Natural gas	8006-14-2	Yes	DSL	EINECS
Methane	74-82-8	Yes	DSL	EINECS
Ethane	74-84-0	Yes	DSL	EINECS
Propane	74-98-6	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

Other Information

The information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Key/Legend

NA - Not Applicable
ND - Not Determined
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TLV - Threshold Limit Value
PEL - Permissible Exposure Limit
RQ - Reportable Quantity
TWA - Time Weighted Average
STEL - Short Term Exposure Limit
NTP - National Toxicology Program
IARC - International Agency for Research on Cancer

Health	1
Flammability	4
Reactivity	0
PPE	

Material Safety Data Sheet

Material Name: Natural Gas Condensate

*** Section 1 - Chemical Product and Company Identification ***

Product name: Natural Gas Condensate
Synonyms: Drips; Condensate; Field Condensate; Gas Well Condensate; High Pressure Inlet Liquids; Lease Condensate; Natural Gas Liquids (NGL or NGLs); Pipeline Liquids
Chemical Family: Petroleum Hydrocarbon
Formula: Complex mixture

Supplier: Chesapeake Energy Corporation and its subsidiaries
6100 N. Western Avenue
Oklahoma City, OK 73118

Other Information: Phone: 405-848-8000 Fax: 405-753-5468
Emergency Phone Number: Chemtrec – 800-424-9300

*** Section 2 - Hazards Identification ***

Emergency Overview

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources. Contact may cause eye, skin and mucous membrane irritation. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headaches, intoxication), and respiratory system effects. If ingested, do NOT induce vomiting as this may cause chemical pneumonia (fluid in the lungs).May contain benzene which can cause blood disease including anemia and leukemia.

Potential Health Effects: Eyes

May cause moderate irritation.

Potential Health Effects: Skin

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

Potential Health Effects: Ingestion

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Contains carbon dioxide, which can produce rapid breathing, fatigue, muscular incoordination, nausea, and asphyxiation depending on the concentration and duration of exposure.

Medical Conditions Aggravated by Exposure

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

HMIS Ratings: Health: 1 **Fire:** 4 **HMIS Reactivity** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

CAS #	Component	Percent Ranges
68919-39-1	Natural gas condensate	100
71-43-2	Benzene	0.1-2

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Seek medical attention. Monitor for breathing difficulty.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO_2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

NFPA Ratings: Health: 1 **Fire:** 4 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Product may release substantial amounts of flammable vapors and gases (e.g., methane, ethane, and propane), at or below ambient temperature depending on source and process conditions and pressure.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection - do not discharge solid water stream patterns into the liquid resulting in splashing.

Clean-Up Procedures

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Response and clean-up crews must be properly trained and must utilize proper protective equipment.

Evacuation Procedures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible.

Special Procedures

Avoid excessive skin contact with the spilled material.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

* * * Section 8 - Exposure Controls / Personal Protection * * *

A: Component Exposure Limits

Benzene (71-43-2)

ACGIH:	0.5 ppm TWA
	2.5 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA:	10 ppm TWA; 25 ppm ceiling; 50 ppm (10 min.)
NIOSH:	0.1 ppm TWA
	1 ppm STEL

Engineering Controls

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as of E.I. DuPont Tyvek-Saranex 23 ®, Tychem®, Barricade® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

Personal Protective Equipment: Respiratory

A NIOSH -approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: General

Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

*** Section 9 - Physical & Chemical Properties ***

Appearance:	A colorless to straw-yellow, water-like	**Odor:**	Petroleum
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	~110 psia @ 100°F	**Vapor Density:**	>1
Boiling Point:	85 to 437°F (39 to 200°C)	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	AP 0.62 - 0.76
Evaporation Rate:	High	**VOC:**	ND
Percent Volatile:	100	**Octanol/H2O Coeff.:**	ND
Flash Point:	AP -40°F / <-40°C	**Flash Point Method:**	TCC
		Lower Flammability Limit (LFL):	ND
		Upper Flammability Limit (UFL):	ND
		Burning Rate:	ND
		Auto Ignition:	480°F / 250°C

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

Stable under normal ambient and anticipated conditions of storage and handling. Extremely flammable liquid and vapor. Vapor can cause flash fire.

Chemical Stability: Conditions to Avoid

Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Incompatibility

Keep away from strong oxidizers

Hazardous Decomposition

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Possibility of Hazardous Reactions

Will not occur.

*** Section 11 - Toxicological Information ***

Acute Dose Effects

Component Analysis - LD50/LC50

Natural gas condensate (68919-39-1)

Inhalation LC50 Rat: >5.2 mg/L/4H; Oral LD50 Rat: 14000 mg/kg; Dermal LD50 Rabbit: >2000 mg/kg

Benzene (71-43-2)

Inhalation LC50 Rat: 13050-14380 ppm/4H; Oral LD50 Rat:1800 mg/kg

Carcinogenicity

Component Carcinogenicity

Benzene (71-43-2)

ACGIH: A1 - Confirmed Human Carcinogen
OSHA: 10 ppm TWA; 25 ppm ceiling; 50 ppm (10 min.)
NIOSH: potential occupational carcinogen
NTP: Known Human Carcinogen (Select Carcinogen)
IARC: Supplement 7 [1987], Monograph 29 [1982] (Group 1 (carcinogenic to humans))

*** Section 12 - Ecological Information ***

Ecotoxicity

Component Analysis - Ecotoxicity - Aquatic Toxicity

Natural gas condensate (68919-39-1)

Test & Species		Conditions
96 Hr LC50 Alburnus alburnus	119 mg/L [static]	
96 Hr LC50 Cyprinodon variegatus	82 mg/L [static]	
72 Hr EC50 Selenastrum capricornutum	56 mg/L	
24 Hr EC50 Daphnia magna	170 mg/L	

Benzene (71-43-2)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	12.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	22 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]	
72 Hr EC50 Selenastrum capricornutum	29 mg/L	
48 Hr EC50 water flea	356 mg/L [Static]	
48 Hr EC50 Daphnia magna	10 mg/L	

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

A: General Product Information

Wastes must be tested using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes.

B: Component Waste Numbers

Benzene (71-43-2)

RCRA: waste number U019 (Ignitable waste, Toxic waste)
0.5 mg/L regulatory level

Disposal Instructions

All wastes must be handled in accordance with local, state and federal regulations.
See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

*** Section 14 - Transportation Information ***

US DOT Information

Shipping Name: Petroleum distillates, n.o.s or Petroleum products, n.o.s. (condensate)
UN/NA #: 1268 **Hazard Class:** 3 **Packing Group:** II

*** Section 15 - Regulatory Information ***

US Federal Regulations

Component Analysis

This material may contain one of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Benzene (71-43-2)

SARA 313: 0.1 % de minimis concentration

CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Benzene	71-43-2	0.1 %

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Natural gas condensate	68919-39-1	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS

*** Section 16 - Other Information ***

Other Information

The information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Key/Legend

NA - Not Applicable
ND - Not Determined
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TLV - Threshold Limit Value
PEL - Permissible Exposure Limit
RQ - Reportable Quantity
TWA - Time Weighted Average
STEL - Short Term Exposure Limit
NTP - National Toxicology Program
IARC - International Agency for Research on Cancer

Health	1
Flammability	4
Reactivity	0
PPE	

Material Safety Data Sheet

Material Name: Produced Water

*** Section 1 - Chemical Product and Company Identification ***

Product name: Produced Water - Sweet
Synonyms: Salt Water, H_2O, Oily Water, Formation Water
Chemical Family: Water
Formula: Complex mixture

Supplier: Chesapeake Energy Corporation and its subsidiaries
6100 N. Western Avenue
Oklahoma City, OK 73118

Other Information: Phone: 405-848-8000 Fax: 405-753-5468
Emergency Phone Number: Chemtrec – 800-424-9300

*** Section 2 - Hazards Identification ***

Emergency Overview
May cause eye, skin, respiratory and gastrointestinal tract irritation.
Potential Health Effects: Eyes
May cause eye irritation.
Potential Health Effects: Skin
Contact may cause skin irritation.
Potential Health Effects: Ingestion
Ingestion may cause irritation of the digestive tract that may result in nausea, vomiting and diarrhea.
Potential Health Effects: Inhalation
Breathing the mist and vapors may be irritating to the respiratory tract.
HMIS Ratings: Health: 1 **Fire:** 4 **HMIS Reactivity** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

Produced water is a mixture of varying amounts of water and oil produced from various exploration and production processes. Produced water may contain an upper layer of flammable liquid and vapor hydrocarbons. Produced water may include small amounts of natural gas condensate, and benzene may be present.

CAS #	Component	Percent
7732-18-5	Water	>68
Not Available	Dissolved Minerals	<32
71-43-2	Benzene	<1
8002-05-9	Petroleum distillates (naphtha)	<1

Normal composition ranges are shown. Exceptions may occur depending on the source of the produced water.

*** Section 4 - First Aid Measures ***

First Aid: Eyes
Flush eyes with clean, low-pressure water for at least 15 minutes, occasionally lifting the eyelids. If pain or redness persists after flushing, obtain medical attention. If eye is exposed to hot liquid, cover eyes with cloth and seek medical attention immediately.
First Aid: Skin
In case of hot liquid exposure, do not remove clothing or treat-wash only unburned area and seek medical attention immediately.
First Aid: Ingestion
Do not induce vomiting. Seek medical attention.
First Aid: Inhalation
Immediately remove person to area of fresh air. For respiratory distress, give oxygen, rescue breathing, or administer CPR if necessary. Obtain prompt medical attention.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards

See Section 9 for Flammability Properties.

May react with strong oxidizing materials and a wide variety of chemicals. Forms explosive mixtures with air.

Hazardous Combustion Products

Not Determined.

Extinguishing Media

Dry chemical, foam, carbon dioxide, or water spray.

Fire Fighting Equipment/Instructions

Any fire would be associated with any natural gas condensate floating on the surface of the produced water. Water may be ineffective on flames but should be used to keep fire exposed containers cool. Keep the surrounding areas cool by using water mists. Firefighters should wear self-contained breathing apparatus and full protective clothing.

NFPA Ratings: Health: 1 **Fire:** 4 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Stop the source of the leak or release. Clean up releases as soon as possible, observing precautions in Personal Protection Equipment section. Contain liquid to prevent further contamination of soil and surface water.

Clean-Up Procedures

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Response and clean-up crews must be properly trained and must utilize proper protective equipment. Where feasible and appropriate, remove contaminated soil or flush with fresh water. Follow prescribed procedures for reporting and responding to larger releases. Advise authorities and the National Response Center (800-424-8802) if the release is to a watercourse.

Evacuation Procedures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible.

Special Procedures

Avoid excessive skin contact with the spilled material.

*** Section 7 - Handling and Storage ***

Handling Procedures

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Do not enter storage areas and confined spaces without adequate ventilation. Use appropriate respiratory protection if there is a potential to exceed component exposure limit(s).

*** Section 8 - Exposure Controls / Personal Protection ***

A: Component Exposure Limits

Petroleum distillates (naphtha) (8002-05-9)

OSHA: 500 ppm TWA; 2000 mg/m^3 TWA

NIOSH: 350 mg/m^3 TWA

1800 mg/m^3 Ceiling (15 min)

Material Name: Produced Water

Benzene (71-43-2)

ACGIH: 0.5 ppm TWA
2.5 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 10 ppm TWA; 25 ppm ceiling; 50 ppm (10 min.)
NIOSH: 0.1 ppm TWA
1 ppm STEL

Engineering Controls

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Chemical goggles or face shield should be worn when handling product if the possibility of spray exists.

Personal Protective Equipment: Skin

Normal working clothes should be worn. Wash contaminated clothing prior to reuse.

Personal Protective Equipment: Respiratory

Respiratory protection is not required for normal use. At excessive concentrations, wear a NIOSH approved air purifying respirator with organic vapor cartridges.

Personal Protective Equipment: General

A source of clean water should be in the work area for flushing eyes and skin.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Clear or opaque	**Odor:**	Salty with a slight hydrocarbon odor.
Physical State:	Liquid	**pH:**	4.9-8.5
Vapor Pressure:	NA	**Vapor Density:**	1.2
Boiling Point:	212°F	**Melting Point:**	ND
Solubility (H2O):	Soluble	**Specific Gravity:**	>1 @ 0°C
Freezing Point:	<32°F	**Evaporation Rate:**	ND
VOC:	ND	**Octanol/H2O Coeff.:**	ND
Flash Point:	ND	**Flash Point Method:**	ND
		Lower Flammability Limit (LFL):	4.0
		Upper Flammability Limit (UFL):	46.0
		Burning Rate:	ND
		Auto Ignition:	NA

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

Stable under normal ambient and anticipated conditions of storage and handling.

Chemical Stability: Conditions to Avoid

Keep material away from heat, sparks, and open flames.

Incompatibility

Keep away from strong oxidizers.

Hazardous Decomposition

Not Determined.

Possibility of Hazardous Reactions

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Dose Effects

Component Analysis - LD50/LC50

Water (7732-18-5)
Oral LD50 Rat: >90 mL/kg

Petroleum distillates (naphtha) (8002-05-9)
Oral LD50 Rat: >4300 mg/kg; Dermal LD50 Rabbit: >2000 mg/kg

Benzene (71-43-2)
Inhalation LC50 Rat: 13050-14380 ppm/4H; Oral LD50 Rat:1800 mg/kg

Carcinogenicity

Component Carcinogenicity

Petroleum distillates (naphtha) (8002-05-9)
IARC: Monograph 45 [1989] (Group 3 (not classifiable))

Benzene (71-43-2)
ACGIH: A1 - Confirmed Human Carcinogen
OSHA: 10 ppm TWA; 25 ppm ceiling; 50 ppm (10 min.)
NIOSH: potential occupational carcinogen
NTP: Known Human Carcinogen (Select Carcinogen)
IARC: Supplement 7 [1987], Monograph 29 [1982] (Group 1 (carcinogenic to humans))

* * * Section 12 - Ecological Information * * *

Ecotoxicity

Component Analysis - Ecotoxicity - Aquatic Toxicity

Petroleum distillates (naphtha) (8002-05-9)

Test & Species		Conditions
96 Hr LC50 Salmo gairdneri	258 mg/L [static]	
24 Hr EC50 Daphnia magna	36 mg/L	

Benzene (71-43-2)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	12.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	22 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]	
72 Hr EC50 Selenastrum capricornutum	29 mg/L	
48 Hr EC50 water flea	356 mg/L [Static]	
48 Hr EC50 Daphnia magna	10 mg/L	

* * * Section 13 - Disposal Considerations * * *

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of a "characteristic" hazardous waste. This product could also contain benzene at low concentrations and may exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed with or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not Regulated

Additional Info.: This may not apply to all shipping situations. Consult 49CFR 172 for additional information.

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

Component Analysis

This material may contain one or more of the following chemicals identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Benzene (71-43-2)

SARA 313: 0.1 % de minimis concentration

CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Petroleum distillates (naphtha)	8002-05-9	No	Yes	Yes	Yes	Yes	Yes
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Benzene	71-43-2	0.1 %

Additional Regulatory Information

Material Name: Produced Water

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Water	7732-18-5	Yes	DSL	EINECS
Petroleum distillates (naphtha)	8002-05-9	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS

*** Section 16 - Other Information ***

Other Information

The information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Key/Legend

NA - Not Applicable
ND - Not Determined
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TLV - Threshold Limit Value
PEL - Permissible Exposure Limit
RQ - Reportable Quantity
TWA - Time Weighted Average
STEL - Short Term Exposure Limit
NTP - National Toxicology Program
IARC - International Agency for Research on Cancer

Health	1
Flammability	4
Reactivity	0
PPE	

Material Safety Data Sheet

Material Name: Petroleum Crude Oil

*** Section 1 - Chemical Product and Company Identification ***

Product name: Petroleum Crude Oil
Synonyms: Crude Oil, Non-hydrogen sulfide crude oil, sweet crude oil, petroleum distillates (naphtha)
Chemical Family: Petroleum Hydrocarbon
Formula: Complex mixture

Supplier: Chesapeake Energy Corporation and its subsidiaries
6100 N. Western Avenue
Oklahoma City, OK 73118

Other Information: Phone: 405-848-8000 Fax: 405-753-5468
Emergency Phone Number: Chemtrec – 800-424-9300

*** Section 2 - Hazards Identification ***

Emergency Overview

FLAMMABLE LIQUID - HIGH FIRE HAZARD - Keep away from heat and ignition sources. High concentrations may cause immediate unconsciousness - death may result unless promptly and successfully resuscitated. Petroleum Crude Oil is a liquid that ranges in color from amber to black depending on the source.

Potential Health Effects: Eyes

Contact with eyes may cause moderate to severe irritation.

Potential Health Effects: Skin

Practically non-toxic if absorbed following a single exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly. Rare, pre-cancerous warts on the forearms, hands and scrotum have been reported from prolonged or repeated skin contact.

Potential Health Effects: Ingestion

The health threat of ingestion occurs from the danger of aspiration of the liquids into the lungs. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure or even death. Ingestion may cause gastrointestinal problems, or central nervous system effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs, and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma respiratory failure, and death may occur.

HMIS Ratings: Health: 1 **Fire:** 4 **HMIS Reactivity** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 3 - Composition / Information on Ingredients ***

Petroleum Crude Oil is a complex mixture of paraffinic, cycloparaffinic and aromatic hydrocarbons with a range of carbon numbers between C1 to C60+. Petroleum Crude Oil can contain minor amounts of sulfur, nitrogen and oxygen compounds as well as trace amounts of heavy metals such as nickel, vanadium and lead. Composition varies depending on source of crude.

CAS #	Component	Percent Ranges
8002-05-9	Petroleum distillates (naphtha)	98-100
1330-20-7	Xylenes (o-, m-, p- isomers)	0-5
108-88-3	Toluene	0-5
100-41-4	Ethyl benzene	0-5
71-43-2	Benzene	0-5

*** Section 4 - First Aid Measures ***

First Aid: Eyes

Flush immediately with fresh water for at least 15 minutes while holding eyelids open. Remove contact lenses if worn. Seek medical attention if irritation persists.

First Aid: Skin

Remove contaminated clothing. Wash skin thoroughly with soap and water. Wash contaminated clothing. Discard contaminated non-waterproof shoes or boots. See a doctor if any signs or symptoms described in this document occur. DO NOT use solvents for washing.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical treatment. If spontaneous vomiting occurs, lean the victim forward to reduce the risk of aspiration and monitor for breathing difficulties.

First Aid: Inhalation

If signs and symptoms described in this document occur, move person to fresh air. If these effects continue, seek medical attention. If breathing is difficult, give oxygen. If breathing has stopped, begin artificial respiration (CPR) and activate 911.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards

See Section 9 for Flammability Properties.

Flash point and explosive limits are highly dependent on the crude oil source. Treat as an OSHA/NFPA flammable liquid unless otherwise indicated. Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon Monoxide, Carbon Dioxide and Reactive Hydrocarbon Compounds.

Extinguishing Media

Dry Chemical, Carbon Dioxide (CO_2), Foam (Foam and water fog can cause frothing.)

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

NFPA Ratings: Health: 1 **Fire:** 4 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection - do not discharge solid water stream patterns into the liquid resulting in splashing.

Clean-Up Procedures

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Evacuation Procedures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Product may release substantial amounts of flammable vapors and gases (e.g., methane, ethane, and propane), at or below ambient temperature depending on source and process conditions and pressure.

Special Procedures

Avoid excessive skin contact with the spilled material.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquids Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API STD 2015 "Safe Entry and Cleaning of Petroleum Storage Tanks". Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated prior to entry.

* * * Section 8 - Exposure Controls / Personal Protection * * *

A: Component Exposure Limits

Petroleum distillates (naphtha) (8002-05-9)

OSHA: 500 ppm TWA; 2000 mg/m^3 TWA
NIOSH: 350 mg/m^3 TWA
1800 mg/m^3 Ceiling (15 min)

Toluene (108-88-3)

ACGIH: 20 ppm TWA
OSHA: 200 ppm TWA; 300 ppm Ceiling; 500 ppm (10 min.)
NIOSH: 100 ppm TWA; 375 mg/m^3 TWA
150 ppm STEL; 560 mg/m^3 STEL

Xylenes (o-, m-, p- isomers) (1330-20-7)

ACGIH: 100 ppm TWA
150 ppm STEL
OSHA: 100 ppm TWA; 435 mg/m^3 TWA
150 ppm STEL; 655 mg/m^3 STEL

Benzene (71-43-2)

ACGIH: 0.5 ppm TWA
2.5 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 10 ppm TWA; 25 ppm ceiling; 50 ppm (10 min.)
NIOSH: 0.1 ppm TWA
1 ppm STEL

Ethyl benzene (100-41-4)

ACGIH:	100 ppm TWA
	125 ppm STEL
OSHA:	100 ppm TWA; 435 mg/m^3 TWA
	125 ppm STEL; 545 mg/m^3 STEL
NIOSH:	100 ppm TWA; 435 mg/m^3 TWA
	125 ppm STEL; 545 mg/m^3 STEL

Engineering Controls

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Chemical splash goggles or safety glasses are recommended.

Personal Protective Equipment: Skin

Neoprene, impervious gloves should be worn to avoid prolonged or frequently repeated skin contact with this material. Normal work clothes should be laundered to decontaminate before reuse. Leather goods contaminated with this product should be discarded. Impervious clothing and boots may be required for prolonged contact.

Personal Protective Equipment: Respiratory

Respiratory protection is not required during normal use in well-ventilated areas. Use a positive-pressure air supplied respirator if there is a (1) potential for uncontrolled release, (2) where exposure levels are not known, (3) oxygen deficient atmospheres, or (4) any condition where ventilation or an air-purifying type of respirator may not be adequate.

Personal Protective Equipment: General

Avoid repeated and prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not gasoline or solvents for washing. Discard leather shoes and gloves contaminated with this product. Launder contaminated clothing before reuse.

*** Section 9 - Physical & Chemical Properties ***

Appearance:	Depending on its source, the typical color ranges from amber to brown to greenish black.	**Odor:**	Petroleum/asphalt type
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	Variable	**Vapor Density:**	3 - 5 typical
Boiling Point:	AP 100° - 1000+°F	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	AP 0.7 - 1.04 - (Varies)
Evaporation Rate:	ND	**VOC:**	ND
Octanol/H2O Coeff.:			
Flash Point:	< 40 to 200°F	**Upper Flammability Limit (UFL):**	15
Flash Point Method:	ND	**Lower Flammability Limit (LFL):**	0.4
		Burning Rate:	ND
		Auto Ignition:	500°F

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

This is a stable material.

Chemical Stability: Conditions to Avoid

Heat, sparks, open flame, static electricity or ignition sources should be avoided.

Incompatibility

Keep away from strong oxidizing agents (such as Peroxide, Dichromate, Permanganate, Chlorine), strong acids, caustics and halogens.

Hazardous Decomposition

Carbon Monoxide, Carbon Dioxide and Reactive Hydrocarbon Compounds.

Possibility of Hazardous Reactions

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Dose Effects

Component Analysis - LD50/LC50

Petroleum distillates (naphtha) (8002-05-9)
Oral LD50 Rat: >4300 mg/kg; Dermal LD50 Rabbit: >2000 mg/kg

Toluene (108-88-3)
Inhalation LC50 Rat: 12.5 mg/L/4H; Inhalation LC50 Rat:>26700 ppm/1H; Oral LD50 Rat:636 mg/kg; Dermal LD50 Rabbit:8390 mg/kg; Dermal LD50 Rat:12124 mg/kg

Xylenes (o-, m-, p- isomers) (1330-20-7)
Inhalation LC50 Rat: 5000 ppm/4H; Oral LD50 Rat: 4300 mg/kg; Dermal LD50 Rabbit: >1700 mg/kg

Benzene (71-43-2)
Inhalation LC50 Rat: 13050-14380 ppm/4H; Oral LD50 Rat:1800 mg/kg

Ethyl benzene (100-41-4)
Inhalation LC50 Rat: 17.2 mg/L/4H; Oral LD50 Rat:3500 mg/kg; Dermal LD50 Rabbit:15354 mg/kg

Carcinogenicity

Component Carcinogenicity

Petroleum distillates (naphtha) (8002-05-9)
IARC: Monograph 45 [1989] (Group 3 (not classifiable))

Toluene (108-88-3)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71 [1999], Monograph 47 [1989] (Group 3 (not classifiable))

Xylenes (o-, m-, p- isomers) (1330-20-7)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 71 [1999], Monograph 47 [1989] (Group 3 (not classifiable))

Benzene (71-43-2)
ACGIH: A1 - Confirmed Human Carcinogen
OSHA: 10 ppm TWA; 25 ppm ceiling; 50 ppm (10 min.)
NIOSH: potential occupational carcinogen
NTP: Known Carcinogen (Select Carcinogen)
IARC: Supplement 7 [1987], Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Ethyl benzene (100-41-4)
ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
IARC: Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))

*** Section 12 - Ecological Information ***

Ecotoxicity

Component Analysis - Ecotoxicity - Aquatic Toxicity

Petroleum distillates (naphtha) (8002-05-9)

Test & Species		Conditions
96 Hr LC50 Salmo gairdneri	258 mg/L [static]	
24 Hr EC50 Daphnia magna	36 mg/L	

Toluene (108-88-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	25 mg/L [flow-through]	1 day old
96 Hr LC50 Oncorhynchus mykiss	24.0 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	24.0 mg/L [static]	
96 Hr LC50 Lepomis macrochirus	13 mg/L [static]	
96 Hr EC50 Selenastrum capricornutum	>433 mg/L	
30 min EC50 Photobacterium phosphoreum	19.7 mg/L	
48 Hr EC50 water flea	11.3 mg/L	
48 Hr EC50 water flea	310 mg/L	
48 Hr EC50 Daphnia magna	11.3 mg/L	

Xylenes (o-, m-, p- isomers) (1330-20-7)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	13.4 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	8.05 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	16.1 mg/L [flow-through]	
96 Hr LC50 Pimephales promelas	26.7 mg/L [static	
24 hr EC50 Photobacterium phosphoreum	0.0084 mg/L	
48 Hr EC50 water flea	3.82 mg/L	
48 Hr LC50 Gammarus lacustris	0.6 mg/L	

Benzene (71-43-2)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	12.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	22 mg/L [static]	
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]	
72 Hr EC50 Selenastrum capricornutum	29 mg/L	
48 Hr EC50 water flea	356 mg/L [Static]	
48 Hr EC50 Daphnia magna	10 mg/L	

Ethyl benzene (100-41-4)

Test & Species		Conditions
96 Hr LC50 Oncorhynchus mykiss	14.0 mg/L [static]	
96 Hr LC50 Pimephales promelas	9.09 mg/L [flow-through]	
96 Hr LC50 Lepomis macrochirus	150.0 mg/L [static]	
96 Hr LC50 Oncorhynchus mykiss	4.2 mg/L [static]	
96 Hr LC50 Lepomis macrochirus	32 mg/L [static]	
96 Hr LC50 Pimephales promelas	48.5 mg/L [static]	
96 Hr LC50 Poecilia reticulata	9.6 mg/L [static]	
72 Hr EC50 Selenastrum capricornutum	4.6 mg/L	
96 Hr EC50 Selenastrum capricornutum	>438 mg/L	
30 min EC50 Photobacterium phosphoreum	9.68 mg/L	
24 Hr EC50 Nitrosomonas	96 mg/L	
48 Hr EC50 Daphnia magna	1.8-2.4 mg/L	

* * * Section 13 - Disposal Considerations * * *

This product as produced is not specifically listed as an EPA RCRA hazardous waste according to federal regulations (40 CFR 261). However, when discarded or disposed of, it may meet the criteria of a "characteristic" hazardous waste. This product could also contain benzene at low concentrations and may exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed with or contaminated with a hazardous waste or other substance(s).

It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations.

* * * Section 14 - Transportation Information * * *

This material when transported via U.S. commerce would be regulated by DOT Regulations.

US DOT Information

Shipping Name: Petroleum Crude Oil
UN/NA #: 1267 **Hazard Class:** 3 **Packing Group:** II
DOT reportable quantity (lbs): Not Applicable
Additional Info.: This description shown may not apply to all shipping situations. Consult 49CFR 172.101 for mode or quantity-specific requirements.

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

Component Analysis

This material contains one or more of the following chemicals identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Toluene (108-88-3)

SARA 313: 1.0 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Xylenes (o-, m-, p- isomers) (1330-20-7)

SARA 313: 1.0 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Benzene (71-43-2)
SARA 313: 0.1 % de minimis concentration
CERCLA: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)

Ethyl benzene (100-41-4)
SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

State Regulations

Component Analysis - State
The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Petroleum distillates (naphtha)	8002-05-9	No	Yes	Yes	Yes	Yes	Yes
Toluene	108-88-3	Yes	Yes	Yes	Yes	Yes	Yes
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	Yes	Yes	Yes	Yes	Yes
Benzene	71-43-2	Yes	Yes	Yes	Yes	Yes	Yes
Ethyl benzene	100-41-4	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

Component Analysis - WHMIS IDL
The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Toluene	108-88-3	1 %
Benzene	71-43-2	0.1 %
Ethyl benzene	100-41-4	0.1 %

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Petroleum distillates (naphtha)	8002-05-9	Yes	DSL	EINECS
Toluene	108-88-3	Yes	DSL	EINECS
Xylenes (o-, m-, p- isomers)	1330-20-7	Yes	DSL	EINECS
Benzene	71-43-2	Yes	DSL	EINECS
Ethyl benzene	100-41-4	Yes	DSL	EINECS

*** Section 16 - Other Information ***

Other Information
The information presented herein has been compiled from sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Key/Legend

NA - Not Applicable
ND - Not Determined
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TLV - Threshold Limit Value
PEL - Permissible Exposure Limit
RQ – Reportable Quantity
TWA - Time Weighted Average
STEL - Short Term Exposure Limit
NTP - National Toxicology Program
IARC - International Agency for Research on Cancer

ATTACHMENT I: EMISSION UNITS TABLE

Attachment I

Emission Units Table

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

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
EUCE-1	EPCE-1	Waukesha L5794 GSI Engine	2010	1,380-hp	Removal; 6/19/14	NSCR
EUCE-2	EPCE-2	Waukesha L5794 GSI Engine	2010	1,380-hp	Existing	NSCR
EUCE-3	EPCE-3	Waukesha L5794 GSI Engine	2010	1,380-hp	Existing	NSCR
EUCE-4	EPCE-4	Waukesha L5794 GSI Engine	2010	1,380-hp	Existing	NSCR
EUCE-5	EPCE-5	Waukesha L5794 GSI Engine	2010	1,380-hp	Existing	NSCR
EUCE-6	EPCE-6	Waukesha L5794 GSI Engine	2010	1,380-hp	Existing	NSCR
EUCE-7	EPCE-7	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-8	EPCE-8	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-9	EPCE-9	Caterpillar G3516B Engine	2012	1,380-hp	Removal; 6/19/14	Oxid. Cat.
EUCE-9	EPCE-9	Caterpillar G3516B Engine	TBD	1,380-hp	New	Oxid. Cat.
EUCE-10	EPCE-10	Caterpillar G3516B Engine	2012	1,380-hp	Removal; 6/19/14	Oxid. Cat.
EUCE-10	EPCE-10	Caterpillar G3516B Engine	TBD	1,380-hp	New	Oxid. Cat.
EUCE-11	EPCE-11	Caterpillar G3516B Engine	2012	1,380-hp	Removal; 6/19/14	Oxid. Cat.
EUCE-11	EPCE-11	Caterpillar G3516B Engine	TBD	1,380-hp	New	Oxid. Cat.
EUCE-12	EPCE-12	Caterpillar G3516B Engine	TBD	1,380-hp	New	Oxid. Cat.
EUGEN-1	EPGEN-1	Capstone C600 Microturbine Generator	2010	805-hp	Existing	N/A
EUGEN-2	EPGEN-2	Capstone C600 Microturbine Generator	2010	805-hp	Existing	N/A
EUDHY-1	EPSTL-1	Glycol Dehydration Unit Still Vent	2010	53.8 MMSCFD	Modification	APCCOND-1
EUDHY-1	EPRBL-1	Glycol Reboiler	2010	1.0-mmBtu/hr	Existing	N/A

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
EUDHY-2	EPSTL-2	Glycol Dehydration Unit Still Vent	2010	53.8 MMSCFD	Modification	APCCOND-2
EUDHY-2	EPRBL-2	Glycol Reboiler	2010	1.0-mmBtu/hr	Existing	N/A
EUDHY-3	EPSTL-3	Glycol Dehydration Unit Still Vent	TBD	53.8 MMSCFD	Modification	APCCOND-3
EUDHY-3	EPRBL-3	Glycol Reboiler	TBD	1.0-mmBtu/hr	Existing	N/A
EUOH-1	EPOH-1	Hot Oil Heater	2010	3.35-mmBtu/hr	Existing	N/A
APCFLARE	APCFLARE	Flare	2010	15 scfh (Pilot)	Existing	N/A
EUTK-1	EPTK-1	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-2	EPTK-2	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-3	EPTK-3	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-4	EPTK-4	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-5	EPTK-5	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-6	EPTK-6	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-7	EPTK-7	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-8	EPTK-8	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-9	EPTK-9	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-10	EPTK-10	Stabilized Condensate Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-11	EPTK-11	Pipeline Fluids/Water Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EUTK-12	EPTK-12	Pipeline Fluids/Water Storage Tank	2010	400-bbl	Existing	Vapor Recovery Unit
EU-LOAD	EP-LOAD	Liquids Truck Loading	2010	13,797,000 gal	Existing	APC-CARBON
EU-FUG	EP-FUG	Fugitive Emissions	2010	N/A	Modification	N/A
EP-BD	EP-BD	Compressor Blowdowns	2010	4,290,000 scf/yr	New	N/A

Emission Units Table 03/2007

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

ATTACHMENT J: EMISSION POINTS DATA SUMMARY SHEET

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
EPCE-2	Upward vertical stack piped directly to control device	EUCE-2	Waukesha L5794 GSI Compressor Engine	-	NSCR	-	-	NOx	42.29	185.22	1.48	6.48	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	26.77	117.26	1.81	7.92			
								VOC	0.91	4.00	0.14	0.62			
								PM_{10}	0.11	0.48	0.11	0.48			
								PM Total	0.22	0.98	0.22	0.98			
								SO_2	0.03	0.13	0.03	0.13			
								Acetaldehyde	0.03	0.13	0.01	0.06			
								Acrolein	0.03	0.12	0.01	0.06			
								Benzene	0.02	0.07	0.01	0.04			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	0.15	0.67	0.08	0.33			
								n-Hexane	-	-	-	-			
								Methanol	0.03	0.14	0.02	0.07			
								Toluene	0.01	0.03	<0.01	0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,212.33	5,309.99	1,212.33	5,309.99			
								CH_4	0.02	0.10	0.02	0.10			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-3	Upward vertical stack piped directly to control device	EUCE-3	Waukesha L5794 GSI Compressor Engine	-	NSCR	-	-	NOx	42.29	185.22	1.48	6.48	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	26.77	117.26	1.81	7.92			
								VOC	0.91	4.00	0.14	0.62			
								PM_{10}	0.11	0.48	0.11	0.48			
								PM Total	0.22	0.98	0.22	0.98			
								SO_2	0.03	0.13	0.03	0.13			
								Acetaldehyde	0.03	0.13	0.01	0.06			
								Acrolein	0.03	0.12	0.01	0.06			
								Benzene	0.02	0.07	0.01	0.04			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	0.15	0.67	0.08	0.33			
								n-Hexane	-	-	-	-			
								Methanol	0.03	0.14	0.02	0.07			
								Toluene	0.01	0.03	<0.01	0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,212.33	5,309.99	1,212.33	5,309.99			
								CH_4	0.02	0.10	0.02	0.10			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-4	Upward vertical stack piped directly to control device	EUCE-4	Waukesha L5794 GSI Compressor Engine	-	NSCR	-	-	NOx	42.29	185.22	1.48	6.48	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	26.77	117.26	1.81	7.92			
								VOC	0.91	4.00	0.14	0.62			
								PM_{10}	0.11	0.48	0.11	0.48			
								PM Total	0.22	0.98	0.22	0.98			
								SO_2	0.03	0.13	0.03	0.13			
								Acetaldehyde	0.03	0.13	0.01	0.06			
								Acrolein	0.03	0.12	0.01	0.06			
								Benzene	0.02	0.07	0.01	0.04			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	0.15	0.67	0.08	0.33			
								n-Hexane	-	-	-	-			
								Methanol	0.03	0.14	0.02	0.07			
								Toluene	0.01	0.03	<0.01	0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,212.33	5,309.99	1,212.33	5,309.99			
								CH_4	0.02	0.10	0.02	0.10			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-5	Upward vertical stack piped directly to control device	EUCE-5	Waukesha L5794 GSI Compressor Engine	-	NSCR	-	-	NOx	42.29	185.22	1.48	6.48	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	26.77	117.26	1.81	7.92			
								VOC	0.91	4.00	0.14	0.62			
								PM_{10}	0.11	0.48	0.11	0.48			
								PM Total	0.22	0.98	0.22	0.98			
								SO_2	0.03	0.13	0.03	0.13			
								Acetaldehyde	0.03	0.13	0.01	0.06			
								Acrolein	0.03	0.12	0.01	0.06			
								Benzene	0.02	0.07	0.01	0.04			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	0.15	0.67	0.08	0.33			
								n-Hexane	-	-	-	-			
								Methanol	0.03	0.14	0.02	0.07			
								Toluene	0.01	0.03	<0.01	0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,212.33	5,309.99	1,212.33	5,309.99			
								CH_4	0.02	0.10	0.02	0.10			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-6	Upward vertical stack piped directly to control device	EUCE-6	Waukesha L5794 GSI Compressor Engine	-	NSCR	-	-	NOx	42.29	185.22	1.48	6.48	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	26.77	117.26	1.81	7.92			
								VOC	0.91	4.00	0.14	0.62			
								PM_{10}	0.11	0.48	0.11	0.48			
								PM Total	0.22	0.98	0.22	0.98			
								SO_2	0.03	0.13	0.03	0.13			
								Acetaldehyde	0.03	0.13	0.01	0.06			
								Acrolein	0.03	0.12	0.01	0.06			
								Benzene	0.02	0.07	0.01	0.04			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	0.15	0.67	0.08	0.33			
								n-Hexane	-	-	-	-			
								Methanol	0.03	0.14	0.02	0.07			
								Toluene	0.01	0.03	<0.01	0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,212.33	5,309.99	1,212.33	5,309.99			
								CH_4	0.02	0.10	0.02	0.10			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-7	Upward vertical stack piped directly to control device	EUCE-7	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst			NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	8.24	36.11	1.52	6.66			
								VOC	1.46	6.40	0.79	3.46			
								PM_{10}	<0.01	<0.01	<0.01	<0.01			
								PM Total	0.13	0.55	0.13	0.55			
								SO_2	0.03	0.14	0.03	0.14			
								Acetaldehyde	0.09	0.42	0.02	0.10			
								Acrolein	0.06	0.26	0.01	0.06			
								Benzene	<0.01	0.02	<0.01	0.01			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.31	5.73	0.31	1.38			
								n-Hexane	0.01	0.06	<0.01	0.01			
								Methanol	0.03	0.12	0.01	0.03			
								Toluene	<0.01	0.02	<0.01	<0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,536.38	6,729.32	1,536.38	6,729.32			
								CH_4	0.03	0.11	0.03	0.11			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-8	Upward vertical stack piped directly to control device	EUCE-8	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst			NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	8.24	36.11	1.52	6.66			
								VOC	1.46	6.40	0.79	3.46			
								PM_{10}	<0.01	<0.01	<0.01	<0.01			
								PM Total	0.13	0.55	0.13	0.55			
								SO_2	0.03	0.14	0.03	0.14			
								Acetaldehyde	0.09	0.42	0.02	0.10			
								Acrolein	0.06	0.26	0.01	0.06			
								Benzene	<0.01	0.02	<0.01	0.01			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.31	5.73	0.31	1.38			
								n-Hexane	0.01	0.06	<0.01	0.01			
								Methanol	0.03	0.12	0.01	0.03			
								Toluene	<0.01	0.02	<0.01	<0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,536.38	6,729.32	1,536.38	6,729.32			
								CH_4	0.03	0.11	0.03	0.11			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-9	Upward vertical stack piped directly to control device	EUCE-9	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	8.24	36.11	1.52	6.66			
								VOC	1.46	6.40	0.79	3.46			
								PM_{10}	<0.01	<0.01	<0.01	<0.01			
								PM Total	0.13	0.55	0.13	0.55			
								SO_2	0.03	0.14	0.03	0.14			
								Acetaldehyde	0.09	0.42	0.02	0.10			
								Acrolein	0.06	0.26	0.01	0.06			
								Benzene	<0.01	0.02	<0.01	0.01			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.31	5.73	0.31	1.38			
								n-Hexane	0.01	0.06	<0.01	0.01			
								Methanol	0.03	0.12	0.01	0.03			
								Toluene	<0.01	0.02	<0.01	<0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,536.38	6,729.32	1,536.38	6,729.32			
								CH_4	0.03	0.11	0.03	0.11			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-10	Upward vertical stack piped directly to control device	EUCE-10	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	8.24	36.11	1.52	6.66			
								VOC	1.46	6.40	0.79	3.46			
								PM_{10}	<0.01	<0.01	<0.01	<0.01			
								PM Total	0.13	0.55	0.13	0.55			
								SO_2	0.03	0.14	0.03	0.14			
								Acetaldehyde	0.09	0.42	0.02	0.10			
								Acrolein	0.06	0.26	0.01	0.06			
								Benzene	<0.01	0.02	<0.01	0.01			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.31	5.73	0.31	1.38			
								n-Hexane	0.01	0.06	<0.01	0.01			
								Methanol	0.03	0.12	0.01	0.03			
								Toluene	<0.01	0.02	<0.01	<0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,536.38	6,729.32	1,536.38	6,729.32			
								CH_4	0.03	0.11	0.03	0.11			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-11	Upward vertical stack piped directly to control device	EUCE-11	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	8.24	36.11	1.52	6.66			
								VOC	1.46	6.40	0.79	3.46			
								PM_{10}	<0.01	<0.01	<0.01	<0.01			
								PM Total	0.13	0.55	0.13	0.55			
								SO_2	0.03	0.14	0.03	0.14			
								Acetaldehyde	0.09	0.42	0.02	0.10			
								Acrolein	0.06	0.26	0.01	0.06			
								Benzene	<0.01	0.02	<0.01	0.01			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.31	5.73	0.31	1.38			
								n-Hexane	0.01	0.06	<0.01	0.01			
								Methanol	0.03	0.12	0.01	0.03			
								Toluene	<0.01	0.02	<0.01	<0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,536.38	6,729.32	1,536.38	6,729.32			
								CH_4	0.03	0.11	0.03	0.11			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-12	Upward vertical stack piped directly to control device	EUCE-12	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	8.24	36.11	1.52	6.66			
								VOC	1.46	6.40	0.79	3.46			
								PM_{10}	<0.01	<0.01	<0.01	<0.01			
								PM Total	0.13	0.55	0.13	0.55			
								SO_2	0.03	0.14	0.03	0.14			
								Acetaldehyde	0.09	0.42	0.02	0.10			
								Acrolein	0.06	0.26	0.01	0.06			
								Benzene	<0.01	0.02	<0.01	0.01			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.31	5.73	0.31	1.38			
								n-Hexane	0.01	0.06	<0.01	0.01			
								Methanol	0.03	0.12	0.01	0.03			
								Toluene	<0.01	0.02	<0.01	<0.01			
								Xylenes	<0.01	0.01	<0.01	<0.01			
								CO_2	1,536.38	6,729.32	1,536.38	6,729.32			
								CH_4	0.03	0.11	0.03	0.11			
								N_2O	<0.01	0.01	<0.01	0.01			

EPGEN-1	Upward vertical stack piped directly to control device	EPGEN-1	Microturbine Generator	-	None	-	-	NOx	0.25	1.09	-	-	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	0.56	2.46					
								VOC	0.01	0.06					
								PM_{10}	0.01	0.06					
								PM Total	0.05	0.20					
								SO_2	0.02	0.09					
								Acetaldehyde	<0.01	<0.01					
								Acrolein	<0.01	<0.01					
								Benzene	<0.01	<0.01					
								Ethylbenzene	<0.01	<0.01					
								Formaldehyde	<0.01	0.02					
								n-Hexane	-	-					
								Methanol	-	-					
								Toluene	<0.01	<0.01					
								Xylenes	<0.01	<0.01					
								CO_2	800.13	3,504.58					
								CH_4	0.02	0.07					
								N_2O	<0.01	0.01					
EPGEN-2	Upward vertical stack piped directly to control device	EPGEN-2	Microturbine Generator	-	None	-	-	NOx	0.25	1.09	-	-	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	0.56	2.46					
								VOC	0.01	0.06					
								PM_{10}	0.01	0.06					
								PM Total	0.05	0.20					
								SO_2	0.02	0.09					
								Acetaldehyde	<0.01	<0.01					
								Acrolein	<0.01	<0.01					
								Benzene	<0.01	<0.01					
								Ethylbenzene	<0.01	<0.01					
								Formaldehyde	<0.01	0.02					
								n-Hexane	-	-					
								Methanol	-	-					
								Toluene	<0.01	<0.01					
								Xylenes	<0.01	<0.01					
								CO_2	800.13	3,504.58					
								CH_4	0.02	0.07					
								N_2O	<0.01	0.01					
EPSTL-1	Upward vertical stack piped directly to control device	EUDHY-1	Glycol Dehydrator Still Vent	APCCOND-1	Condenser	-	-	VOC	11.00	48.17	0.49	2.13	Gas/Vapor	O (GRI GLYCalc)	-
								Benzene	0.48	2.11	0.02	0.10			
								Toluene	1.48	6.49	0.06	0.25			
								Ethylbenzene	0.16	0.72	0.00	0.02			
								Xylenes	1.74	7.61	0.04	0.18			
								n-Hexane	0.23	1.03	0.01	0.05			
								CO_2	0.01	0.06	<0.01	<0.01			
								CH_4	2.28	9.98	0.11	0.50			

EPRBL-1	Upward vertical stack	EUDHY-1	Glycol Dehydrator Reboiler	-	-	-	-	NOx CO VOC PM_{10} PM Total SO_2 n-Hexane CO_2 CH_4 N_2O	0.09 0.07 <0.01 0.01 0.01 <0.01 <0.01 116.98 <0.01 <0.01	0.38 0.32 0.02 0.02 0.03 <0.01 0.01 512.36 0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPSTL-2	Upward vertical stack piped directly to control device	EUDHY-2	Glycol Dehydrator Still Vent	APCCOND-2	Condenser	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	11.00 0.48 1.48 0.16 1.74 0.23 0.01 2.28	48.17 2.11 6.49 0.72 7.61 1.03 0.06 9.98	0.49 0.02 0.06 0.00 0.04 0.01 <0.01 0.11	2.13 0.10 0.25 0.02 0.18 0.05 <0.01 0.50	Gas/Vapor	O (GRI GLYCalc)	-
EPRBL-2	Upward vertical stack	EUDHY-2	Glycol Dehydrator Reboiler	-	-	-	-	NOx CO VOC PM_{10} PM Total SO_2 n-Hexane CO_2 CH_4 N_2O	0.09 0.07 <0.01 0.01 0.01 <0.01 <0.01 116.98 <0.01 <0.01	0.38 0.32 0.02 0.02 0.03 <0.01 0.01 512.36 0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPSTL-3	Upward vertical stack piped directly to control device	EUDHY-3	Glycol Dehydrator Still Vent	APCCOND-3	Condenser	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	11.00 0.48 1.48 0.16 1.74 0.23 0.01 2.28	48.17 2.11 6.49 0.72 7.61 1.03 0.06 9.98	0.49 0.02 0.06 0.00 0.04 0.01 <0.01 0.11	2.13 0.10 0.25 0.02 0.18 0.05 <0.01 0.50	Gas/Vapor	O (GRI GLYCalc)	-
EPRBL-3	Upward vertical stack	EUDHY-3	Glycol Dehydrator Reboiler	-	-	-	-	NOx CO VOC PM_{10} PM Total SO_2 n-Hexane CO_2 CH_4 N_2O	0.09 0.07 <0.01 0.01 0.01 <0.01 <0.01 116.98 <0.01 <0.01	0.38 0.32 0.02 0.02 0.03 <0.01 0.01 512.36 0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-

EPOH-1	Upward vertical stack	EUOH-1	Hot Oil Heater	-	-	-	-	NOx CO VOC PM_{10} PM Total SO_2 n-Hexane CO_2 CH_4 N_2O	0.29 0.25 0.02 0.02 0.02 <0.01 0.01 391.87 0.01 <0.01	1.29 1.08 0.07 0.07 0.10 <0.01 0.02 1,716.40 0.03 <0.01	-	-	Gas/Vapor	O (AP-42)	-
APC-FLARE	Upward vertical stack	APC-FLARE	Flare	-	-	-	-	NOx CO VOC PM_{10} SO_2 Benzene Toluene Xylenes Formaldehyde n-Hexane CO_2 CH_4 N_2O	2.89 15.62 924.12 <0.01 <0.01 0.01 0.01 <0.01 <0.01 13.18 29.72 558.81 <0.01	0.45 2.11 121.43 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 1.73 88.83 73.43 <0.01	2.89 15.62 18.48 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 0.26 29.72 11.18 <0.01	0.45 2.11 2.43 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 0.03 88.83 1.62 <0.01	Gas/Vapor	O (AP-42)	-
EPTK-1 – EPTK-12	Tank Vent	EUTK-1 – EUTK-12	Twelve (12) 400-bbl Tanks	Vapor Recovery Unit	-	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane	N/A N/A N/A N/A N/A N/A	362.25 0.20 0.12 <0.01 0.02 12.34	N/A N/A N/A N/A N/A N/A	7.24 <0.01 <0.01 <0.01 <0.01 0.25	Gas/Vapor	O (TANKS 4.0.9d)	
EP-LOAD	Fugitive	EU-LOAD	Truck Loading	APC-CARBON	-	-	-	VOC CO_2 CH_4 Benzene Toluene Ethylbenzene Xylenes n-Hexane	N/A N/A N/A N/A N/A N/A N/A N/A	22.73 0.04 1.71 0.20 0.30 0.02 0.11 0.36	N/A N/A N/A N/A N/A N/A N/A N/A	7.61 0.01 0.57 0.07 0.10 0.01 0.04 0.12	Gas/Vapor	O (AP-42)	-
EP-FUG	Fugitive	EU-FUG	Fugitive Emissions	-	-	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	N/A N/A N/A N/A N/A N/A N/A N/A	8.56 <0.01 0.01 <0.01 <0.01 0.09 0.46 108.71	-	-	Gas/Vapor	O (API)	-

EP-BD	Fugitive	EU-BD	Compressor Blowdowns	-	-	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	24.93 0.01 0.02 <0.01 <0.01 0.26 1.33 239.01	8.23 <0.01 0.01 <0.01 <0.01 0.09 0.44 78.87	-	-	Gas/Vapor	O (API)	-

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, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

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

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

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

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
EPCE-2	1.0	1,149	6,525	138.5	~900	20 (est.)	4396.730	532.478
EPCE-3	1.0	1,149	6,525	138.5	~900	20 (est.)	4396.730	532.478
EPCE-4	1.0	1,149	6,525	138.5	~900	20 (est.)	4396.730	532.478
EPCE-5	1.0	1,149	6,525	138.5	~900	20 (est.)	4396.730	532.478
EPCE-6	1.0	1,149	6,525	138.5	~900	20 (est.)	4396.730	532.478
EPCE-7	1.0	995	9,156	195.99	~900	20 (est.)	4396.730	532.478
EPCE-8	1.0	995	9,156	195.99	~900	20 (est.)	4396.730	532.478
EPCE-9	1.0	995	9,156	195.99	~900	20 (est.)	4396.730	532.478
EPCE-10	1.0	995	9,156	195.99	~900	20 (est.)	4396.730	532.478
EPCE-11	1.0	995	9,156	195.99	~900	20 (est.)	4396.730	532.478
EPCE-12	1.0	995	9,156	195.99	~900	20 (est.)	4396.730	532.478
EPSTL-1	N/A	212	N/A	N/A	~900	N/A	4396.730	532.478
EPRBL-1	1.3	N/A	N/A	N/A	~900	N/A	4396.730	532.478
EPSTL-2	N/A	212	N/A	N/A	~900	N/A	4396.730	532.478
EPRBL-2	1.3	N/A	N/A	N/A	~900	N/A	4396.730	532.478

Emission Point ID No. *(Must match Emission Units Table*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
EPSTL-3	N/A	212	N/A	N/A	~900	N/A	4396.730	532.478
EPRBL-3	1.3	N/A	N/A	N/A	~900	N/A	4396.730	532.478
EPOH-1	N/A	N/A	N/A	N/A	~900	20	4396.730	532.478
APCFLARE	0.8	250	N/A	279.9	~900	75.4	4396.730	532.478
EPTK-1 – EPTK-12	N/A	Ambient	N/A	N/A	~900	20	4396.730	532.478
EP-LOAD	N/A	Ambient	N/A	N/A	~900	20	4396.730	532.478
EP-FUG	N/A	Ambient	N/A	N/A	~900	N/A	4396.730	532.478
EP-BD	N/A	Ambient	N/A	N/A	~900	20 (est.)	4396.730	532.478

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

Note: Greenhouse Gas (GHG) emissions were calculated using EPA Mandatory Reporting Rule and 2009 API Compendium guidance, as well as manufacturer data (if available). Emissions calculation methodologies that calculated emissions in metric tons (tonnes) were converted to short tons for consistency with other pollutants.

ATTACHMENT K: FUGITIVE EMISSIONS DATA SUMMARY SHEET

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, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No **Previously Submitted** ☒ If YES, 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, 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, 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, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, 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 Uncontrolled Emissions[2]		Maximum Potential Controlled Emissions[3]		Est. Method Used[4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads						
Storage Pile Emissions						
Loading/Unloading Operations	VOC n-Hexane Benzene Toluene Ethylbenzene Xylenes CO_2 CH_4	Does not apply	22.73 0.36 0.20 0.30 0.02 0.11 0.04 1.71	Does not apply	N/A	O (AP-42 5.2-4)
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	VOC n-Hexane Benzene Toluene Ethylbenzene Xylenes CO_2 CH_4	Does not apply	8.56 0.09 <0.01 0.01 <0.01 <0.01 0.46 108.71	Does not apply	N/A	O (API)
General Clean-up VOC Emissions						

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Other						

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in 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).

Note: Greenhouse Gas (GHG) emissions were calculated using EPA Mandatory Reporting Rule and 2009 API Compendium guidance, as well as manufacturer data (if available). Emissions calculation methodologies that calculated emissions in metric tons (tonnes) were converted to short tons for consistency with other pollutants.

ATTACHMENT L: EMISSION UNIT DATA SHEETS

EUDS - General: Compressor Engines

EUDS – General: Dehydrators

EUDS - Chemical Process (Leak Sources)

EUDS – General: Compressor Blowdowns

Note: Only equipment affected by this project has been included in this application. All other equipment remains as permitted.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

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

1. Name or type and model of proposed affected source: This form applies to six (6) identical 1,380-hp Caterpillar G3516B Compressor Engine w/ Oxidation Catalysts (EUCE-7 through EUCE-12)
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: Emissions provided in Question 8. Each unit will operate a maximum of 8,760 hours per year.
4. Name(s) and maximum amount of proposed material(s) produced per hour: Emissions provided in Question 8.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Emissions from the combustion of natural gas.

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

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6. Combustion Data (if applicable):

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

Natural gas is used for fuel. Estimated maximum of 8,226 Btu per horsepower-hour for 8,760 hours per year at maximum horsepower rating, which equals 87.78 million cubic feet per year per unit at 1,138 Btu per standard cubic foot. However, AMS requests to retain current limitation for fuel use: 99.01 million cubic feet per year.

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

Gas analyses attached.

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

@ °F and psia.

(d) Percent excess air:

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

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

Not applicable

(g) Proposed maximum design heat input: 11.35 × 10^6 BTU/hr.

7. Projected operating schedule:

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

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

@ 995 °F and 14.7 psia

a.	NO_X	1.52	lb/hr	grains/ACF
b.	SO_2	0.03	lb/hr	grains/ACF
c.	CO	8.24	lb/hr	grains/ACF
d.	PM_{10}	<0.01	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	1.46	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
	Total HAPs	1.51	lb/hr	grains/ACF
	PM_{TOT}	0.13	lb/hr	grains/ACF
	Note: Emissions shown are per unit. Speciated HAPs and Greenhouse Gases presented in Attachment J.		lb/hr	grains/ACF
			lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	TESTING
None Proposed	None Proposed

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

Not applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

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

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

This form applies to three (3) identical glycol dehydration units (EUDHY-1, EUDHY-2 and EUDHY3)

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

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

Emissions provided in Question 8. Each unit will process a maximum of 53.8 million standard cubic feet of natural gas per day.

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

Emissions provided in Question 8.

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

Emissions from the still column are formed by boiling off water and absorbed hydrocarbons from triethylene glycol. Emissions from the reboiler are from combustion of natural gas.

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

6. Combustion Data (if applicable):

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

Natural gas is used for the reboiler fuel (maximum 1.0 million Btu per hour or 7.26 million cubic feet per year per reboiler)

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

Gas analyses attached.

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

@ °F and psia.

(d) Percent excess air:

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

Each unit has a 1.0-mmBtu/hr natural gas-fired reboiler (EPRBL-1, EPRBL-2, EPRBL-3, respectively)

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

Not applicable

(g) Proposed maximum design heat input: 1.0 × 10^6 BTU/hr.

7. Projected operating schedule:

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

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

@ 212 °F and 14.8 psia

a. NO_X	0.08	lb/hr	grains/ACF
b. SO_2	<0.01	lb/hr	grains/ACF
c. CO	0.07	lb/hr	grains/ACF
d. PM_{10}	<0.01	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	38.99*	lb/hr	grains/ACF
g. Pb	N/A	lb/hr	grains/ACF
h. Specify other(s)			
Total HAPs	4.23*	lb/hr	grains/ACF
**Still vent, flash tank and reboiler emissions*		lb/hr	grains/ACF
Note: Emissions shown are per unit. Speciated HAPs and Greenhouse Gases presented in Attachment J.		lb/hr	grains/ACF
		lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Each of the glycol dehydration units will not exceed the following limits: a. The natural gas throughput will not exceed 53.8 MMSCFD based on an annual average. b. The lean glycol flow rate of the glycol dehydration unit will not exceed 15 gallons per minute. c. Still vent vapors shall be routed to an air-cooled condenser. Non-condensables from the still column overheads will be routed to the reboiler and burned as fuel. d. Flash tank off-gases shall be routed to the reboiler and burned as fuel. Excess vapors not burned as fuel in the reboiler shall be routed to the flash gas suction scrubber.	AMS shall comply with all applicable requirements of 40 CFR 63 (NESHAP) Subpart HH for Oil and Natural Gas Production for each affected dehydration unit including, but not limited to, 40 CFR 63.760 through 63.775. An owner or operator of a glycol dehydration unit that meets the exemption criteria in §63.764(e)(1)(i) or §63.764(e)(1)(ii) shall maintain the records specified in §§63.774(d)(1)(i) or (d)(1)(ii), as appropriate, for that glycol dehydration unit.
REPORTING	TESTING
None proposed	None proposed

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

Not applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
CHEMICAL PROCESS

For chemical processes please fill out this sheet and all supplementary forms (see below) that apply. Please check all supplementary forms that have been completed.

- ☐ *Emergency Vent Summary Sheet*
- ☒ *Leak Sources Data Sheet*
- ☐ *Toxicology Data Sheet*
- ☐ *Reactor Data Sheet*
- ☐ *Distillation Column Data Sheet*

1. Chemical process area name and equipment ID number (as shown in *Equipment List Form*)
   Components in natural gas and light liquid service (EU-FUG)

2. Standard Industrial Classification Codes (SICs) for process(es)
   1311

3. List raw materials and ☒ attach MSDSs
   Natural gas and condensate

4. List Products and Maximum Production and ☐ attach MSDSs

Description and CAS Number	Maximum Hourly (lb/hr)	Maximum Annual (ton/year)
Not applicable		

5. Complete the *Emergency Vent Summary Sheet* for all emergency relief devices.

6. Complete the *Leak Source Data Sheet* and describe below or attach to application the leak detection or maintenance program to minimize fugitive emissions. Include detection instruments, calibration gases or methods, planned inspection frequency, and record-keeping, and similar pertinent information. If subject to a rule requirement (e.g. 40CFR60, Subpart VV), please list those here.

   This facility was subject to this subpart based on the Joule-Thomson (JT) system; however, the system has been removed and this subpart no longer applies.

7. Clearly describe below or attach to application Accident Procedures to be followed in the event of an accidental spill or release.

   In the event of an accidental spill or release, personnel will be protected, emergency response personnel will be notified and immediate steps to stop the spill or release will be implemented.

8A. Complete the *Toxicology Data Sheet* or attach to application a toxicology report (an up-to-date material safety data sheets (MSDS) may be used) outlining the currently known acute and chronic health effects of each compound or chemical entity emitted to the air. If these compounds have already been listed in Item 3, then a duplicate MSDS sheet is not required. Include data such as the OSHA time weighted average (TWA) or mutagenicity, teratogenicity, irritation, and other known or suspected effects should be addressed. Indicate where these are unknown, and provide references.

8B. Describe any health effects testing or epidemiological studies on these compounds that are being or may be conducted by the company or required under TSCA, RCRA or other federal regulations. Discuss the persistence in the environment of any emission (e.g. pesticides, etc.).

9. **Waste Products** - Waste products status: (If source is subject to RCRA or 45CSR25, please contact the Hazardous Waste Section of WVDEP, OAQ at (304) 926-3647.)

9A. Types and amounts of wastes to be disposed:

9B. Method of disposal and location of waste disposal facilities:

Carrier: Phone:

9C. Check here if approved USEPA/State Hazardous Waste Landfill will be used ☐

10. Maximum and Projected Typical Operating Schedule for process or project as a whole (circle appropriate units).

circle units:	(hrs/day) (hr/batch)	(days), (batches/day), (batches/week)	(days/yr), (weeks/year)
10A. Maximum			
10B. Typical			

11. Complete a *Reactor Data Sheet* for each reactor in this chemical process.

12. Complete a *Distillation Column Data Sheet* for each distillation column in this chemical process.

13. **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
None proposed	None proposed
REPORTING	**TESTING**
None proposed	None proposed

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 or 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 or air pollution control device.

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

Not applicable

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]	As shown in the emissions calculations located in Attachment N, the fugitive emission factors are given on an equipment basis, rather than an individual component basis. The factors presented in the API Compendium are for methane emissions; therefore, the fugitive VOC and HAP emissions were calculated using a gas analysis.			
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				

[1 - 13] See notes on the following page.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): EU-BD

1. Name or type and model of proposed affected source: Natural gas blowdowns
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: Emissions provided in Question 8.
4. Name(s) and maximum amount of proposed material(s) produced per hour: Emissions provided in Question 8.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Emissions from the release of natural gas

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

Revision 03/2007

6. Combustion Data (if applicable):

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

Not Applicable

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

Gas analyses attached.

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

Not Applicable @ °F and psia.

(d) Percent excess air: Not Applicable

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

Not Applicable

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

Not Applicable

(g) Proposed maximum design heat input: Not Applicable $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	Variable	Days/Week	Variable	Weeks/Year	Variable

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

@ Ambient °F and Atmospheric psia

a.	NO_X	lb/hr	grains/ACF
b.	SO_2	lb/hr	grains/ACF
c.	CO	lb/hr	grains/ACF
d.	PM_{10}	lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs*	24.93 lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
	Total HAPs*	0.30 lb/hr	grains/ACF
		lb/hr	grains/ACF
	Short-term emission rate is highly variable. Tons per year emissions, as well as speciated HAP and GHG emissions, are presented in Attachment J.	lb/hr	grains/ACF
		lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	TESTING
None Proposed	None Proposed

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

Not Applicable

ATTACHMENT M: AIR POLLUTION CONTROL DEVICE SHEET

APCDS – Condenser

GRI-GLYCalc ™ Condenser Control Efficiency Curves Report (Electric Pump)

GRI-GLYCalc ™ Condenser Vent Stream (Electric Pump)

GRI-GLYCalc ™ Flash Tank Off-Gas Stream (Electric Pump)

GRI-GLYCalc ™ Condenser Control Efficiency Curves Report (Gas Pumps)

GRI-GLYCalc ™ Condenser Vent Stream (Gas Pumps)

GRI-GLYCalc ™ Flash Tank Off-Gas Stream (Gas Pumps)

Attachment M
Air Pollution Control Device Sheet
(CONDENSER SYSTEM)

Control Device ID No. (must match Emission Units Table): APCCOND-1, APCCOND-2, APCCOND-3

Equipment Information and Filter Characteristics

1. Manufacturer: NATCO Model No. BTEX Buster	2. Method: ☐ Pressure condensation ☒ Temperature condensation ☐ Surface ☐ Contact ☐ Other, specify
3. Control Device Name: Condenser	
4. Provide diagram of condenser:	
5. 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.	
6. Heat exchanger area: N/A ft^3	7. Reported removal efficiency: **See attached GLYCalc Condenser Control Curve Efficiency Report** %
8. Coolant Used: Air-cooled	9. Refrigeration capacity: Ref. N/A tons
10. Composition of coolant: N/A	11. Internal operating temperature: 120 °F
12. Specific heat of coolant: N/A BTU/lb.°F, at 77°F	13. Temperature of condensation: <120 °F
Average Operation:	**Maximum Operation:**
14. Coolant Temperature: Inlet: Varies °F Outlet: <120 °F	15. Coolant Temperature: Inlet: Varies °F Outlet: <120 °F
16. Gas Temperature: Inlet: 212 °F Outlet: 120 °F	17. Gas Temperature: Inlet: 212 °F Outlet: 120 °F
18. Gas flow rate: 10.25 ft^3/min ***Regenerator Overheads Stream**	19. Gas flow rate: 10.25 ft^3/min ***Regenerator Overheads Stream**
20. Coolant flow rate per condenser: Type: Water: - gal/min Air: N/A ft^3/min Other: - lb/hour	21. Coolant flow rate per condenser: Type: Water: - gal/min Air: N/A ft^3/min Other: - lb/hour
22. Efficiency of condenser: **See attached GLYCalc Condenser Control Curve Efficiency Report** %	23. Efficiency of condenser: **See attached GLYCalc Condenser Control Curve Efficiency Report** %
24. Condenser surface area: N/A ft^2	25. Condenser surface area: N/A ft^2

Revision 03/15/2007

26. Pollutant	Guaranteed Minimum Control Efficiency %	Concentration ppmv	Specific Heat BTU/lb-mol °F	Heat of Vaporation BTU/lb-mol
A VOC	N/A*	-	N/A	N/A
B Benzene	N/A*	-	0.24295	N/A
C Toluene	N/A*	-	0.26005	N/A
D Ethylbenzene	N/A*	-	0.27768	N/A
E Xylenes	N/A*	-	0.27954	N/A
F n-Hexane	N/A*	-	0.38628	N/A
G				
Total Concentration in ppmv		-		

Emission Gas (Vapor) Stream

27. **Before Condenser (Regenerator Overheads)**

Inlet vapor flow rate: 10.25 ft³/min

Influent vapor temperature: 212 °F

Effluent vapor temperature: 120 °F

28. **After Condenser (Condenser Vent Stream)**

Inlet vapor flow rate: 2.88 ft³/min

Influent vapor temperature: 212 °F

Effluent vapor temperature: 120 °F

29. Pollutant	INLET*			OUTLET*		
	Vapor Pressure	Condensation Temperature	Rate lb/hr	Rate lb/hr	Vapor Pressure	Condensation Temperature
A VOC	N/A	N/A	11.01	8.87	N/A	N/A
B Benzene	N/A	N/A	0.48	0.42	N/A	N/A
C Toluene	N/A	N/A	1.48	1.05	N/A	N/A
D Ethylbenzene	N/A	N/A	0.17	0.77	N/A	N/A
E Xylenes	N/A	N/A	1.74	0.74	N/A	N/A
F n-Hexane	N/A	N/A	0.24	0.22	N/A	N/A
G						
Total of the POLLUTANT lb/hr			11.01	8.87		

Inlet = Regenerator Overheads Stream.
Outlet = Condenser Vent Stream. Pollutants are then combusted by reboiler for lower overall emissions.

30. Moisture content: %

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

32. Describe the collection material disposal system:
N/A

33. Have you included ***Condenser Control Device*** in the Emissions Points Data Summary Sheet? Yes

34. **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:
Each of the glycol dehydration units will not exceed the following limits: a. The natural gas throughput will not exceed 53.8 MMSCFD based on an annual average. b. The lean glycol flow rate of the glycol dehydration unit will not exceed 15 gallons per minute. c. Still vent vapors shall be routed to an air-cooled condenser. Non-condensables from the still column overheads will be routed to the reboiler and burned as fuel. d. Flash tank off-gases shall be routed to the reboiler and burned as fuel. Excess vapors not burned as fuel in the reboiler shall be routed to the stabilizer feed drum.	AMS shall comply with all applicable requirements of 40 CFR 63 (NESHAP) Subpart HH for Oil and Natural Gas Production for each affected dehydration unit including, but not limited to, 40 CFR 63.760 through 63.775. An owner or operator of a glycol dehydration unit that meets the exemption criteria in §63.764(e)(1)(i) or §63.764(e)(1)(ii) shall maintain the records specified in §§63.774(d)(1)(i) or (d)(1)(ii), as appropriate, for that glycol dehydration unit.
REPORTING:	TESTING:
None Proposed	None Proposed

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.

35. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
N/A

36. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
*Manufacturer does not guarantee control efficiency but attached specification sheet demonstrates representative efficiency. Refer to attached GLYCalc Condenser Control Curve Efficiency Report for control efficiency at various operating temperatures.

37. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
N/A

GRI-GLYCalc VERSION 4.0 - CONDENSER CONTROL CURVE EFFICIENCY REPORT

Case Name: Miller Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2015Jan R13 Mod change engines\Miller_GLYCalc_Electric.ddf
Date: December 29, 2014

CONDENSER CONTROL EFFICIENCY CURVES

Note: Condenser curves computed for the range 40.0 F <= T <= 170.0 F. DO NOT EXTRAPOLATE BEYOND THIS RANGE!

Temp(F)	BTEX	Total HAP	VOC
40.0	94.47	93.07	55.65
45.0	93.38	91.80	54.09
50.0	92.03	90.25	52.36
55.0	90.55	88.60	50.68
60.0	88.86	86.73	48.93
65.0	86.93	84.63	47.10
70.0	84.74	82.29	45.18
75.0	82.24	79.66	43.16
80.0	79.42	76.74	41.04
85.0	76.23	73.49	38.81
90.0	72.65	69.87	36.45
95.0	68.62	65.86	33.98
100.0	64.11	61.41	31.37
105.0	59.09	56.50	28.64
110.0	53.51	51.08	25.77
115.0	47.35	45.13	22.76
120.0	40.62	38.67	19.63
125.0	33.44	31.80	16.43
130.0	26.62	25.29	13.48
135.0	19.52	18.54	10.47
140.0	13.33	12.66	7.84
145.0	8.56	8.12	5.73
150.0	5.16	4.90	4.05
155.0	2.64	2.50	2.48
160.0	0.76	0.72	0.81
165.0	0.09	0.08	0.03
170.0	0.07	0.07	0.03

GRI-GLYCalc VERSION 4.0 - STREAM REPORT

Case Name: Miller Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2015Jan R13 Mod change engines\Miller_GLYCalc_Electric.ddf
Date: December 29, 2014

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 14.81 psia
Flow Rate: 1.73e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.15e+001	9.47e-001
Carbon Dioxide	6.61e+000	1.33e+000
Nitrogen	1.23e-001	1.57e-002
Methane	2.67e+001	1.95e+000
Ethane	2.54e+001	3.49e+000
Propane	1.08e+001	2.17e+000
Isobutane	2.21e+000	5.86e-001
n-Butane	5.00e+000	1.33e+000
Isopentane	1.13e+000	3.71e-001
n-Pentane	1.22e+000	4.00e-001
n-Hexane	5.56e-001	2.19e-001
Cyclohexane	4.17e-001	1.60e-001
Other Hexanes	8.97e-001	3.53e-001
Heptanes	1.39e+000	6.37e-001
Methylcyclohexane	6.88e-001	3.08e-001
2,2,4-Trimethylpentane	6.11e-003	3.19e-003
Benzene	1.18e+000	4.20e-001
Toluene	2.50e+000	1.05e+000
Ethylbenzene	1.59e-001	7.68e-002
Xylenes	1.53e+000	7.43e-001
C8+ Heavies	5.43e-003	4.22e-003
Total Components	100.00	1.66e+001

GRI-GLYCalc VERSION 4.0 - STREAM REPORT

Case Name: Miller Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2015Jan R13 Mod change engines\Miller_GLYCalc_Electric.ddf
Date: December 29, 2014

FLASH TANK OFF GAS STREAM

Temperature: 130.00 deg. F
Pressure: 84.70 psia
Flow Rate: 1.03e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.08e-001	5.31e-002
Carbon Dioxide	1.57e+000	1.87e+000
Nitrogen	3.38e-001	2.58e-001
Methane	7.27e+001	3.17e+001
Ethane	1.91e+001	1.56e+001
Propane	4.07e+000	4.88e+000
Isobutane	5.49e-001	8.67e-001
n-Butane	9.53e-001	1.50e+000
Isopentane	1.90e-001	3.72e-001
n-Pentane	1.65e-001	3.23e-001
n-Hexane	4.30e-002	1.01e-001
Cyclohexane	7.89e-003	1.80e-002
Other Hexanes	8.97e-002	2.10e-001
Heptanes	5.79e-002	1.58e-001
Methylcyclohexane	1.12e-002	2.98e-002
2,2,4-Trimethylpentane	5.05e-004	1.57e-003
Benzene	3.46e-003	7.35e-003
Toluene	5.75e-003	1.44e-002
Ethylbenzene	3.20e-004	9.22e-004
Xylenes	2.38e-003	6.86e-003
C8+ Heavies	1.23e-003	5.69e-003
Total Components	100.00	5.80e+001

GRI-GLYCalc VERSION 4.0 - CONDENSER CONTROL CURVE EFFICIENCY REPORT

Case Name: Miller Compressor Station - Gas Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2015Jan R13 Mod change engines\Miller_GLYCalc_Gas.ddf
Date: December 29, 2014

CONDENSER CONTROL EFFICIENCY CURVES

Note: Condenser curves computed for the range 40.0 F <= T <= 170.0 F. DO NOT EXTRAPOLATE BEYOND THIS RANGE!

Temp(F)	BTEX	Total HAP	VOC
40.0	95.62	94.83	69.49
45.0	94.79	93.91	68.32
50.0	93.87	92.89	67.16
55.0	92.78	91.70	65.90
60.0	91.54	90.36	64.57
65.0	90.14	88.85	63.17
70.0	88.55	87.17	61.68
75.0	86.75	85.28	60.11
80.0	84.73	83.18	58.44
85.0	82.48	80.87	56.68
90.0	79.74	78.08	54.64
95.0	76.87	75.18	52.62
100.0	73.69	71.98	50.47
105.0	70.15	68.45	48.18
110.0	66.24	64.57	45.76
115.0	61.93	60.31	43.19
120.0	57.22	55.68	40.48
125.0	52.10	50.66	37.62
130.0	46.60	45.27	34.64
135.0	40.77	39.59	31.55
140.0	34.73	33.71	28.38
145.0	28.69	27.83	25.21
150.0	22.87	22.18	22.09
155.0	17.51	16.98	19.04
160.0	12.96	12.57	16.10
165.0	8.74	8.48	12.73
170.0	4.73	4.59	8.29

GRI-GLYCalc VERSION 4.0 - STREAM REPORT

Case Name: Miller Compressor Station - Gas Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2015Jan R13 Mod change engines\Miller_GLYCalc_Gas.ddf
Date: December 29, 2014

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 14.81 psia
Flow Rate: 1.25e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.15e+001	6.82e-001
Carbon Dioxide	2.25e+000	3.26e-001
Nitrogen	1.50e-001	1.38e-002
Methane	4.32e+001	2.28e+000
Ethane	1.97e+001	1.95e+000
Propane	8.26e+000	1.20e+000
Isobutane	1.62e+000	3.09e-001
n-Butane	3.33e+000	6.37e-001
Isopentane	8.79e-001	2.08e-001
n-Pentane	8.50e-001	2.02e-001
n-Hexane	4.04e-001	1.14e-001
Cyclohexane	3.38e-001	9.36e-002
Other Hexanes	6.67e-001	1.89e-001
Heptanes	1.08e+000	3.56e-001
Methylcyclohexane	5.84e-001	1.88e-001
2,2,4-Trimethylpentane	6.00e-003	2.25e-003
Benzene	1.29e+000	3.30e-001
Toluene	2.42e+000	7.32e-001
Ethylbenzene	1.33e-001	4.65e-002
Xylenes	1.28e+000	4.46e-001
C8+ Heavies	1.26e-002	7.03e-003
Total Components	100.00	1.03e+001

GRI-GLYCalc VERSION 4.0 - STREAM REPORT

Case Name: Miller Compressor Station - Gas Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2015Jan R13 Mod change engines\Miller_GLYCalc_Gas.ddf
Date: December 29, 2014

FLASH TANK OFF GAS STREAM

Temperature: 130.00 deg. F
Pressure: 84.70 psia
Flow Rate: 1.09e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.08e-001	5.60e-001
Carbon Dioxide	3.86e-001	4.88e+000
Nitrogen	2.99e-001	2.41e+000
Methane	8.51e+001	3.93e+002
Ethane	1.07e+001	9.28e+001
Propane	2.25e+000	2.86e+001
Isobutane	2.92e-001	4.88e+000
n-Butane	4.63e-001	7.74e+000
Isopentane	1.10e-001	2.29e+000
n-Pentane	8.64e-002	1.79e+000
n-Hexane	2.43e-002	6.03e-001
Cyclohexane	5.20e-003	1.26e-001
Other Hexanes	5.13e-002	1.27e+000
Heptanes	3.84e-002	1.11e+000
Methylcyclohexane	8.32e-003	2.35e-001
2,2,4-Trimethylpentane	4.26e-004	1.40e-002
Benzene	3.09e-003	6.95e-002
Toluene	5.34e-003	1.42e-001
Ethylbenzene	3.07e-004	9.38e-003
Xylenes	2.31e-003	7.05e-002
C8+ Heavies	3.71e-003	1.82e-001
Total Components	100.00	5.43e+002

ATTACHMENT N: SUPPORTING EMISSIONS CALCULATIONS

EXAMPLE CALCULATIONS

g/hp-hr Emission Factors:

Emission Factor (g/hp-hr) * Engine Rating (hp) * 1 lb/453.6 g = lb/hr

lb/mmBtu Emission Factors:

Emission Factor (lb/mmBtu) * Engine Rating (hp) * Fuel Use (Btu/hp-hr) * 1 mmBtu/1000000 Btu = lb/hr

Emission Factor (lb/mmBtu) * Combustor Rating (mmBtu/hr) = lb/hr

lb/mmscf Emission Factors:

Emission Factor (lb/mmscf) * Heater Rating (mmBtu/hr) * 1/Fuel Heating Value (Btu/scf) = lb/hr

kg/mmBtu Emission Factors:

Emission Factor (kg/mmBtu) * Engine Rating (hp) * Fuel Use (Btu/hp-hr) * 2.20462 lb/kg * 1 mmBtu/1000000 Btu = lb/hr

Emission Factor (kg/mmBtu) * Heater Rating (mmBtu/hr) * 2.20462 lb/kg = lb/hr

Fugitives:

TOC Emission Factor (lb/hr/source) * Number of Sources * VOC wt% = lb/hr VOC

Tons per Year (TPY) Conversion:

lb/hr * Hours/Year * 1 ton/2000 lb = TPY

Tonnes/Year * 1.10231131 = TPY

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Summary of Criteria Air Pollutant Emissions

Equipment	Point ID	NOx		CO		VOC		SO_2		PM	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REMOVED	*EPCE-1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-2	1.48	6.48	1.81	7.92	0.22	0.95	0.03	0.13	*0.22*	*0.98*
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-3	1.48	6.48	1.81	7.92	0.22	0.95	0.03	0.13	*0.22*	*0.98*
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-4	1.48	6.48	1.81	7.92	0.22	0.95	0.03	0.13	*0.22*	*0.98*
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-5	1.48	6.48	1.81	7.92	0.22	0.95	0.03	0.13	*0.22*	*0.98*
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-6	1.48	6.48	1.81	7.92	0.22	0.95	0.03	0.13	*0.22*	*0.98*
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-7	1.52	6.66	*1.52*	*6.66*	*1.10*	*4.84*	*0.03*	*0.14*	*0.13*	*0.55*
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-8	1.52	6.66	*1.52*	*6.66*	*1.10*	*4.84*	*0.03*	*0.14*	*0.13*	*0.55*
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-9	1.52	6.66	*1.52*	*6.66*	*1.10*	*4.84*	*0.03*	*0.14*	*0.13*	*0.55*
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-10	1.52	6.66	*1.52*	*6.66*	*1.10*	*4.84*	*0.03*	*0.14*	*0.13*	*0.55*
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-11	1.52	6.66	*1.52*	*6.66*	*1.10*	*4.84*	*0.03*	*0.14*	*0.13*	*0.55*
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - NEW	*EPCE-12*	*1.52*	*6.66*	*1.52*	*6.66*	*1.10*	*4.84*	*0.03*	*0.14*	*0.13*	*0.55*
805-hp Capstone C600 Microturbine Generator	EPGEN-1	0.25	1.09	0.56	2.46	0.01	0.06	0.02	0.09	0.05	0.20
805-hp Capstone C600 Microturbine Generator	EPGEN-2	0.25	1.09	0.56	2.46	0.01	0.06	0.02	0.09	0.05	0.20
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	*EPSTL-1*	-	-	-	-	*0.49*	*2.13*	-	-	-	-
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-1	*0.09*	*0.38*	*0.07*	*0.32*	*<0.01*	*0.02*	*<0.01*	*<0.01*	*0.01*	*0.03*
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	*EPSTL-2*	-	-	-	-	*0.49*	*2.13*	-	-	-	-
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-2	*0.09*	*0.38*	*0.07*	*0.32*	*<0.01*	*0.02*	*<0.01*	*<0.01*	*0.01*	*0.03*
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	*EPSTL-3*	-	-	-	-	*0.49*	*2.13*	-	-	-	-
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-3	*0.09*	*0.38*	*0.07*	*0.32*	*<0.01*	*0.02*	*<0.01*	*<0.01*	*0.01*	*0.03*
3.35-mmBtu/hr Hot Oil Heater - REVISED	EPOH-1	0.25	1.29	0.25	1.08	0.02	0.07	*<0.01*	*<0.01*	*0.02*	*0.10*
Flare	APCFLARE	2.89	0.45	15.62	2.11	18.48	2.43	<0.01	<0.01	<0.01	0.01
Ten (10) 400-bbl Stabilized Condensate Tanks + Two (2) 400-bbl Pipeline Fluids/Water Tanks	EPTK-1 - EPTK-12	-	-	-	-	-	7.24	-	-	-	-
Truck Loading	EPLOAD	-	-	-	-	-	7.61	-	-	-	-
Fugitive Emissions - REVISED	*EP-FUG*	-	-	-	-	-	*8.56*	-	-	-	-
Compressor Blowdowns - ADDED	*EP-BD*	-	-	-	-	*24.93*	*8.23*	-	-	-	-
Proposed Total =		20.47	77.46	35.37	88.63	52.66	74.54	0.38	1.68	2.02	8.83
Currently Permitted Total =		22.87	77.47	49.09	91.54	30.05	61.98	0.38	1.66	1.90	8.34
Change in Emissions =		-2.40	-0.01	-13.72	-2.91	22.61	12.56	0.00	0.02	0.12	0.49

Note: Per manufacturer guidance, engine VOC emission factor does not include formaldehyde; therefore, it has been added to this summary to calculate total VOC for the site.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Summary of Hazardous Air Pollutants

Equipment	Point ID	Estimated Emissions (lb/hr)									
		Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes	Total HAPs
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REMOVED	***EPCE-1***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-2	0.01	0.01	0.01	<0.01	0.08	0.02	-	<0.01	<0.01	0.13
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-3	0.01	0.01	0.01	<0.01	0.08	0.02	-	<0.01	<0.01	0.13
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-4	0.01	0.01	0.01	<0.01	0.08	0.02	-	<0.01	<0.01	0.13
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-5	0.01	0.01	0.01	<0.01	0.08	0.02	-	<0.01	<0.01	0.13
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-6	0.01	0.01	0.01	<0.01	0.08	0.02	-	<0.01	<0.01	0.13
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-7	0.02	0.01	<0.01	<0.01	***0.31***	0.01	<0.01	<0.01	<0.01	***0.36***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-8	0.02	0.01	<0.01	<0.01	***0.31***	0.01	<0.01	<0.01	<0.01	***0.36***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-9	0.02	0.01	<0.01	<0.01	***0.31***	0.01	<0.01	<0.01	<0.01	***0.36***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-10	0.02	0.01	<0.01	<0.01	***0.31***	0.01	<0.01	<0.01	<0.01	***0.36***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-11	0.02	0.01	<0.01	<0.01	***0.31***	0.01	<0.01	<0.01	<0.01	***0.36***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - NEW	***EPCE-12***	***0.02***	***0.01***	***<0.01***	***<0.01***	***0.31***	***0.01***	***<0.01***	***<0.01***	***<0.01***	***0.36***
805-hp Capstone C600 Microturbine Generator	EPGEN-1	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	0.01
805-hp Capstone C600 Microturbine Generator	EPGEN-2	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	<0.01	0.01
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	***EPSTL-1***	-	-	***0.02***	***0.00***	-	-	***0.01***	***0.06***	***0.04***	***0.13***
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	***EPSTL-2***	-	-	***0.02***	***0.00***	-	-	***0.01***	***0.06***	***0.04***	***0.13***
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-2	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	***EPSTL-3***	-	-	***0.02***	***0.00***	-	-	***0.01***	***0.06***	***0.04***	***0.13***
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-3	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
3.35-mmBtu/hr Hot Oil Heater - REVISED	EHOH-1	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
Flare	APCFLARE	-	-	<0.01	-	<0.01	-	0.26	<0.01	<0.01	0.26
Ten (10) 400-bbl Stabilized Condensate Tanks + Two (2) 400-bbl Pipeline Fluids/Water Tanks	EPTK-1 - EPTK-12	-	-	-	-	-	-	-	-	-	-
Truck Loading	EPLOAD	-	-	-	-	-	-	-	-	-	-
Fugitive Emissions - REVISED	***EP-FUG***	-	-	-	-	-	-	-	-	-	-
Compressor Blowdowns - ADDED	***EP-BD***	-	-	***0.01***	***<0.01***	-	-	***0.26***	***0.02***	***<0.01***	***0.29***
	Proposed Total =	***0.21***	***0.15***	***0.12***	***<0.01***	***2.27***	***0.12***	***0.59***	***0.22***	***0.13***	***3.81***
	Currently Permitted Total =	0.20	0.15	0.21	<0.01	1.93	0.13	0.40	0.36	0.16	3.54
	Change in Emissions =	***0.01***	***0.00***	***-0.10***	***0.00***	***0.35***	***-0.01***	***0.18***	***-0.14***	***-0.03***	***0.28***

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Table 1b: Summary of Hazardous Air Pollutants (Continued)

Equipment	Point ID	Estimated Emissions (tons/yr)									
		Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes	Total HAPs
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REMOVED	***EPCE-1***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-2	0.06	0.06	0.04	<0.01	0.33	0.07	-	0.01	<0.01	0.58
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-3	0.06	0.06	0.04	<0.01	0.33	0.07	-	0.01	<0.01	0.58
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-4	0.06	0.06	0.04	<0.01	0.33	0.07	-	0.01	<0.01	0.58
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-5	0.06	0.06	0.04	<0.01	0.33	0.07	-	0.01	<0.01	0.58
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-6	0.06	0.06	0.04	<0.01	0.33	0.07	-	0.01	<0.01	0.58
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-7	0.10	0.06	0.01	<0.01	***1.38***	0.03	0.01	<0.01	<0.01	***1.59***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-8	0.10	0.06	0.01	<0.01	***1.38***	0.03	0.01	<0.01	<0.01	***1.59***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-9	0.10	0.06	0.01	<0.01	***1.38***	0.03	0.01	<0.01	<0.01	***1.59***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-10	0.10	0.06	0.01	<0.01	***1.38***	0.03	0.01	<0.01	<0.01	***1.59***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-11	0.10	0.06	0.01	<0.01	***1.38***	0.03	0.01	<0.01	<0.01	***1.59***
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - NEW	***EPCE-12***	***0.10***	***0.06***	***0.01***	***<0.01***	***1.38***	***0.03***	***0.01***	***<0.01***	***<0.01***	***1.59***
805-hp Capstone C600 Microturbine Generator	EPGEN-1	<0.01	<0.01	<0.01	<0.01	0.02	-	-	<0.01	<0.01	0.03
805-hp Capstone C600 Microturbine Generator	EPGEN-2	<0.01	<0.01	<0.01	<0.01	0.02	-	-	<0.01	<0.01	0.03
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	***EPSTL-1***	-	-	***0.10***	***0.02***	-	-	***0.05***	***0.25***	***0.18***	***0.60***
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-1	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	***EPSTL-2***	-	-	***0.10***	***0.02***	-	-	***0.05***	***0.25***	***0.18***	***0.60***
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-2	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	***EPSTL-3***	-	-	***0.10***	***0.02***	-	-	***0.05***	***0.25***	***0.18***	***0.60***
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-3	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
3.25-mmBtu/hr Hot Oil Heater - REVISED	EPOH-1	-	-	<0.01	-	<0.01	-	0.02	<0.01	-	0.02
Flare	APCFLARE	-	-	<0.01	-	<0.01	-	0.03	<0.01	<0.01	0.03
Ten (10) 400-bbl Stabilized Condensate Tanks + Two (2) 400-bbl Pipeline Fluids/Water Tanks	EPTK-1 - EPTK-12	-	-	<0.01	<0.01	-	-	0.25	<0.01	<0.01	0.25
Truck Loading	EPLOAD	-	-	0.07	0.01	-	-	0.12	0.10	0.04	0.34
Fugitive Emissions - REVISED	***EP-FUG***	-	-	***<0.01***	***<0.01***	-	-	***0.09***	***0.01***	***<0.01***	***0.10***
Compressor Blowdowns - ADDED	***EP-BD***	-	-	***<0.01***	***<0.01***	-	-	***0.09***	***0.01***	***<0.01***	***0.10***
Proposed Total =		***0.92***	***0.67***	***0.59***	***0.07***	***9.96***	***0.53***	***0.85***	***0.96***	***0.53***	***15.18***
Currently Permitted Total =		0.88	0.66	0.95	0.01	8.44	0.57	0.99	1.64	0.70	14.85
Change in Emissions =		***0.04***	***0.00***	***-0.36***	***0.06***	***1.52***	***-0.04***	***-0.14***	***-0.68***	***-0.07***	***0.33***

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Summary of Greenhouse Gas Emissions

Equipment	Point ID	Carbon Dioxide (CO_2)		Methane (CH_4)		Nitrous Oxide (N_2O)		Methane (CH_4) as CO_2e		Nitrous Oxide (N_2O) as CO_2e		Total $CO_2 + CO_2e$	
		lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REMOVED	EPCE-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-2	1,212.33	4,817.14	0.02	0.09	<0.01	0.01	0.57	2.27	0.68	2.71	1,213.58	4,822.12
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-3	1,212.33	4,817.14	0.02	0.09	<0.01	0.01	0.57	2.27	0.68	2.71	1,213.58	4,822.12
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-4	1,212.33	4,817.14	0.02	0.09	<0.01	0.01	0.57	2.27	0.68	2.71	1,213.58	4,822.12
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-5	1,212.33	4,817.14	0.02	0.09	<0.01	0.01	0.57	2.27	0.68	2.71	1,213.58	4,822.12
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-6	1,212.33	4,817.14	0.02	0.09	<0.01	0.01	0.57	2.27	0.68	2.71	1,213.58	4,822.12
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-7	1,536.38	6,104.74	0.03	0.10	<0.01	0.01	0.63	2.49	0.75	2.96	1,537.75	6,110.19
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-8	1,536.38	6,104.74	0.03	0.10	<0.01	0.01	0.63	2.49	0.75	2.96	1,537.75	6,110.19
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-9	1,536.38	6,104.74	0.03	0.10	<0.01	0.01	0.63	2.49	0.75	2.96	1,537.75	6,110.19
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-10	1,536.38	6,104.74	0.03	0.10	<0.01	0.01	0.63	2.49	0.75	2.96	1,537.75	6,110.19
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-11	1,536.38	6,104.74	0.03	0.10	<0.01	0.01	0.63	2.49	0.75	2.96	1,537.75	6,110.19
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - NEW	EPCE-12	1,536.38	6,104.74	0.03	0.10	<0.01	0.01	0.63	2.49	0.75	2.96	1,537.75	6,110.19
905-hp Capstone C600 Microturbine Generator	EPGEN-1	800.13	3,179.30	0.02	0.06	<0.01	0.01	0.38	<0.01	0.45	<0.01	800.96	3,179.30
905-hp Capstone C600 Microturbine Generator	EPGEN-2	800.13	3,179.30	0.02	0.06	<0.01	0.01	0.38	<0.01	0.45	<0.01	800.96	3,179.30
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	EPSTL-1	<0.01	<0.01	0.11	0.45	-	-	2.85	11.31	-	-	2.85	11.31
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-1	116.98	464.80	<0.01	0.01	<0.01	<0.01	0.06	0.22	0.07	0.26	117.10	465.28
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	EPSTL-2	<0.01	<0.01	0.11	0.45	-	-	2.85	11.31	-	-	2.96	11.31
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-2	116.98	464.80	<0.01	0.01	<0.01	<0.01	0.06	0.22	0.07	0.26	117.10	465.28
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	EPSTL-3	<0.01	<0.01	0.11	0.45	-	-	2.85	11.31	-	-	2.85	11.31
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-3	116.98	464.80	<0.01	0.01	<0.01	<0.01	0.06	0.22	0.07	0.26	117.10	465.28
3.35-mmBtu/hr Hot Oil Heater - REVISED	EPOH-1	391.87	1,557.10	0.01	0.03	<0.01	<0.01	0.18	0.73	0.22	0.87	392.28	1,558.70
Flare	APCFLARE	29.72	80.59	11.18	1.47	<0.01	<0.01	279.42	36.75	0.01	0.04	309.14	117.39
Ten (10) 400-bbl Stabilized Condensate Tanks + Two (2) 400-bbl Pipeline Fluids/Water Tanks	EPTK-1 - EPTK-12	0.02	0.08	0.39	1.54	-	-	9.69	38.51	-	-	9.71	38.59
Truck Loading	EPLOAD	-	0.01	-	0.52	-	-	-	13.00	-	-	-	13.01
Fugitive Emissions - REVISED	EP-FUG	-	0.41	-	98.66	-	-	-	2,466.44	-	-	-	2,466.86
Compressor Blowdowns - ADDED	EP-BD	1.33	0.40	239.01	71.58	-	-	5,975.26	1,971.83	-	-	5,976.58	1,972.23
Proposed Total =		17,654.03	70,105.74	251.22	176.32	0.03	0.13	6,280.62	4,583.12	9.21	33.01	23,943.97	74,726.88
Currently Permitted Total =		17,336.65	68,790.85	34.22	102.98	0.03	0.13	718.56	2,160.09	9.49	34.00	18,064.80	70,984.94
Change in Emissions =		317.38	1,314.89	217.01	73.34	0.00	0.00	5,562.07	2,423.03	-0.28	-0.99	5,879.17	3,741.94

API Chapter 5: Emissions from working and breathing losses are very small in production and virtually non-existent in the downstream segments. Unless site-specific data indicate otherwise, working and breathing losses from "weathered" crude and other refined petroleum products are assumed to contain no CH_4 or CO_2.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Summary of Greenhouse Gas Emissions

Equipment	Point ID	Carbon Dioxide (CO_2)		Methane (CH_4)		Nitrous Oxide (N_2O)		Methane (CH_4) as CO_2e		Nitrous Oxide (N_2O) as CO_2e		Total CO_2 + CO_2e	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REMOVED	EPCE-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-2	1,212.33	5,309.99	0.02	0.10	<0.01	0.01	0.57	2.50	0.68	2.98	1,213.58	5,315.47
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-3	1,212.33	5,309.99	0.02	0.10	<0.01	0.01	0.57	2.50	0.68	2.98	1,213.58	5,315.47
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-4	1,212.33	5,309.99	0.02	0.10	<0.01	0.01	0.57	2.50	0.68	2.98	1,213.58	5,315.47
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-5	1,212.33	5,309.99	0.02	0.10	<0.01	0.01	0.57	2.50	0.68	2.98	1,213.58	5,315.47
1,380-hp Waukesha L5794 GSI Engine w/ NSCR - REVISED	EPCE-6	1,212.33	5,309.99	0.02	0.10	<0.01	0.01	0.57	2.50	0.68	2.98	1,213.58	5,315.47
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-7	1,536.38	6,729.32	0.03	0.11	<0.01	0.01	0.63	2.74	0.75	3.27	1,537.75	6,735.33
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REVISED	EPCE-8	1,536.38	6,729.32	0.03	0.11	<0.01	0.01	0.63	2.74	0.75	3.27	1,537.75	6,735.33
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-9	1,536.38	6,729.32	0.03	0.11	<0.01	0.01	0.63	2.74	0.75	3.27	1,537.75	6,735.33
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-10	1,536.38	6,729.32	0.03	0.11	<0.01	0.01	0.63	2.74	0.75	3.27	1,537.75	6,735.33
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - REPLACED	EPCE-11	1,536.38	6,729.32	0.03	0.11	<0.01	0.01	0.63	2.74	0.75	3.27	1,537.75	6,735.33
1,380-hp Caterpillar G3516B Engine w/Oxid. Cat. - NEW	EPCE-12	1,536.38	6,729.32	0.03	0.11	<0.01	0.01	0.63	2.74	0.75	3.27	1,537.75	6,735.33
805-hp Capstone C800 Microturbine Generator	EPGEN-1	800.13	3,504.58	0.02	0.07	<0.01	0.01	0.38	<0.01	0.45	<0.01	800.96	3,504.58
805-hp Capstone C800 Microturbine Generator	EPGEN-2	800.13	3,504.58	0.02	0.07	<0.01	0.01	0.38	<0.01	0.45	<0.01	800.96	3,504.58
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	EPSTL-1	<0.01	<0.01	0.11	0.50	-	-	2.85	12.47	-	-	2.85	12.47
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-1	116.98	512.36	<0.01	0.01	<0.01	<0.01	0.06	0.24	0.07	0.29	117.10	512.89
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	EPSTL-2	<0.01	<0.01	0.11	0.50	-	-	2.85	12.47	-	-	2.96	12.47
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-2	116.98	512.36	<0.01	0.01	<0.01	<0.01	0.06	0.24	0.07	0.29	117.10	512.89
53.8-MMSCFD TEG Dehydration Unit Still Vent - REVISED	EPSTL-3	<0.01	<0.01	0.11	0.50	-	-	2.85	12.47	-	-	2.85	12.47
1.0-mmBtu/hr Reboiler - REVISED	EPREBL-3	116.98	512.36	<0.01	0.01	<0.01	<0.01	0.06	0.24	0.07	0.29	117.10	512.89
3.35-mmBtu/hr Hot Oil Heater - REVISED	EPOH-1	391.87	1,716.40	0.01	0.03	<0.01	<0.01	0.18	0.81	0.22	0.96	392.28	1,718.18
Flare	APCFLARE	29.72	63.83	11.18	1.62	<0.01	<0.01	279.42	40.51	0.01	0.05	309.14	129.39
Ten (10) 400-bbl Stabilized Condensate Tanks + Two (2) 400-bbl Pipeline Fluids/Water Tanks	EPTK-1 - EPTK-12	0.02	0.09	0.39	1.70	-	-	9.69	42.45	-	-	9.71	42.54
Truck Loading	EPLOAD	-	0.01	-	0.57	-	-	-	14.33	-	-	-	14.34
Fugitive Emissions - REVISED	EP-FUG	-	0.46	-	108.71	-	-	-	2,717.55	-	-	-	2,718.11
Compressor Blowdowns - ADDED	EP-BD	1.33	0.44	239.01	78.87	-	-	5,975.26	1,971.83	-	-	5,976.58	1,972.27
Proposed Total =		17,654.03	77,278.34	251.22	194.32	0.03	0.14	6,280.82	4,854.66	9.21	36.39	23,943.97	82,169.39
Currently Permitted Total =		17,336.65	75,828.92	34.22	113.47	0.03	0.14	718.56	2,380.20	9.49	37.48	18,064.80	78,246.60
Change in Emissions =		317.38	1,449.42	217.01	80.85	0.00	0.00	5,562.07	2,474.46	-0.29	-1.10	5,879.17	3,922.79

API Chapter 5: Emissions from working and breathing losses are very small in production and virtually non-existent in the downstream segments. Unless site-specific data indicate otherwise, working and breathing losses from "weathered" crude and other refined petroleum products are assumed to contain no CH_4 or CO_2.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Criteria Air Pollutants (1 of 2)

Equipment Information

Point ID:	EPCE-2	EPCE-3	EPCE-4	EPCE-5	EPCE-6
Make:	Waukesha	Waukesha	Waukesha	Waukesha	Waukesha
Model:	L5794 GSI	L5794 GSI	L5794 GSI	L5794 GSI	L5794 GSI
Design Class:	4S-RB	4S-RB	4S-RB	4S-RB	4S-RB
Controls:	NSCR	NSCR	NSCR	NSCR	NSCR
Horsepower (hp):	1,380	1,380	1,380	1,380	1,380
Fuel Use (Btu/hp-hr):	7,510	7,510	7,510	7,510	7,510
Fuel Use (scfh)[1]:	10,364	10,364	10,364	10,364	10,364
Fuel Use (mmBtu/hr):	10.36	10.36	10.36	10.36	10.36
Exhaust Flow (acfm):	6,525	6,525	6,525	6,525	6,525
Exhaust Temp (°F):	1,149	1,149	1,149	1,149	1,149
Operating Hours:	8,760	8,760	8,760	8,760	8,760
Fuel HHV (Btu/scf):	1,138	1,138	1,138	1,138	1,138
Uncontrolled Emission Factors[1]					
NOx (g/hp-hr):	13.90	13.90	13.90	13.90	13.90
CO (g/hp-hr):	8.80	8.80	8.80	8.80	8.80
VOC (g/hp-hr):	0.30	0.30	0.30	0.30	0.30
Controlled Emission Factors					
NOx Control Eff. %	96.50%	96.50%	96.50%	96.50%	96.50%
CO Control Eff. %	93.25%	93.25%	93.25%	93.25%	93.25%
VOC Control Eff. %	84.50%	84.50%	84.50%	84.50%	84.50%
NOx (g/hp-hr):	0.49	0.49	0.49	0.49	0.49
CO (g/hp-hr):	0.59	0.59	0.59	0.59	0.59
VOC (g/hp-hr):	0.05	0.05	0.05	0.05	0.05

Uncontrolled Criteria Air Pollutant Emissions[2]

Point ID:	EPCE-2		EPCE-3		EPCE-4		EPCE-5		EPCE-6	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
NOx	42.29	185.22	42.29	185.22	42.29	185.22	42.29	185.22	42.29	185.22
CO	26.77	117.26	26.77	117.26	26.77	117.26	26.77	117.26	26.77	117.26
VOC	0.91	4.00	0.91	4.00	0.91	4.00	0.91	4.00	0.91	4.00
SO_2	0.03	0.13	0.03	0.13	0.03	0.13	0.03	0.13	0.03	0.13
$PM_{10/2.5}$	0.11	0.48	0.11	0.48	0.11	0.48	0.11	0.48	0.11	0.48
PM_{COND}	0.11	0.50	0.11	0.50	0.11	0.50	0.11	0.50	0.11	0.50
PM_{TOT}	0.22	0.98	0.22	0.98	0.22	0.98	0.22	0.98	0.22	0.98

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Criteria Air Pollutants (Continued)

Controlled Criteria Air Pollutant Emissions[2]

Point ID:	EPCE-2		EPCE-3		EPCE-4		EPCE-5		EPCE-6	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
NOx	1.48	6.48	1.48	6.48	1.48	6.48	1.48	6.48	1.48	6.48
CO	1.81	7.92	1.81	7.92	1.81	7.92	1.81	7.92	1.81	7.92
VOC	0.14	0.62	0.14	0.62	0.14	0.62	0.14	0.62	0.14	0.62
SO_2	0.03	0.13	0.03	0.13	0.03	0.13	0.03	0.13	0.03	0.13
$PM_{10/2.5}$	0.11	0.48	0.11	0.48	0.11	0.48	0.11	0.48	0.11	0.48
PM_{COND}	0.11	0.50	0.11	0.50	0.11	0.50	0.11	0.50	0.11	0.50
PM_{TOT}	0.22	0.98	0.22	0.98	0.22	0.98	0.22	0.98	0.22	0.98

AP-42 Emission Factors (lb/mmBtu)[3]

	4S-RB
Pollutant	**3.2-3 (7/00)**
$PM_{10/2.5}$	9.50E-03
PM_{COND}	9.91E-03
PM_{TOT}	1.94E-02

Notes:
1) Increasing the HHV decreases estimated fuel use. AMS requests to retain current fuel use limitations to be conservative.
2) NOx, CO, VOC: Manufacturer data. SO_2: Mass balance assuming fuel sulfur content of 1 grain sulfur per 100 cubic feet of fuel. PM: AP-42 factor adjusted using HHV.

3) All particulate matter (PM) - total, condensable and filterable - resulting from combustion of natural gas is assumed to be <1 micrometer in diameter. Total PM is the sum of filterable PM and condensable PM.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Hazardous Air Pollutants (1 of 2)

Equipment Information

Point ID:	EPCE-2	EPCE-3	EPCE-4	EPCE-5	EPCE-6
Make:	Waukesha	Waukesha	Waukesha	Waukesha	Waukesha
Model:	L5794 GSI	L5794 GSI	L5794 GSI	L5794 GSI	L5794 GSI
Design Class:	4S-RB	4S-RB	4S-RB	4S-RB	4S-RB
Controls:	NSCR	NSCR	NSCR	NSCR	NSCR
Horsepower (hp):	1,380	1,380	1,380	1,380	1,380
Fuel Use (Btu/hp-hr):	7,510	7,510	7,510	7,510	7,510
Fuel Use (scfh):	10,364	10,364	10,364	10,364	10,364
Fuel Use (mmBtu/hr):	10.36	10.36	10.36	10.36	10.36
Exhaust Flow (acfm):	6,525	6,525	6,525	6,525	6,525
Exhaust Temp (°F):	1,149	1,149	1,149	1,149	1,149
Operating Hours:	8,760	8,760	8,760	8,760	8,760
HAP Control Eff. %	50.00%	50.00%	50.00%	50.00%	50.00%

Uncontrolled Hazardous Air Pollutant (HAP) Emissions

Point ID:	EPCE-2		EPCE-3		EPCE-4		EPCE-5		EPCE-6	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Acetaldehyde	0.03	0.13	0.03	0.13	0.03	0.13	0.03	0.13	0.03	0.13
Acrolein	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12
Benzene	0.02	0.07	0.02	0.07	0.02	0.07	0.02	0.07	0.02	0.07
Ethylbenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Formaldehyde	0.15	0.67	0.15	0.67	0.15	0.67	0.15	0.67	0.15	0.67
n-Hexane	-	-	-	-	-	-	-	-	-	-
Methanol	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
Toluene	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
Xylenes	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
Total HAPs =	**0.26**	**1.16**	**0.26**	**1.16**	**0.26**	**1.16**	**0.26**	**1.16**	**0.26**	**1.16**

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Hazardous Air Pollutants (Continued)

Controlled Hazardous Air Pollutant (HAP) Emissions

Point ID:	EPCE-2		EPCE-3		EPCE-4		EPCE-5		EPCE-6	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Acetaldehyde	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06
Acrolein	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06
Benzene	0.01	0.04	0.01	0.04	0.01	0.04	0.01	0.04	0.01	0.04
Ethylbenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Formaldehyde	0.08	0.33	0.08	0.33	0.08	0.33	0.08	0.33	0.08	0.33
n-Hexane	-	-	-	-	-	-	-	-	-	-
Methanol	0.02	0.07	0.02	0.07	0.02	0.07	0.02	0.07	0.02	0.07
Toluene	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
Xylenes	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total HAPs =	**0.13**	**0.58**	**0.13**	**0.58**	**0.13**	**0.58**	**0.13**	**0.58**	**0.13**	**0.58**

AP-42 Emission Factors (lb/mmBtu)

	4S-RB
Pollutant	3.2-3 (7/00)
Acetaldehyde	2.79E-03
Acrolein	2.63E-03
Benzene	1.58E-03
Ethylbenzene	2.18E-05
Formaldehyde	2.05E-02
n-Hexane	NA
Methanol	3.06E-03
Toluene	5.58E-04
Xylenes	1.95E-04

Manufacturer data for formaldehyde (g/hp-hr): 0.05

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Greenhouse Gas Emissions (1 of 2)

Equipment Information

Point ID:	EPCE-2	EPCE-3	EPCE-4	EPCE-5	EPCE-6
Make:	Waukesha	Waukesha	Waukesha	Waukesha	Waukesha
Model:	L5794 GSI	L5794 GSI	L5794 GSI	L5794 GSI	L5794 GSI
Design Class:	4S-RB	4S-RB	4S-RB	4S-RB	4S-RB
Controls:	NSCR	NSCR	NSCR	NSCR	NSCR
Horsepower (hp):	1,380	1,380	1,380	1,380	1,380
Fuel Use (Btu/hp-hr):	7,510	7,510	7,510	7,510	7,510
Fuel Use (scfh):	10,364	10,364	10,364	10,364	10,364
Fuel Use (mmBtu/hr):	10.36	10.36	10.36	10.36	10.36
Exhaust Flow (acfm):	6,525	6,525	6,525	6,525	6,525
Exhaust Temp (°F):	1,149	1,149	1,149	1,149	1,149
Operating Hours:	8,760	8,760	8,760	8,760	8,760

Greenhouse Gas (GHG) Emissions

Point ID:	EPCE-2		EPCE-3		EPCE-4		EPCE-5		EPCE-6	
Pollutant	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr
CO_2	1,212.33	4,817.14	1,212.33	4,817.14	1,212.33	4,817.14	1,212.33	4,817.14	1,212.33	4,817.14
CH_4	0.02	0.09	0.02	0.09	0.02	0.09	0.02	0.09	0.02	0.09
N_2O	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
CH_4 as CO_2e	0.57	2.27	0.57	2.27	0.57	2.27	0.57	2.27	0.57	2.27
N_2O as CO_2e	0.68	2.71	0.68	2.71	0.68	2.71	0.68	2.71	0.68	2.71
Total CO_2 + CO_2e	1,213.58	4,822.12	1,213.58	4,822.12	1,213.58	4,822.12	1,213.58	4,822.12	1,213.58	4,822.12

Point ID:	EPCE-2		EPCE-3		EPCE-4		EPCE-5		EPCE-6	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
CO_2	1,212.33	5,309.99	1,212.33	5,309.99	1,212.33	5,309.99	1,212.33	5,309.99	1,212.33	5,309.99
CH_4	0.02	0.10	0.02	0.10	0.02	0.10	0.02	0.10	0.02	0.10
N_2O	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
CH_4 as CO_2e	0.57	2.50	0.57	2.50	0.57	2.50	0.57	2.50	0.57	2.50
N_2O as CO_2e	0.68	2.98	0.68	2.98	0.68	2.98	0.68	2.98	0.68	2.98
Total CO_2 + CO_2e	1,213.58	5,315.47	1,213.58	5,315.47	1,213.58	5,315.47	1,213.58	5,315.47	1,213.58	5,315.47

CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 =25, N_2O = 298

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Criteria Air Pollutants (2 of 2)

Equipment Information

Point ID:	EPCE-7	EPCE-8	EPCE-9	EPCE-10	EPCE-11	EPCE-12
Make:	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar
Model:	G3516B	G3516B	G3516B	G3516B	G3516B	G3516B
Design Class:	4S-LB	4S-LB	4S-LB	4S-LB	4S-LB	4S-LB
Controls:	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.
Horsepower (hp):	1,380	1,380	1,380	1,380	1,380	1,380
Fuel Use (Btu/hp-hr):	8,226	8,226	8,226	8,226	8,226	8,226
Fuel Use (scfh)[1]:	10,020	10,020	10,020	10,020	10,020	10,020
Fuel Use (mmBtu/hr):	11.35	11.35	11.35	11.35	11.35	11.35
Exhaust Flow (acfm):	9,156	9,156	9,156	9,156	9,156	9,156
Exhaust Temp (°F):	995	995	995	995	995	995
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760
Fuel HHV (Btu/scf):	1,138	1,138	1,138	1,138	1,138	1,138
Uncontrolled Emission Factors						
NOx (g/hp-hr):	0.50	0.50	0.50	0.50	0.50	0.50
CO (g/hp-hr):	2.71	2.71	2.71	2.71	2.71	2.71
VOC (g/hp-hr):	0.48	0.48	0.48	0.48	0.48	0.48
Controlled Emission Factors						
NOx Control Eff. %	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CO Control Eff. %	82.00%	82.00%	82.00%	82.00%	82.00%	82.00%
VOC Control Eff. %	45.00%	45.00%	45.00%	45.00%	45.00%	45.00%
NOx (g/hp-hr):	0.50	0.50	0.50	0.50	0.50	0.50
CO (g/hp-hr):	0.50	0.50	0.50	0.50	0.50	0.50
VOC (g/hp-hr):	0.26	0.26	0.26	0.26	0.26	0.26

Uncontrolled Criteria Air Pollutant Emissions[2]

Point ID:	EPCE-7		EPCE-8		EPCE-9		EPCE-10		EPCE-11		EPCE-12	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
NOx	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66
CO	8.24	36.11	8.24	36.11	8.24	36.11	8.24	36.11	8.24	36.11	8.24	36.11
VOC	1.46	6.40	1.46	6.40	1.46	6.40	1.46	6.40	1.46	6.40	1.46	6.40
SO_2	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
$PM_{10/2.5}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PM_{COND}	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55
PM_{TOT}	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55

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Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Criteria Air Pollutants (Continued)

Controlled Criteria Air Pollutant Emissions[2]

Point ID:	EPCE-7		EPCE-8		EPCE-9		EPCE-10		EPCE-11		EPCE-12	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
NOx	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66
CO	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66	1.52	6.66
VOC	0.79	3.46	0.79	3.46	0.79	3.46	0.79	3.46	0.79	3.46	0.79	3.46
SO_2	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
$PM_{10/2.5}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PM_{COND}	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55
PM_{TOT}	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55	0.13	0.55

AP-42 Emission Factors (lb/mmBtu)[3]

	4S-RB
Pollutant	3.2-3 (7/00)
$PM_{10/2.5}$	9.50E-03
PM_{COND}	9.91E-03
PM_{TOT}	1.94E-02

Notes;

1) Increasing the HHV decreases estimated fuel use. AMS requests to retain current fuel use limitations to be conservative.

2) NOx, CO, VOC: Manufacturer data. SO_2: Mass balance assuming fuel sulfur content of 1 grain sulfur per 100 cubic feet of fuel. PM: AP-42 factor adjusted using HHV.

3) All particulate matter (PM) - total, condensable and filterable - resulting from combustion of natural gas is assumed to be <1 micrometer in diameter. Total PM is the sum of filterable PM and condensable PM.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Hazardous Air Pollutants (2 of 2)

Equipment Information

Point ID:	EPCE-7	EPCE-8	EPCE-9	EPCE-10	EPCE-11	EPCE-12
Make:	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar
Model:	G3516B	G3516B	G3516B	G3516B	G3516B	G3516B
Design Class:	4S-LB	4S-LB	4S-LB	4S-LB	4S-LB	4S-LB
Controls:	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.
Horsepower (hp):	1,380	1,380	1,380	1,380	1,380	1,380
Fuel Use (Btu/hp-hr):	8,226	8,226	8,226	8,226	8,226	8,226
Fuel Use (scfh):	10,020	10,020	10,020	10,020	10,020	10,020
Fuel Use (mmBtu/hr):	11.35	11.35	11.35	11.35	11.35	11.35
Exhaust Flow (acfm):	9,156	9,156	9,156	9,156	9,156	9,156
Exhaust Temp (°F):	995	995	995	995	995	995
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760
HAP Control Eff. %	76.00%	76.00%	76.00%	76.00%	76.00%	76.00%

Uncontrolled Hazardous Air Pollutant (HAP) Emissions

Point ID:	EPCE-7		EPCE-8		EPCE-9		EPCE-10		EPCE-11		EPCE-12	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Acetaldehyde	0.09	0.42	0.09	0.42	0.09	0.42	0.09	0.42	0.09	0.42	0.09	0.42
Acrolein	0.06	0.26	0.06	0.26	0.06	0.26	0.06	0.26	0.06	0.26	0.06	0.26
Benzene	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.02
Ethylbenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Formaldehyde	1.31	5.73	1.31	5.73	1.31	5.73	1.31	5.73	1.31	5.73	1.31	5.73
n-Hexane	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06
Methanol	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12
Toluene	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.02
Xylenes	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
Total HAPs =	**1.51**	**6.63**	**1.51**	**6.63**	**1.51**	**6.63**	**1.51**	**6.63**	**1.51**	**6.63**	**1.51**	**6.63**

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Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Hazardous Air Pollutants (Continued)

Controlled Hazardous Air Pollutant (HAP) Emissions

Point ID:	EPCE-7		EPCE-8		EPCE-9		EPCE-10		EPCE-11		EPCE-12	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Acetaldehyde	0.02	0.10	0.02	0.10	0.02	0.10	0.02	0.10	0.02	0.10	0.02	0.10
Acrolein	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06	0.01	0.06
Benzene	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
Ethylbenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Formaldehyde	**0.31**	**1.38**	**0.31**	**1.38**	**0.31**	**1.38**	**0.31**	**1.38**	**0.31**	**1.38**	**0.31**	**1.38**
n-Hexane	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
Methanol	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
Toluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total HAPs =	**0.36**	**1.59**	**0.36**	**1.59**	**0.36**	**1.59**	**0.36**	**1.59**	**0.36**	**1.59**	**0.36**	**1.59**

AP-42 Emission Factors (lb/mmBtu)

	4S-LB
Pollutant	3.2-2 (7/00)
Acetaldehyde	8.36E-03
Acrolein	5.14E-03
Benzene	4.40E-04
Ethylbenzene	3.97E-05
Formaldehyde	5.28E-02
n-Hexane	1.11E-03
Methanol	2.50E-03
Toluene	4.08E-04
Xylenes	1.84E-04

Manufacturer data for formaldehyde (g/hp-hr): 0.43

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Greenhouse Gas Emissions (2 of 2)

Equipment Information

Point ID:	EPCE-7	EPCE-8	EPCE-9	EPCE-10	EPCE-11	EPCE-12
Make:	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar	Caterpillar
Model:	G3516B	G3516B	G3516B	G3516B	G3516B	G3516B
Design Class:	4S-LB	4S-LB	4S-LB	4S-LB	4S-LB	4S-LB
Controls:	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.	Oxid. Cat.
Horsepower (hp):	1,380	1,380	1,380	1,380	1,380	1,380
Fuel Use (Btu/hp-hr):	8,226	8,226	8,226	8,226	8,226	8,226
Fuel Use (scfh):	10,020	10,020	10,020	10,020	10,020	10,020
Fuel Use (mmBtu/hr):	11.35	11.35	11.35	11.35	11.35	11.35
Exhaust Flow (acfm):	9,156	9,156	9,156	9,156	9,156	9,156
Exhaust Temp (°F):	995	995	995	995	995	995
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760

Greenhouse Gas (GHG) Emissions

Point ID:	EPCE-7		EPCE-8		EPCE-9		EPCE-10		EPCE-11		EPCE-12	
Pollutant	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr
CO_2	1,536.38	6,104.74	1,536.38	6,104.74	1,536.38	6,104.74	1,536.38	6,104.74	1,536.38	6,104.74	1,536.38	6,104.74
CH_4	0.03	0.10	0.03	0.10	0.03	0.10	0.03	0.10	0.03	0.10	0.03	0.10
N_2O	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
CH_4 as CO_2e	0.63	2.49	0.63	2.49	0.63	2.49	0.63	2.49	0.63	2.49	0.63	2.49
N_2O as CO_2e	0.75	2.96	0.75	2.96	0.75	2.96	0.75	2.96	0.75	2.96	0.75	2.96
Total $CO_2 + CO_2e$	1,537.75	6,110.19	1,537.75	6,110.19	1,537.75	6,110.19	1,537.75	6,110.19	1,537.75	6,110.19	1,537.75	6,110.19

Point ID:	EPCE-7		EPCE-8		EPCE-9		EPCE-10		EPCE-11		EPCE-12	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
CO_2	1,536.38	6,729.32	1,536.38	6,729.32	1,536.38	6,729.32	1,536.38	6,729.32	1,536.38	6,729.32	1,536.38	6,729.32
CH_4	0.03	0.11	0.03	0.11	0.03	0.11	0.03	0.11	0.03	0.11	0.03	0.11
N_2O	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
CH_4 as CO_2e	0.63	2.74	0.63	2.74	0.63	2.74	0.63	2.74	0.63	2.74	0.63	2.74
N_2O as CO_2e	0.75	3.27	0.75	3.27	0.75	3.27	0.75	3.27	0.75	3.27	0.75	3.27
Total $CO_2 + CO_2e$	1,537.75	6,735.33	1,537.75	6,735.33	1,537.75	6,735.33	1,537.75	6,735.33	1,537.75	6,735.33	1,537.75	6,735.33

CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)

Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Note: Manufacturer data available for CO_2 emissions from Caterpillar engines: 505 g/hp-hr

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Generator Emissions Calculations - Criteria Air Pollutants

Equipment Information

Point ID:	**EPGEN-1**	**EPGEN-2**
Make:	Capstone	Capstone
Model:	C600	C600
Design Class:	Turbine	Turbine
Controls:	None	None
Horsepower (hp):	805	805
Fuel Use (Btu/hp-hr):	8,497	8,497
Fuel Use (scfh):	5,672	5,672
Fuel Use (mmBtu/hr):	6.84	6.84
Operating Hours:	8,760	8,760
Fuel HHV (Btu/scf):	1,206	1,206

Emission Factors

NOx (g/hp-hr):	0.14	0.14
CO (g/hp-hr):	AP-42	AP-42
VOC (g/hp-hr):	AP-42	AP-42

Criteria Air Pollutant Emissions

Point ID:	**EPGEN-1**		**EPGEN-2**	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
NOx	0.25	1.09	0.25	1.09
CO	0.56	2.46	0.56	2.46
VOC	0.01	0.06	0.01	0.06
SO_2	0.02	0.09	0.02	0.09
$PM_{10/2.5}$	0.01	0.06	0.01	0.06
PM_{COND}	0.03	0.14	0.03	0.14
PM_{TOT}	0.05	0.20	0.05	0.20

Emission Factors (lb/mmBtu)

Pollutant	**3.1-1, 3.1-2a (4/00)**
CO	8.20E-02
VOC	2.10E-03
$PM_{10/2.5}$	1.90E-03
PM_{COND}	4.70E-03
PM_{TOT}	6.60E-03

Emission Factor Sources:
NOx: Manufacturer data. SO_2: Mass balance assuming fuel sulfur content of 1 grain sulfur per 100 cubic feet of fuel. CO, VOC and PM: AP-42.

Note: All particulate matter (PM) - total, condensable and filterable - resulting from combustion of natural gas is assumed to be <1 micrometer in diameter. Total PM is the sum of filterable PM and condensable PM.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Generator Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Point ID:	EPGEN-1	EPGEN-2
Make:	Capstone	Capstone
Model:	C600	C600
Design Class:	Turbine	Turbine
Controls:	None	None
Horsepower (hp):	805	805
Fuel Use (Btu/hp-hr):	8,497	8,497
Fuel Use (scfh):	5,672	5,672
Fuel Use (mmBtu/hr):	6.84	6.84
Operating Hours:	8,760	8,760

Hazardous Air Pollutant Emissions

Point ID:	EPGEN-1		EPGEN-2	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
Acetaldehyde	<0.01	<0.01	<0.01	<0.01
Acrolein	<0.01	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	<0.01	<0.01	<0.01	<0.01
Formaldehyde	<0.01	0.02	<0.01	0.02
Methanol	-	-	-	-
Toluene	<0.01	<0.01	<0.01	<0.01
Xylenes	<0.01	<0.01	<0.01	<0.01
Total HAPs	**0.01**	**0.03**	**0.01**	**0.03**

AP-42 Emission Factors (lb/mmBtu)

Pollutant	3.1-1, 3.1-2a (4/00)
Acetaldehyde	4.00E-05
Acrolein	6.40E-06
Benzene	1.20E-05
Ethylbenzene	3.20E-05
Formaldehyde	7.10E-04
Methanol	NA
Toluene	1.30E-04
Xylenes	6.40E-05
Total HAPs	1.03E-03

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Engine Emissions Calculations - Greenhouse Gas Emissions

Equipment Information

Point ID:	**EPGEN-1**	**EPGEN-2**
Make:	**Capstone**	**Capstone**
Model:	C600	C600
Design Class:	Turbine	Turbine
Controls:	None	None
Horsepower (hp):	805	805
Fuel Use (Btu/hp-hr):	8,497	8,497
Fuel Use (scfh):	5,672	5,672
Fuel Use (mmBtu/hr):	6.84	6.84
Operating Hours:	8,760	8,760

Greenhouse Gas (GHG) Emissions

Point ID:	EPGEN-1		EPGEN-2	
Pollutant	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**
CO_2	800.13	3,179.30	800.13	3,179.30
CH_4	0.02	0.06	0.02	0.06
N_2O	<0.01	0.01	<0.01	0.01
CH_4 as CO_2e	0.38	<0.01	0.38	<0.01
N_2O as CO_2e	0.45	<0.01	0.45	<0.01
Total CO_2 + CO_2e	**800.96**	**3,179.30**	**800.96**	**3,179.30**

Point ID:	EPGEN-1		EPGEN-2	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
CO_2	800.13	3,504.58	800.13	3,504.58
CH_4	0.02	0.07	0.02	0.07
N_2O	<0.01	0.01	<0.01	0.01
CH_4 as CO_2e	0.38	<0.01	0.38	<0.01
N_2O as CO_2e	0.45	<0.01	0.45	<0.01
Total CO_2 + CO_2e	**800.96**	**3,504.58**	**800.96**	**3,504.58**

CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Glycol Dehydration Unit Emissions

Equipment Information

Parameter	Units	Value	Value	Value
Point ID:	-	EPSTL-1	EPSTL-2	EPSTL-3
Maximum Throughput	MMSCFD	53.80	53.80	53.80
Operating Hours	Hours/Year	8,760	8,760	8,760
Wet Gas Temperature	°F	50	50	50
Wet Gas Pressure	psig	1,440	1,440	1,440
Wet Gas Water Content	lb H_2O/MMSCF	Saturated	Saturated	Saturated
Dry Gas Water Content	lb H_2O/MMSCF	7.00	7.00	7.00
Pump Type	Electric/Gas	See Note	See Note	See Note
Lean Glycol Flow Rate	gpm	15.00	15.00	15.00
Flash Tank Temperature	°F	130	130	130
Flash Tank Pressure	psig	70	70	70
Flash Tank Controls	-	Recycle/ Recompress	Recycle/ Recompress	Recycle/ Recompress
Stripping Gas Flow Rate	scfm	N/A	N/A	N/A
Regenerator Still Vent Controls	-	Condenser/ Combustion	Condenser/ Combustion	Condenser/ Combustion
Condenser Temperature	°F	120	120	120
Condenser Pressure	psig	14.80	14.80	14.80

1) Units are equipped with both a primary electric pump and two Kimray 45015 PV gas injection pump to be used as backups. The electric pump result in higher emissions; therefore, emissions have been modeled assuming use of the electric pump for a more conservative (higher) emissions estimate.

2) Non-condensables from the condenser vent stream and flash tank off-gases will be burned by the reboiler as fuel during typical operating conditions; therefore, these emissions are accounted for in the reboiler calculations. Any excess vapors not burned as fuel will be routed to the stabilizer feed drum; therefore, a closed system with 100% control efficiency for flash tank off-gases was used in GRI-GLYCalc to reflect these operating conditions. During upset conditions, excess flash gas may be routed to the flare and combusted, where emissions would be accounted for in the flare calculations.

3) GRI-GLYCalc Reports attached. 10% safety factor added to GRI-GLYCalc results (TPY) to account for potential fluctuations in gas composition. Gas pump emissions scenario shown for reference only.

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Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Glycol Dehydration Unit Emissions (Continued)

Proposed Emissions

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
n-Hexane	0.01	0.05	0.01	0.05	0.01	0.05
Benzene	0.02	0.10	0.02	0.10	0.02	0.10
Toluene	0.06	0.25	0.06	0.25	0.06	0.25
Ethylbenzene	0.00	0.02	0.00	0.02	0.00	0.02
Xylenes	0.04	0.18	0.04	0.18	0.04	0.18
Total HAPs =	**0.14**	**0.60**	**0.14**	**0.60**	**0.14**	**0.60**
Total VOC =	**0.49**	**2.13**	**0.49**	**2.13**	**0.49**	**2.13**

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Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Table 4a: Glycol Dehydration Unit Emissions (Continued)

GRI-GLYCalc Results - Uncontrolled Emissions (Electric Pump)

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
2, 2, 4-Trimethylpentane	0.0038	0.0168	0.0038	0.0168	0.0038	0.0168
n-Hexane	0.2348	1.0282	0.2348	1.0282	0.2348	1.0282
Benzene	0.4807	2.1056	0.4807	2.1056	0.4807	2.1056
Toluene	1.4812	6.4875	1.4812	6.4875	1.4812	6.4875
Ethylbenzene	0.1649	0.7221	0.1649	0.7221	0.1649	0.7221
Xylenes	1.7372	7.6088	1.7372	7.6088	1.7372	7.6088
Total HAPs =	**4.1026**	**17.9690**	**4.1026**	**17.9690**	**4.1026**	**17.9690**
Total VOC =	**10.9975**	**48.1692**	**10.9975**	**48.1692**	**10.9975**	**48.1692**

GRI-GLYCalc Results - Controlled Emissions (Electric Pump)

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
2, 2, 4-Trimethylpentane	0.0002	0.0007	0.0002	0.0007	0.0002	0.0007
n-Hexane	0.0109	0.0479	0.0109	0.0479	0.0109	0.0479
Benzene	0.0210	0.0920	0.0210	0.0920	0.0210	0.0920
Toluene	0.0525	0.2297	0.0525	0.2297	0.0525	0.2297
Ethylbenzene	0.0038	0.0168	0.0038	0.0168	0.0038	0.0168
Xylenes	0.0371	0.1626	0.0371	0.1626	0.0371	0.1626
Total HAPs =	**0.1255**	**0.5497**	**0.1255**	**0.5497**	**0.1255**	**0.5497**
Total VOC =	**0.4415**	**1.9339**	**0.4415**	**1.9339**	**0.4415**	**1.9339**

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Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Table 4a: Glycol Dehydration Unit Emissions (Continued)

GRI-GLYCalc Results - Uncontrolled Emissions (Gas Pump) - For Reference Only

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
2, 2, 4-Trimethylpentane	0.0032	0.0142	0.0032	0.0142	0.0032	0.0142
n-Hexane	0.1326	0.5809	0.1326	0.5809	0.1326	0.5809
Benzene	0.4287	1.8777	0.4287	1.8777	0.4287	1.8777
Toluene	1.3779	6.0353	1.3779	6.0353	1.3779	6.0353
Ethylbenzene	0.1591	0.6971	0.1591	0.6971	0.1591	0.6971
Xylenes	1.6955	7.4265	1.6955	7.4265	1.6955	7.4265
Total HAPs =	**3.7970**	**16.6317**	**3.7970**	**16.6317**	**3.7970**	**16.6317**
Total VOC =	**8.5238**	**37.3344**	**8.5238**	**37.3344**	**8.5238**	**37.3344**

GRI-GLYCalc Results - Controlled Emissions (Gas Pump) - For Reference Only

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
2, 2, 4-Trimethylpentane	0.0001	0.0005	0.0001	0.0005	0.0001	0.0005
n-Hexane	0.0057	0.0250	0.0057	0.0250	0.0057	0.0250
Benzene	0.0165	0.0723	0.0165	0.0723	0.0165	0.0723
Toluene	0.0366	0.1602	0.0366	0.1602	0.0366	0.1602
Ethylbenzene	0.0023	0.0102	0.0023	0.0102	0.0023	0.0102
Xylenes	0.0223	0.0977	0.0223	0.0977	0.0223	0.0977
Total HAPs =	**0.0835**	**0.3659**	**0.0835**	**0.3659**	**0.0835**	**0.3659**
Total VOC =	**0.2529**	**1.1076**	**0.2529**	**1.1076**	**0.2529**	**1.1076**

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Glycol Dehydration Unit Emissions - Greenhouse Gas Emissions

Equipment Information

Parameter	Units	Value	Value	Value
Point ID:	-	EPSTL-1	EPSTL-2	EPSTL-3
Maximum Throughput	MMSCFD	53.8	53.8	53.8
Operating Hours	Hours/Year	8,760	8,760	8,760
Wet Gas Temperature	°F	50	50	50
Wet Gas Pressure	psig	1,440	1,440	1,440
Wet Gas Water Content	lb H_2O/MMSCF	Saturated	Saturated	Saturated
Dry Gas Water Content	lb H_2O/MMSCF	7.00	7.00	7.00
Pump Type	Electric/Gas	See Note	See Note	See Note
Lean Glycol Flow Rate	gpm	15.00	15.00	15.00
Flash Tank Temperature	°F	130	130	130
Flash Tank Pressure	psig	70	70	70
Flash Tank Controls	Yes/No	Recycle/ Recompress	Recycle/ Recompress	Recycle/ Recompress
Stripping Gas Flow Rate	scfm	N/A	N/A	N/A
Regenerator Still Vent Controls	Yes/No	Condenser/ Combustion	Condenser/ Combustion	Condenser/ Combustion
Condenser Temperature	°F	120	120	120
Condenser Pressure	psig	14.80	14.80	14.80

Note: Units are equipped with both a primary electric pump and two Kimray 45015 PV gas injection pump to be used as backups. The gas pumps result in higher GHG emissions; therefore, GHG emissions have been modeled assuming use of the gas pumps for a more conservative (higher) emissions estimate.

Source: CH_4: GRI-GLYCalc™ Report(s) attached. CO_2: Mass Balance.

CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO2 = 1, CH4 = 25, N2O = 298
Example CO_2 Calculation (Exhibit 5.1: API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry, August 2009):
tonnes CH_4 * tonne mole CH_4/16 tonne CH_4 * tonne mole gas/tonne mole CH_4 * tonne mole CO_2/tonne mole gas * 44 tonne CO_2/tonne mole CO_2 = tonnes CO_2/yr

Input CH_4 wt% from gas analysis =	86.9600
Input CO_2 wt% from gas analysis =	0.1760

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Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Glycol Dehydration Unit Emissions - Greenhouse Gas Emissions (Continued)

Uncontrolled Emissions (Gas Pump)

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**
CO_2 =	0.0127	0.0504	0.0127	0.0504	0.0127	0.0504
CH_4 =	2.2779	9.0513	2.2779	9.0513	2.2779	9.0513
CH_4 as CO_2e =	56.9475	226.2814	56.9475	226.2814	56.9475	226.2814
Total CO_2 + CO_2e =	56.9602	226.3317	56.9602	226.3317	56.9602	226.3317

Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
CO_2 =	0.0127	0.0555	0.0127	0.0555	0.0127	0.0555
Input CH_4 from GLYCalc =	2.2779	9.9773	2.2779	9.9773	2.2779	9.9773
CH_4 as CO_2e =	56.9475	249.4325	56.9475	249.4325	56.9475	249.4325
Total CO_2 + CO_2e =	56.9602	249.4880	56.9602	249.4880	56.9602	249.4880

Controlled Emissions (Gas Pump)

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**
CO_2 =	0.0006	0.0025	0.0006	0.0025	0.0006	0.0025
CH_4 =	0.1139	0.4524	0.1139	0.4524	0.1139	0.4524
CH_4 as CO_2e =	2.8475	11.3103	2.8475	11.3103	2.8475	11.3103
Total CO_2 + CO_2e =	2.8481	11.3128	2.8481	11.3128	2.8481	11.3128

Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
CO_2 =	0.0006	0.0028	0.0006	0.0028	0.0006	0.0028
Input CH_4 from GLYCalc =	0.1139	0.4987	0.1139	0.4987	0.1139	0.4987
CH_4 as CO_2e =	2.8475	12.4675	2.8475	12.4675	2.8475	12.4675
Total CO_2 + CO_2e =	2.8481	12.4703	2.8481	12.4703	2.8481	12.4703

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Table 4b: Glycol Dehydration Unit Emissions - Greenhouse Gas Emissions (Continued)

Uncontrolled Emissions (Electric Pump) - For Reference Only

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**
CO_2 =	0.0109	0.0432	0.0109	0.0432	0.0109	0.0432
CH_4 =	1.9513	7.7534	1.9513	7.7534	1.9513	7.7534
CH_4 as CO_2e =	48.7825	193.8359	48.7825	193.8359	48.7825	193.8359
Total CO_2 + CO_2e =	48.7934	193.8790	48.7934	193.8790	48.7934	193.8790

Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
CO_2 =	0.0109	0.0476	0.0109	0.0476	0.0109	0.0476
Input CH_4 from GLYCalc =	1.9513	8.5467	1.9513	8.5467	1.9513	8.5467
CH_4 as CO_2e =	48.7825	213.6675	48.7825	213.6675	48.7825	213.6675
Total CO_2 + CO_2e =	48.7934	213.7151	48.7934	213.7151	48.7934	213.7151

Controlled Emissions (Electric Pump) - For Reference Only

Point ID:	EPSTL-1		EPSTL-2		EPSTL-3	
Pollutant	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**
CO_2 =	0.0005	0.0022	0.0005	0.0022	0.0005	0.0022
CH_4 =	0.0975	0.3876	0.0975	0.3876	0.0975	0.3876
CH_4 as CO_2e =	2.4375	9.6910	2.4375	9.6910	2.4375	9.6910
Total CO_2 + CO_2e =	2.4380	9.6932	2.4380	9.6932	2.4380	9.6932

Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
CO_2 =	0.0005	0.0024	0.0005	0.0024	0.0005	0.0024
Input CH_4 from GLYCalc =	0.0975	0.4273	0.0975	0.4273	0.0975	0.4273
CH_4 as CO_2e =	2.4375	10.6825	2.4375	10.6825	2.4375	10.6825
Total CO_2 + CO_2e =	2.4380	10.6849	2.4380	10.6849	2.4380	10.6849

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condenser Vent Stream Heat Content - Electric Pump

Each Reboiler Capacity = 1.00 mmBtu/hr

From GRI-GLYCalc
Condenser Vent Stream

Name	MW	LHV	Mole %	Btu/scf
Water	18.015	0.00	1.15E+01	0
Carbon Dioxide	44.010	0.00	6.61E+00	0
Nitrogen	28.013	0.00	1.23E-01	0
Methane	16.042	919.00	2.67E+01	245
Ethane	30.069	1,619.00	2.54E+01	411
Propane	44.096	2,315.00	1.08E+01	250
Isobutane	58.122	3,000.00	2.21E+00	66
n-Butane	58.122	3,011.00	5.00E+00	151
Isopentane	72.149	3,699.00	1.13E+00	42
n-Pentane	72.149	3,707.00	1.22E+00	45
Cyclopentane	70.134	3,764.80	0.00E+00	0
n-Hexane	86.175	4,756.00	5.56E-01	26
Cyclohexane	84.161	4,481.50	4.17E-01	19
Other Hexanes (as n-Hexane)	86.175	4,756.00	8.97E-01	43
n-Heptane	100.204	5,502.50	1.39E+00	76
Methylcyclohexane	98.188	5,215.70	6.88E-01	36
Benzene	78.114	3,741.80	1.18E+00	44
Toluene	92.141	4,475.00	2.50E+00	112
Ethylbenzene	106.167	5,222.20	1.59E-01	8
Xylenes	106.500	5,208.87	1.53E+00	80
C8+ (as Nonane)	128.258	6,996.40	1.15E-02	1
		* Total =	1.00E+02	1,655

* May not = 100% due to rounding

GLYCalc Flow Rate = 1.73E+02 SCFH

Condenser Stream Heat Content = 0.29 mmBtu/hr

Condenser + Flash Tank Off-Gas Stream Heat Content = 1.46 mmBtu/hr

Excess (not burned by reboiler) = 0.46 mmBtu/hr

Note: Non-condensables from the condenser vent stream and flash tank overhead vapors will be burned by the reboiler as fuel during typical operating conditions. The heating value of each stream has been calculated to determine how much can be burned by each 1.0-mmBtu/hr reboiler. Any excess vapors not burned as fuel will be routed to the stabilizer feed drum. During upset conditions, excess flash gas may be routed to the flare and combusted. Upset conditions include loss of both permanent and backup power or compressor malfunction of the primary and secondary flash gas compressors. Excess gases that are not burned in the reboiler would be burned in the flare during upset conditions only.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flash Tank Off-Gas Heat Content - Electric Pump

Each Reboiler Capacity = 1.00 mmBtu/hr

From GRI-GLYCalc
Flash Tank Off-Gas Stream

Name	MW	LHV	Mole %	Btu/scf
Water	18.015	0.00	1.08E-01	0
Carbon Dioxide	44.010	0.00	1.57E+00	0
Nitrogen	28.013	0.00	3.38E-01	0
Methane	16.042	919.00	7.27E+01	668
Ethane	30.069	1,619.00	1.91E+01	309
Propane	44.096	2,315.00	4.07E+00	94
Isobutane	58.122	3,000.00	5.49E-01	16
n-Butane	58.122	3,011.00	9.53E-01	29
Isopentane	72.149	3,699.00	1.90E-01	7
n-Pentane	72.149	3,707.00	1.65E-01	6
Cyclopentane	70.134	3,764.80	0.00E+00	0
n-Hexane	86.175	4,756.00	4.30E-02	2
Cyclohexane	84.161	4,481.50	7.89E-03	0
Other Hexanes (as n-Hexane)	86.175	4,756.00	8.97E-02	4
n-Heptane	100.204	5,502.50	5.79E-02	3
Methylcyclohexane	98.188	5,215.70	1.12E-02	1
Benzene	78.114	3,741.80	3.46E-03	0
Toluene	92.141	4,475.00	5.75E-03	0
Ethylbenzene	106.167	5,222.20	3.20E-04	0
Xylene	106.500	5,208.87	2.38E-03	0
C8+ (as Nonane)	128.258	6,996.40	1.74E-03	0
		* Total =	1.00E+02	1,141

*May not = 100% due to rounding

GLYCalc Flow Rate = 1.03E+03 SCFH

Flash Tank Off-Gas Heat Content = 1.18 mmBtu/hr

Condenser + Flash Tank Off-Gas Stream Heat Content = 1.46 mmBtu/hr

Excess (not burned by reboiler) = 0.46 mmBtu/hr

Note: Non-condensables from the condenser vent stream and flash tank overhead vapors will be burned by the reboiler as fuel during typical operating conditions. The heating value of each stream has been calculated to determine how much can be burned by each 1.0-mmBtu/hr reboiler. Any excess vapors not burned as fuel will be routed to the stabilizer feed drum. During upset conditions, excess flash gas may be routed to the flare and combusted. Upset conditions include loss of both permanent and backup power or compressor malfunction of the primary and secondary flash gas compressors. Excess gases that are not burned in the reboiler would be burned in the flare during upset conditions only.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condenser Vent Stream Heat Content - Gas Pumps

Each Reboiler Capacity = 1.00 mmBtu/hr

From GRI-GLYCalc
Condenser Vent Stream

Name	MW	LHV	Mole %	Btu/scf
Water	18.015	0.00	1.15E+01	0
Carbon Dioxide	44.010	0.00	2.25E+00	0
Nitrogen	28.013	0.00	1.50E-01	0
Methane	16.042	919.00	4.32E+01	397
Ethane	30.069	1,619.00	1.97E+01	319
Propane	44.096	2,315.00	8.26E+00	191
Isobutane	58.122	3,000.00	1.62E+00	49
n-Butane	58.122	3,011.00	3.33E+00	100
Isopentane	72.149	3,699.00	8.79E-01	33
n-Pentane	72.149	3,707.00	8.50E-01	32
Cyclopentane	70.134	3,764.80	0.00E+00	0
n-Hexane	86.175	4,756.00	4.04E-01	19
Cyclohexane	84.161	4,481.50	3.38E-01	15
Other Hexanes (as n-Hexane)	86.175	4,756.00	6.67E-01	32
n-Heptane	100.204	5,502.50	1.08E+00	59
Methylcyclohexane	98.188	5,215.70	5.84E-01	30
Benzene	78.114	3,741.80	1.29E+00	48
Toluene	92.141	4,475.00	2.42E+00	108
Ethylbenzene	106.167	5,222.20	1.33E-01	7
Xylenes	106.500	5,208.87	1.28E+00	67
C8+ (as Nonane)	128.258	6,996.40	1.86E-02	1
		* Total =	1.00E+02	1,508

* May not = 100% due to rounding

GLYCalc Flow Rate = 1.25E+02 SCFH

Condenser Stream Heat Content = 0.19 mmBtu/hr

Condenser + Flash Tank Off-Gas Stream Heat Content = 1.36 mmBtu/hr

Excess (not burned by reboiler) = 0.36 mmBtu/hr

Note: Non-condensables from the condenser vent stream and flash tank overhead vapors will be burned by the reboiler as fuel during typical operating conditions. The heating value of each stream has been calculated to determine how much can be burned by each 1.0-mmBtu/hr reboiler. Any excess vapors not burned as fuel will be routed to the stabilizer feed drum. During upset conditions, excess flash gas may be routed to the flare and combusted. Upset conditions include loss of both permanent and backup power or compressor malfunction of the primary and secondary flash gas compressors. Excess gases that are not burned in the reboiler would be burned in the flare during upset conditions only.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flash Tank Off-Gas Heat Content - Gas Pumps

Each Reboiler Capacity = 1.00 mmBtu/hr

From GRI-GLYCalc
Flash Tank Off-Gas Stream

Name	MW	LHV	Mole %	Btu/scf
Water	18.015	0.00	1.08E-01	0
Carbon Dioxide	44.010	0.00	3.86E-01	0
Nitrogen	28.013	0.00	2.99E-01	0
Methane	16.042	919.00	8.51E+01	782
Ethane	30.069	1,619.00	1.07E+01	173
Propane	44.096	2,315.00	2.25E+00	52
Isobutane	58.122	3,000.00	2.92E-01	9
n-Butane	58.122	3,011.00	4.63E-01	14
Isopentane	72.149	3,699.00	1.10E-01	4
n-Pentane	72.149	3,707.00	8.64E-02	3
Cyclopentane	70.134	3,764.80	0.00E+00	0
n-Hexane	86.175	4,756.00	2.43E-02	1
Cyclohexane	84.161	4,481.50	5.20E-03	0
Other Hexanes (as n-Hexane)	86.175	4,756.00	5.13E-02	2
n-Heptane	100.204	5,502.50	3.84E-02	2
Methylcyclohexane	98.188	5,215.70	8.32E-03	0
Benzene	78.114	3,741.80	3.09E-03	0
Toluene	92.141	4,475.00	5.34E-03	0
Ethylbenzene	106.167	5,222.20	3.07E-04	0
Xylene	106.500	5,208.87	2.31E-03	0
C8+ (as Nonane)	128.258	6,996.40	4.14E-03	0
		* Total =	9.99E+01	1,045

*May not = 100% due to rounding

GLYCalc Flow Rate = 1.09E+04 SCFH

Flash Tank Off-Gas Heat Content = 11.39 mmBtu/hr

Condenser + Flash Tank Off-Gas Stream Heat Content = 11.67 mmBtu/hr

Excess (not burned by reboiler) = 10.67 mmBtu/hr

Note: Non-condensables from the condenser vent stream and flash tank overhead vapors will be burned by the reboiler as fuel during typical operating conditions. The heating value of each stream has been calculated to determine how much can be burned by each 1.0-mmBtu/hr reboiler. Any excess vapors not burned as fuel will be routed to the stabilizer feed drum. During upset conditions, excess flash gas may be routed to the flare and combusted. Upset conditions include loss of both permanent and backup power or compressor malfunction of the primary and secondary flash gas compressors. Excess gases that are not burned in the reboiler would be burned in the flare during upset conditions only.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Heater Emissions Calculations - Criteria Air Pollutants

Equipment Information

Point ID:	EPREBL-1	EPREBL-2	EPREBL-3	EPOH-1
Description:	TEG Reboiler	TEG Reboiler	TEG Reboiler	Hot Oil Heater
Combustor Type:	Uncontrolled	Uncontrolled	Uncontrolled	Uncontrolled
Burner Design (mmBtu/hr):	1.00	1.00	1.00	3.35
Fuel HHV (Btu/scf):	1,138	1,138	1,138	1,138
Annual Fuel Use (mmscf)	7.70	7.70	7.70	25.79
Annual Operating Hours:	8,760	8,760	8,760	8,760

Criteria Air Pollutant Emissions

Point ID:	EPREBL-1		EPREBL-2		EPREBL-3		EPOH-1	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
NOx	0.09	0.38	0.09	0.38	0.09	0.38	0.29	1.29
CO	0.07	0.32	0.07	0.32	0.07	0.32	0.25	1.08
VOC	<0.01	0.02	<0.01	0.02	<0.01	0.02	0.02	0.07
SO_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
$PM_{10/2.5}$	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.07
PM_{COND}	<0.01	0.01	<0.01	0.01	<0.01	0.01	0.01	0.02
PM_{TOT}	0.01	0.03	0.01	0.03	0.01	0.03	0.02	0.10

AP-42 Emission Factors for Units <100 mmBtu/hr (lb/mmscf)

Pollutant	1.4-1, -2 (7/98)
NOx	100.0
CO	84.0
VOC	5.5
$PM_{10/2.5}$	5.7
PM_{COND}	1.9
PM_{TOT}	7.6

Source: SO_2: Mass balance assuming fuel sulfur content of 1 grain sulfur per 100 cubic feet of fuel. All Other Pollutants: AP-42 Table 1.4-1, -2 (7/98)

Note: All PM (total, condensable and filterable) is assumed to be <1 micrometer in diameter. Total PM is the sum of filterable PM and condensable PM.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Heater Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Point ID:	EPREBL-1	EPREBL-2	EPREBL-3	EPOH-1
Description:	TEG Reboiler	TEG Reboiler	TEG Reboiler	Hot Oil Heater
Combustor Type:	Uncontrolled	Uncontrolled	Uncontrolled	Uncontrolled
Burner Design (mmBtu/hr):	1.00	1.00	1.00	3.35
Fuel HHV (Btu/scf):	1,138	1,138	1,138	1,138
Annual Fuel Use (mmscf)	7.70	7.70	7.70	25.79
Annual Operating Hours:	8,760	8,760	8,760	8,760

Hazardous Air Pollutant Emissions

Point ID:	EPREBL-1		EPREBL-2		EPREBL-3		EPOH-1	
Pollutant	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**	**lb/hr**	**tons/yr**
n-Hexane	<0.01	0.01	<0.01	0.01	<0.01	0.01	0.01	0.02
Formaldehyde	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total HAPs	**<0.01**	**0.01**	**<0.01**	**0.01**	**<0.01**	**0.01**	**0.01**	**0.02**

AP-42 Emission Factors (lb/mmscf)

Pollutant	**1.4-3 (7/98)**
n-Hexane	1.80E+00
Formaldehyde	7.50E-02
Benzene	2.10E-03
Toluene	3.40E-03

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Heater Emissions Calculations - Greenhouse Gas Emissions

Equipment Information

Point ID:	EPREBL-1	EPREBL-2	EPREBL-3	EPOH-1
Description:	TEG Reboiler	TEG Reboiler	TEG Reboiler	Hot Oil Heater
Combustor Type:	Uncontrolled	Uncontrolled	Uncontrolled	Uncontrolled
Burner Design (mmBtu/hr):	1.00	1.00	1.00	3.35
Fuel HHV (Btu/scf):	1,138	1,138	1,138	1,138
Annual Fuel Use (mmscf)	7.70	7.70	7.70	25.79
Annual Operating Hours:	8,760	8,760	8,760	8,760

Greenhouse Gas (GHG) Emissions

Point ID:	EPREBL-1		EPREBL-2		EPREBL-3		EPOH-1	
Pollutant	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr
CO_2	116.98	464.80	116.98	464.80	116.98	464.80	391.87	1,557.10
CH_4	<0.01	0.01	<0.01	0.01	<0.01	0.01	0.01	0.03
N_2O	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CH_4 as CO_2e	0.06	0.22	0.06	0.22	0.06	0.22	0.18	0.73
N_2O as CO_2e	0.07	0.26	0.07	0.26	0.07	0.26	0.22	0.87
Total $CO_2 + CO_2e$	117.10	465.28	117.10	465.28	117.10	465.28	392.28	1,558.70

Point ID:	EPREBL-1		EPREBL-2		EPREBL-3		EPOH-1	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
CO_2	116.98	512.36	116.98	512.36	116.98	512.36	391.87	1,716.40
CH_4	<0.01	0.01	<0.01	0.01	<0.01	0.01	0.01	0.03
N_2O	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CH_4 as CO_2e	0.06	0.24	0.06	0.24	0.06	0.24	0.18	0.81
N_2O as CO_2e	0.07	0.29	0.07	0.29	0.07	0.29	0.22	0.96
Total $CO_2 + CO_2e$	117.10	512.89	117.10	512.89	117.10	512.89	392.28	1,718.18

CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flare Emissions Calculations - Criteria Air Pollutants

Unit ID	Pollutant	Emission Factors [1]	Emissions	
			lb/hr	tons/yr
APCFLARE	NOx	-	2.89	0.45
(Flare + Pilot + Purge)	CO	-	15.62	2.11
	VOC	-	18.48	2.43
	SO_2	-	0.00005	0.00022
	PM_{TOT}	-	<0.01	0.01
APCFLARE	NOx	0.068	2.87	0.38
(Flare Stream)	CO	0.37	15.60	2.05
	VOC	Mass Balance [2]	18.48	2.43
APCFLARE	NOx	100	0.007	0.028
(Pilot Gas)	CO	84	0.005	0.024
	VOC	5.5	0.0004	0.0016
	SO_2	Mass Balance [3]	0.000019	0.00008
	PM_{TOT}	7.6	0.0005	0.0022
APCFLARE	NOx	100	0.011	0.048
(Purge Gas) [4]	CO	84	0.009	0.040
	VOC	5.5	0.0006	0.0026
	SO_2	Mass Balance [3]	0.000031	0.00014
	PM_{TOT}	7.6	0.0008	0.0037

Flare Stream [5]:	924.12	VOC to flare from all sources (lb/hr)
	1,516	Flare Stream Heat Content (Btu/ft^3)
	42,175,502	Flare Stream Net Btu Value (Btu/hr)
	263	Flare Hours/Yr
	98.00%	Flare Control Efficiency
Pilot:	975	Pilot Gas Heat Content (Btu/ft^3)
	65	Pilot Gas Flow Rate (scfh)
	8,760	Pilot Gas Hours/Yr
Purge Gas:	975	Purge Heat Content (Btu/ft^3)
	110	Purge Gas Flow Rate (scfh)
	8,760	Purge Gas Hours/Yr

1) Flare NOx and CO emission factors (lb/mmBtu): AP-42, Table 13.5-1 (1/95), based on heat input to the flare. Pilot and Purge Gas NOx, CO, VOC, and PM_{TOT} emission factors (lb/mmscf): AP-42 Table 1.4-1, -2 (7/98) SO_2: Mass balance assuming fuel sulfur content of 1 grain sulfur per 100 cubic feet of fuel.

2) VOC emissions estimated based on VOC routed to flare and 98% efficiency.

3) Mass balance assuming fuel sulfur content of 1 grain sulfur per 100 cubic feet of fuel.

4) Purge gas used to prevent air impingement in the process header where there is little or no process flow going to the flare (as in the case of a intermittent or ESD flare).

5) See attached Flare Stream Analysis.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flare Stream Analysis

		Flash Tank Off-Gas from Three (3) Dehys		Flash Drum Vapors		Stabilizer Overheads		Total Streams Burned in Flare			Emissions @ 98% Destruction		Component Net Heating Value	Net Btu Value
		29.1284	MSCF/D	452.4600	MSCF/D	185.5790	MSCF/D	Uncontr.			Contr.			
	Mol Wt	Mol %	lb/hr	Mol %	lb/hr	Mol %	lb/hr	lb/hr	tons/yr	scfd	lb/hr	tons/yr	Btu/scf	Btu/hr
Water	18.0150	0.10800	0.06	0.129107	1.18	0.006222	0.02	1.241	0.163	627	0.02	<0.01	0.00	0
Carbon Dioxide	44.0100	0.40100	0.56	0.313125	6.85	0.261291	2.34	9.756	1.282	2,018	9.76	1.28	0.00	0
Nitrogen	28.0134	0.32300	0.29	0.129107	1.80	0.006222	0.04	2.122	0.279	690	0.04	0.01	0.00	0
Hydrogen Sulfide	34.0760	0.00000	0.00	0.000000	0.00	0.000000	0.00	0.000	0.000	0	0.00	<0.01	637.11	0
Methane	16.0420	79.40000	40.75	61.175900	487.65	9.302310	30.41	558.813	73.428	317,188	11.18	1.47	919.00	12,145,641
Ethane	30.0690	14.00000	13.47	25.447000	380.21	29.276200	179.41	573.093	75.304	173,546	11.46	1.51	1,619.00	11,707,121
Propane	44.0960	3.92000	5.53	9.368400	205.28	47.217900	424.35	635.157	83.460	131,157	12.70	1.67	2,315.00	12,651,147
Isobutane	58.1220	0.51000	0.95	1.072820	30.98	5.107820	60.51	92.438	12.146	14,482	1.85	0.24	3,000.00	1,810,210
n-Butane	58.1220	0.88200	1.64	1.749250	50.52	6.211420	73.58	125.739	16.522	19,699	2.51	0.33	3,011.00	2,471,361
Isopentane	72.1490	0.19300	0.45	0.335124	12.01	1.074850	15.81	28.265	3.714	3,567	0.57	0.07	3,699.00	549,797
n-Pentane	72.1490	0.16000	0.37	0.263979	9.46	0.888283	13.06	22.895	3.008	2,889	0.46	0.06	3,707.00	446,303
n-Hexane	86.1750	0.03440	0.09	0.115048	4.93	0.464316	8.15	13.176	1.731	1,392	0.26	0.03	4,404.00	255,476
Other Hexanes	86.1750	0.06959	0.19	0.000000	0.00	0.000000	0.00	0.192	0.025	20	0.00	<0.01	4,404.00	3,720
Heptanes	100.2020	0.03340	0.11	0.000000	0.00	0.000000	0.00	0.107	0.014	10	0.00	<0.01	5,100.00	2,067
Benzene	78.1140	0.00500	0.01	0.000000	0.00	0.000000	0.00	0.012	0.002	1	0.00	<0.01	3,590.90	218
Toluene	92.1410	0.00414	0.01	0.000000	0.00	0.000000	0.00	0.012	0.002	1	0.00	<0.01	4,273.60	215
Ethylbenzene	106.1670	0.00004	0.00	0.000000	0.00	0.000000	0.00	0.000	0.000	0	0.00	<0.01	4,970.50	3
Xylenes	106.5000	0.00004	0.00	0.000000	0.00	0.000000	0.00	0.000	0.000	0	0.00	<0.01	4,957.10	3
Octanes	114.2290	0.00223	0.01	0.030227	1.72	0.189306	4.41	6.131	0.806	489	0.12	0.02	6,493.00	132,221
	Totals	100.04585	64.49	100.13	1,192.57	100.01	812.09	2,069.15	271.89	667,776		-	Btu/hr	42,175,502
							Total VOC	924.12	121.43	-	18.48	2.43	Heat Value (Btu/scf)	1,516
							Total HAP	13.20	1.73	-	0.26	0.03		
							Total H_2S	0.00	0.00	-	0.00	0.00		
							MW (Stream) =	28.21						

Notes:
Under typical non-emergency operating conditions, excess flash tank off-gas from both dehys (the amount not burned in glycol reboilers), flash gas from condensate feed drum, and stabilizer overheads are recompressed into the suction. However, these streams may be flared up to 263 hrs/yr during upset conditions, such as compressor malfunction, or maintenance activities, such as blowdowns prior to compressor maintenance. The flare pilot will be lit continuously (8,760 hrs/yr).

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flare Emissions Calculations - Greenhouse Gas Emissions

Unit ID	Pollutant	Emission Factors	Emissions		
			lb/hr	tonnes/yr	tons/yr
APCFLARE	CO_2	-	29.72	80.59	88.83
(Flare + Pilot + Purge)	CH_4	-	11.18	1.47	1.62
	N_2O	-	<0.01	<0.01	<0.01
	CH_4 as CO_2e	-	279.42	36.75	40.51
	N_2O as CO_2e	-	0.01	0.04	0.05
	Total CO_2 + CO_2e	-	**309.14**	**117.39**	**129.39**
APCFLARE	CO_2	Mass Balance	9.76	1.28	1.41
(Flare Stream)	CH_4	Mass Balance	11.18	1.47	1.62
	N_2O	-	-	-	-
	CH_4 as CO_2e	-	279.41	36.71	40.47
	N_2O as CO_2e	-	-	-	-
	Total CO_2 + CO_2e	-	**300.34**	**39.46**	**43.50**
APCFLARE	CO_2	53.06	7.41	29.46	32.47
(Pilot Gas)	CH_4	0.001	<0.01	<0.01	<0.01
	N_2O	0.0001	<0.01	<0.01	<0.01
	CH_4 as CO_2e	-	<0.01	0.01	0.02
	N_2O as CO_2e	-	<0.01	0.02	0.02
	Total CO_2 + CO_2e	-	**7.42**	**29.49**	**32.50**
APCFLARE	CO_2	53.06	12.55	49.85	54.95
(Purge Gas)	CH_4	0.001	<0.01	<0.01	<0.01
	N_2O	0.0001	<0.01	<0.01	<0.01
	CH_4 as CO_2e	-	0.01	0.02	0.03
	N_2O as CO_2e	-	0.01	0.03	0.03
	Total CO_2 + CO_2e	-	**12.56**	**49.90**	**55.01**

	263	Flare Hours/Yr
Pilot:	975	Pilot Gas Heat Content (Btu/ft^3)
	65	Pilot Gas Flow Rate (scfh)
	0.06	Pilot Gas Capacity (mmBtu/hr)
	8,760	Pilot Gas Hours/Yr
Purge Gas:	975	Purge Gas Stream Heat Content (Btu/ft^3)
	110	Purge Gas Flow Rate (scfh)
	0.11	Purge Gas Capacity (mmBtu/hr)
	8,760	Purge Gas Hours/Yr

Source: Flare Stream: Mass balance. Pilot Gas and Purge Gas: 40 CFR 98
CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flare Design Evaluation - Emergency Conditions (Sonic Velocity)

			Flare Tip Diameter =	**10**	*inches*
			Flare Stream Flow =	**27,824**	*scfh*
Compound	*Mole Percent*	*Mole Fraction*	*Gross Heat Value (Btu/scf)*	*Net Heat Value (Btu/scf)*	*Mixture Net Heat Value (Btu/scf)*
Water		0.00000	0.0	0.0	0.0
Carbon Dioxide	0.0700	0.00070	0.0	0.0	0.0
Nitrogen		0.00000	0.0	0.0	0.0
Hydrogen Sulfide		0.00000	637.1	586.8	0.0
Methane	2.3900	0.02390	1,010.0	919.0	22.0
Ethane	7.5400	0.07540	1,769.7	1,619.0	122.1
Propane	12.2600	0.12260	2,516.2	2,315.0	283.8
Isobutane		0.00000	3,252.0	3,000.0	0.0
n-Butane	13.8300	0.13830	3,262.4	3,011.0	416.4
Isopentane	0.0000	0.00000	4,000.9	3,699.0	0.0
n-Pentane	11.2000	0.11200	4,008.7	3,707.0	415.2
Hexanes (as n-Hexane)	52.7100	0.52710	4,756.0	4,404.0	2,321.3
n-Heptane		0.00000	5,502.5	5,100.0	0.0
Benzene		0.00000	3,741.8	3,590.9	0.0
Toluene		0.00000	4,475.0	4,273.6	0.0
Ethylbenzene		0.00000	5,222.2	4,970.5	0.0
Xylenes		0.00000	5,208.9	4,957.1	0.0
Octanes + (as n-Nonane)		0.00000	6,996.4	6,493.0	0.0
TOTALS:	100.0000				3,580.8

Notes:
1) Composition above represents design (worst-case) emergency scenario. Actual anticipated flare stream composition shown in the Flare Stream Analysis table.
2) Flare is a sonic (pressure-assisted) flare that is not subject to maximum allowable flare exit velocity limits during emergency use. Pressure-assisted flares utilize the waste gas pressure to create a condition where air is drawn into contact with the gas and mixed to achieve smokeless combustion. This results in high exit velocities greater than 400 ft/sec; however, sonic flares are designed to have comparable or higher combustion efficiencies than air-assisted or steam-assisted flares.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flare Design Evaluation - Non-Emergency Conditions (Subsonic Velocity)

Flare Tip Diameter =	**10**	*inches*
Flare Stream Flow =	**27,824**	*scfh*
Assist gas requirements for nonassisted flare per 40 CFR 60.18(c)(3):		
Min. allowable net heat value for nonassisted flare	200	*Btu/scf*
Additional assist gas required	0	*scfh*
Assist (fuel) gas supplied	0	*scfh*
Assist air	0	*scfh*
Maximum allowable flare exit velocity (V_{max}) for non-assisted flare per 40 CFR 60.18(f)(5):		
	Btu/scf	MJ/scm
Lower (Net) Heating Value (Btu/scf)	1,515.8	56.5
	m/sec	ft/sec
Log_{10} (V_{max}) = (LHV +28.8)/31.7	492.1	1,614.2
V_{max} limit based on 40 CFR 60.18(b)(4)(iii)	122.0	400.0
Actual Tip Velocity	5.9	19.3
Less than maximum allowable flare exit velocity?	YES	YES
Actual flare exit velocity:		
Total volumetric flow ((Flare stream + Assist gas + Assist air in scfh)/3600 sec/hr)	7.73	*scf/sec*
Total volumetric flow	10.55	*acf/sec*
Flare exit cross-sectional area based on diameter	0.55	*ft^2*
Velocity = volumetric flow / cross-sectional area	19.3	*ft/sec*

Notes:
1) LHV based on stream composition during non-emergency conditions, which includes up to 263 hours per year of flaring excess flash tank off-gas from both dehys (the amount not burned in glycol reboilers), flash gas from condensate feed drum, and stabilizer overheads that are typically recompressed into the suction under normal operating conditions.

2) During non-emergency conditions, flow rates with pressures 3 - 11 psig will exit at subsonic velocities.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Storage Emissions - Criteria Air Pollutants

Tank Information

Point ID:	**EPTK1 - EPTK-12**
Each Tank [1]:	
Capacity (bbl):	400
Capacity (gal):	16,800
Throughput (bbl/yr):	27,375
Throughput (gal/yr):	1,149,750
Throughput (bbl/d):	75
Control Type [2]:	VRU
Control Efficiency:	98%
Total Throughput (gal/yr):	13,797,000

Uncontrolled VOC Emissions

Point ID:	Each Tank		EPTK-1 - EPTK-12 (Total)	
Emissions	**lb/yr**	**tons/yr**	**lb/yr**	**tons/yr**
Working	6,752.97	3.38	81,035.64	40.52
Breathing	1,444.25	0.72	17,331.00	8.67
Flashing	52,177.74	26.09	626,132.88	313.07
Total =	**60,374.96**	**30.19**	**724,499.52**	**362.25**

Controlled VOC Emissions

Point ID:	Each Tank		EPTK-1 - EPTK-12 (Total)	
Emissions	**lb/yr**	**tons/yr**	**lb/yr**	**tons/yr**
Working	135.06	0.07	1,620.71	0.81
Breathing	28.89	0.01	346.62	0.17
Flashing	1,043.55	0.52	12,522.66	6.26
Total =	**1,207.50**	**0.60**	**14,489.99**	**7.24**

1) There are twelve (12) like-kind storage tanks. Ten are used to store stabilized condensate and two are used to store pipeline fluids/water. Each tank was modeled with an estimated 1,149,750 gal/yr throughput with a maximum of 13,797,000 gal/yr throughput for all 12 tanks. All tanks were modeled as Gasoline RVP15 in EPA TANKS 4.0.9d for a conservative emissions estimate of working and breathing. Flash emissions were modeled with ProMax process simulation.

2) Tanks are controlled by vapor recovery system, which is a closed system that is 100% efficient at preventing VOC emissions from being vented to atmosphere except during vapor recovery system downtime (maintenance, utility power outage, etc.). Vapor recovery system downtime will not exceed 175 hours per year, or 2% of the operating time, to ensure that a minimum overall control efficiency of 98% is achieved to control VOC emissions from the tanks. AMS will monitor and record vapor recovery system downtime to document compliance with this requirement.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Flashing Emissions - Process Simulation

ProMax Results

	lb/hr	VOC TPY
Hydrogen Sulfide	-	-
Nitrogen	0.00076814	-
Carbon Dioxide	0.020884	-
Methane	0.38767	
Ethane	2.3165	-
Propane	10.783	47.2295
i-Butane	9.3957	41.1532
n-Butane	27.685	121.2603
i-Pentane	7.438316	32.5798
n-Pentane	7.6757	33.6196
n-Hexane	2.4347	10.6640
Other Hexanes	4.43775	19.4373
Benzene	0.038517	0.1687
Heptane	1.45284	6.3634
Toluene	0.023862	0.1045
Octane	0.10369	0.4542
Ethylbenzene	0.0000	0.0000
Xylenes	0.0031977	0.0140
Nonanes	0.0039218	0.0172
Decanes	0.00016119	0.0007
Total =	**71.4691**	**313.0664**

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Handling Emissions - Hazardous Air Pollutants

Uncontrolled HAP Emissions (tons/yr)

Point ID:	Each Tank	EPTK-1 - EPTK-12 (Total)
Total VOC* =	**30.19**	**362.25**
n-Hexane	1.03	12.34
Benzene	0.02	0.20
Toluene	0.01	0.12
Ethylbenzene	<0.01	<0.01
Xylenes	<0.01	0.02
Total HAPs =	**1.06**	**12.67**

Controlled HAP Emissions (tons/yr)

Point ID:	Each Tank	EPTK-1 - EPTK-12 (Total)
Total VOC* =	**0.60**	**7.24**
n-Hexane	0.02	0.25
Benzene	<0.01	<0.01
Toluene	<0.01	<0.01
Ethylbenzene	<0.01	<0.01
Xylenes	<0.01	<0.01
Total HAPs =	**0.02**	**0.25**

*VOC emissions calculated in Criteria Air Pollutant calculations

Estimated HAP Composition (% by Weight) **

Pollutant	Wt%
n-Hexane	3.406%
Benzene	0.054%
Toluene	0.033%
Ethylbenzene	0.000%
Xylenes	0.004%
Total HAPs =	**4.398%**

** ProMax flash gas composition

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Loading Emissions

Loading Information

Point ID:	**EPLOAD**
Fill Method:	Submerged
Type of Service:	Dedicated
Mode of Operation:	Normal
Saturation Factor:	0.6
Em. Factor (lb/1000 gal)*:	3.29
Throughput (1000 gal):	13,797
Maximum Loading Rate (gal/hr):	15,120
Control Type:	Carbon Canister
Capture Efficiency:	70.00%
Captured Vapors Routed to:	Carbon Canister
Control Efficiency:	95.00%
Overall Control Efficiency [1]:	66.50%

*AP-42 5.2-4 Equation 1 (6/2008): Loading Loss (lb/1000 gal) = 12.46 *S*P*M/T, where:

7.2078	= P, True vapor pressure of liquid loaded (average psia)
31.7964	= M, Molecular weight of vapor (lb/lb-mol) - Actual Analysis
60	= T, Temperature of bulk liquid loaded (average °F)
520	= T, Temperature of bulk liquid loaded (°F + 460 = °R)

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Loading Emissions (Continued)

Uncontrolled Loading VOC Emissions

Pollutant	lb/hr	tons/yr
VOC	49.82	22.73

Uncaptured Loading VOC Emissions

Pollutant	lb/hr	tons/yr
VOC	14.95	6.82

Controlled Loading VOC Emissions

Pollutant	lb/hr	tons/yr
VOC	1.74	0.80

Total Loading VOC Emissions (Uncaptured + Controlled)

Pollutant	lb/hr	tons/yr
VOC	16.69	7.61

Notes:

1) Uncontrolled emissions that are captured by a collection system are routed to the carbon canister, which reduces emissions with 95% control efficiency. Per AP-42 5.2-6, 70% capture efficiency can be assumed for trucks not subject to NSPS. Uncaptured emissions shown represent those not captured by the collection system or controlled by the carbon canister. The overall reduction efficiency accounts for the capture efficiency of the collection system as well as the control efficiency of the carbon canister.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Loading Emissions (Continued)

Uncontrolled Loading HAP Emissions

Pollutant	lb/hr	tons/yr
VOC	**49.82**	**22.73**
n-Hexane	0.80	0.36
Benzene	0.45	0.20
Toluene	0.65	0.30
Ethylbenzene	0.05	0.02
Xylenes	0.25	0.11
Total HAPs	**2.19**	**1.00**

Uncaptured Loading HAP Emissions

Pollutant	lb/hr	tons/yr
VOC	**14.95**	**6.82**
n-Hexane	0.24	0.11
Benzene	0.13	0.06
Toluene	0.19	0.09
Ethylbenzene	0.01	0.01
Xylenes	0.07	0.03
Total HAPs	**0.66**	**0.30**

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Loading Emissions (Continued)

Controlled Loading HAP Emissions

Pollutant	lb/hr	tons/yr
VOC	**1.74**	**0.80**
n-Hexane	0.03	0.01
Benzene	0.02	0.01
Toluene	0.02	0.01
Ethylbenzene	<0.01	<0.01
Xylenes	0.01	<0.01
Total HAPs	**0.08**	**0.04**

Total Loading HAP Emissions (Uncaptured + Controlled)

Pollutant	lb/hr	tons/yr
VOC	**16.69**	**7.61**
n-Hexane	0.27	0.12
Benzene	0.15	0.07
Toluene	0.22	0.10
Ethylbenzene	0.02	0.01
Xylenes	0.08	0.04
Total HAPs	**0.73**	**0.34**

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Loading Emissions (Continued)

HAP Composition (% by Weight) [1]

Pollutant	Wt%
n-Hexane	1.6000%
Benzene	0.9000%
Toluene	1.3000%
Ethylbenzene	0.1000%
Xylenes	0.5000%
Total HAPs	**4.4000%**

Notes:

1) Table 11.3-2, "HAP Percent of VOC Emissions, "Gasoline Marketing (Stage I and Stage II), EPA Document Revised Final 1/2001.

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Loading Emissions Calculations - Greenhouse Gas Emissions

Loading Information

Point ID:	EPLOAD
Fill Method:	Submerged
Type of Service:	Dedicated
Mode of Operation:	Normal
Saturation Factor:	0.6
TOC Em. Factor (tonne/10^6 gal) *:	2.20
Throughput (10^6 gal):	13.797
Maximum Loading Rate (gal/hr):	15,120
Control Type:	Carbon Canister
Capture Efficiency:	70.00%
Captured Vapors Routed to:	Carbon Canister
Control Efficiency:	95.00%
Overall Control Efficiency [1]:	66.50%

Input CH_4 wt% from vapor analysis =	5.113%
Input CO_2 wt% from vapor analysis =	0.114%

Uncontrolled GHG Emissions - Metric Tons (Tonnes)

Pollutant	lb/hr	tonnes/yr
CH_4	3.75	1.55
CH_4 as CO_2e	93.74	38.80
CO_2	0.08	0.03
Total CO_2 + CO_2e	93.82	38.83

Uncontrolled GHG Emissions - Short Tons (Tons)

Pollutant	lb/hr	tons/yr
CH_4	3.75	1.71
CH_4 as CO_2e	93.74	42.77
CO_2	0.08	0.04
Total CO_2 + CO_2e	93.82	42.81

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Truck Loading Emissions Calculations - Greenhouse Gas Emissions (Continued)

Uncaptured GHG Emissions - Metric Tons (Tonnes)

Pollutant	lb/hr	tonnes/yr
CH_4	1.12	0.47
CH_4 as CO_2e	28.12	11.64
CO_2	0.03	0.01
Total CO_2 + CO_2e	28.15	11.65

Uncaptured GHG Emissions - Short Tons (Tons)

Pollutant	lb/hr	tons/yr
CH_4	1.12	0.51
CH_4 as CO_2e	28.12	12.83
CO_2	0.03	0.01
Total CO_2 + CO_2e	28.15	12.84

Controlled GHG Emissions - Metric Tons (Tonnes)

Pollutant	lb/hr	tonnes/yr
CH_4	0.13	0.05
CH_4 as CO_2e	3.28	1.36
CO_2	<0.01	<0.01
Total CO_2 + CO_2e	3.28	1.36

Controlled GHG Emissions - Short Tons (Tons)

Pollutant	lb/hr	tons/yr
CH_4	0.13	0.06
CH_4 as CO_2e	3.28	1.50
CO_2	<0.01	<0.01
Total CO_2 + CO_2e	3.28	1.50

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Condensate Truck Loading Emissions Calculations - Greenhouse Gas Emissions (Continued)

Total Loading GHG Emissions (Uncaptured + Controlled) - Metric Tons (Tonnes)

Pollutant	lb/hr	tonnes/yr
CH_4	1.26	0.52
CH_4 as CO_2e	31.40	13.00
CO_2	0.03	0.01
Total CO_2 + CO_2e	31.43	13.01

Total Loading GHG Emissions (Uncaptured + Controlled) - Short Tons (Tons)

Pollutant	lb/hr	tons/yr
CH_4	1.26	0.57
CH_4 as CO_2e	31.40	14.33
CO_2	0.03	0.01
Total CO_2 + CO_2e	31.43	14.34

1) Uncontrolled emissions that are captured by a collection system are routed to the carbon canister, which reduces emissions with 95% control efficiency. Per AP-42 5.2-6, 70% capture efficiency can be assumed for trucks not subject to NSPS. Uncaptured emissions shown represent those not captured by the collection system or controlled by the carbon canister. The overall reduction efficiency accounts for the capture efficiency of the collection system as well as the control efficiency of the carbon canister.

2) CO_2e = CO_2 equivalent (Pollutant times GWP multiplier)

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Fugitive Emissions Calculations

Equipment Information

Equipment Basis	Function	Default CH_4 Basis (mol %) [1]	CH_4 Adjustment Factor [2]	CH_4 Emission Factor (EF) [3]	Adjusted CH_4 EF	Units
Large Compressor Station	Processing	78.80%	1.104	6.59E-03	7.27E-03	tonne/station-hr
Small Recip. Compressor	Processing	78.80%	1.104	2.12E-04	2.34E-04	tonne/compressor-hr
Dehydrators	Processing	78.80%	1.104	7.13E-05	7.87E-05	tonne/dehydrator-hr
Gas Pump w/ Flash Sep.	N/A	78.80%	1.104	1.54E-04	1.70E-04	tonne/MMSCF processed
Gas Heaters	N/A	78.80%	1.104	4.59E-05	5.07E-05	tonne/heater-hr

Fugitive Emissions

Emission Unit ID	Annual Op Hours	Methane (CH_4)				CO_2
		lb/hr	lb/yr	tonnes/yr	MMSCF/yr	tonnes/yr
Facility-Level	8,760	16.03	140,448	63.71	2.89	0.27
EPCE-2 - EPCE-12	8,760	5.67	49,700	22.54	1.02	0.09
EPGEN-1 - EPGEN-2	8,760	1.03	9,036	4.10	0.19	0.02
EPSTL-1 - EPSTL-3 (Dehys)	8,760	0.52	4,559	2.07	0.09	0.01
EPSTL-1 - EPSTL-3 (Pumps)	8,760	1.12	9,846	4.47	0.20	0.02
EPRBL-1 - EPRBL-3	8,760	0.34	2,935	1.33	0.06	0.01
EPOH-1	8,760	0.11	978	0.44	0.02	<0.01
	TOTAL =	**24.83**	**217,503.10**	**98.66**	**4.47**	**0.41**

Emission Unit ID	Annual Op Hours	VOC	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes
		tonnes/yr					
Facility-Level	8,760	5.02	0.05	<0.01	<0.01	<0.01	<0.01
EPCE-2 - EPCE-12	8,760	1.77	0.02	<0.01	<0.01	<0.01	<0.01
EPGEN-1 - EPGEN-2	8,760	0.32	<0.01	<0.01	<0.01	<0.01	<0.01
EPSTL-1 - EPSTL-3 (Dehys)	8,760	0.16	<0.01	<0.01	<0.01	<0.01	<0.01
EPSTL-1 - EPSTL-3 (Pumps)	8,760	0.35	<0.01	<0.01	<0.01	<0.01	<0.01
EPRBL-1 - EPRBL-3	8,760	0.10	<0.01	<0.01	<0.01	<0.01	<0.01
EPOH-1	8,760	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
	TOTAL =	**7.77**	**0.08**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

Continued on Next Page

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Fugitive Emissions Calculations (Continued)

Emission Unit ID	Annual Op Hours	Methane (CH_4)				CO_2
		lb/hr	lb/yr	tons/yr	MMSCF/yr	tons/yr
Facility-Level	8,760	16.03	140,448	70.22	2.89	0.29
EPCE-2 - EPCE-12	8,760	5.67	49,700	24.85	1.02	0.10
EPGEN-1 - EPGEN-2	8,760	1.03	9,036	4.52	0.19	0.02
EPSTL-1 - EPSTL-3 (Dehys)	8,760	0.52	4,559	2.28	0.09	0.01
EPSTL-1 - EPSTL-3 (Pumps)	8,760	1.12	9,846	4.92	0.20	0.02
EPRBL-1 - EPRBL-3	8,760	0.34	2,935	1.47	0.06	0.01
EPOH-1	8,760	0.11	978	0.44	0.02	<0.01
	TOTAL =	**24.83**	**217,503.10**	**108.71**	**4.47**	**0.46**

Emission Unit ID	Annual Op Hours	VOC	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes
		tons/yr					
Facility-Level	8,760	5.53	0.06	<0.01	<0.01	<0.01	<0.01
EPCE-2 - EPCE-12	8,760	1.96	0.02	<0.01	<0.01	<0.01	<0.01
EPGEN-1 - EPGEN-2	8,760	0.36	<0.01	<0.01	<0.01	<0.01	<0.01
EPSTL-1 - EPSTL-3 (Dehys)	8,760	0.18	<0.01	<0.01	<0.01	<0.01	<0.01
EPSTL-1 - EPSTL-3 (Pumps)	8,760	0.39	<0.01	<0.01	<0.01	<0.01	<0.01
EPRBL-1 - EPRBL-3	8,760	0.12	<0.01	<0.01	<0.01	<0.01	<0.01
EPOH-1	8,760	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
	TOTAL =	**8.56**	**0.09**	**<0.01**	**0.01**	**<0.01**	**<0.01**

Emissions Factors [3]

Source Type	Emission Factor	Units
Small Recip. Compressor	2.12E-04	tonne/compressor-hr
Large Compressor Station	6.59E-03	tonne/station-hr
Gas Heaters	4.60E-05	tonne/heater-hr
Dehydrators	7.13E-05	tonne/dehydrator-hr
Gas Pump w/ Flash Sep.	1.54E-04	tonne/MMSCF processed

1) Table 5-2, American Petroleum Institute (API) Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry (August 2009)

2) Emission factor adjusted from default CH_4 basis to actual CH4 basis.

3) Table 5-3 (Pumps) and Table 6-4 (Production Equipment), API Compendium (August 2009)

Note: Large compressors are those with more than 3 stages of compression. Large compressor stations are those with 5 or more compressors. Dehys are equipped with both a gas injection and an electric pump. Emissions have been modeled assuming the gas pump for a more conservative (higher) emissions estimate.

Continued on Next Page

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Fugitive Emissions Calculations (Continued)

Gas Analysis *

Component	Molecular Weight	Mole %	Density (g/l)	Contrib. to Overall Density (g/l)	Weight %
Hydrogen Sulfide	34.082	0.000%	1.438	0.0000	0.00%
Carbon Dioxide	44.010	0.176%	1.857	0.0033	0.42%
Nitrogen	28.013	0.296%	1.182	0.0035	0.45%
Helium	4.003	0.000%	0.169	0.0000	0.00%
Oxygen	31.999	0.000%	1.350	0.0000	0.00%
Methane	16.042	86.960%	0.677	0.5886	75.48%
Ethane	30.069	9.696%	1.269	0.1230	15.78%
Propane	44.096	1.989%	1.860	0.0370	4.75%
i-Butane	58.122	0.248%	2.452	0.0061	0.78%
n-Butane	58.122	0.368%	2.452	0.0090	1.16%
i-Pentane	72.149	0.094%	3.044	0.0029	0.37%
n-Pentane	72.149	0.068%	3.044	0.0021	0.27%
n-Hexane	86.175	0.018%	3.636	0.0007	0.08%
Other Hexanes	86.175	0.040%	3.636	0.0015	0.19%
Heptanes (as n-Heptane)	100.202	0.027%	4.228	0.0011	0.14%
Benzene	78.114	0.001%	3.296	0.0000	0.00%
Toluene	92.141	0.001%	3.888	0.0000	0.00%
Ethylbenzene	106.167	0.000%	4.479	0.0000	0.00%
Xylenes	106.167	0.001%	4.479	0.0000	0.00%
Octanes (as n-Octane)	114.229	0.014%	4.819	0.0007	0.09%
Nonanes (as n-Nonane)	128.255	0.004%	5.411	0.0002	0.03%
Decanes (as n-Decane)	142.282	0.001%	6.003	0.0001	0.01%
	TOTALS =	100.002%	64.669	0.7797	100.00%
				TOTAL VOC =	7.87%
				TOTAL HAP =	0.10%
		GAS DENSITY =	48,676.87	lb/mmscf	

Gas analysis dated 9/3/2014

Appalachia Midstream Services, L.L.C.
Miller Compressor Station
Blowdown Emissions Calculations

Estimated volume (scf/yr) = 4,290,000
Maximum volume/blowdown (scf/hr) = 6,500
Number of Compressors = 11
Number of Blowdowns per Year = 60

Speciated Gas Analysis and Emission Rates

Component	Molecular Weight lb/lb-mole	Vent Stream Mole %	Equiv. Wt. Basis	Weight %	HC Weight %	scf/yr	lb-mole/yr	TPY	lb/hr for 1 Blowdown over 1 hr[2] scf/hr	lb-mole/hr[3]	lb/hr
Hydrogen Sulfide	34.082	0.000%	0.000	0.000%	-	0	0	0.00	0	0	0.00
Carbon Dioxide	44.010	0.176%	0.077	0.419%	-	7,550	20	0.44	11	0	1.33
Nitrogen	28.013	0.296%	0.083	0.449%	-	12,698	33	0.47	19	0	1.42
Helium	4.003	0.000%	0.000	0.000%	-	0	0	0.00	0	0	0.00
Oxygen	31.999	0.000%	0.000	0.000%	-	0	0	0.00	0	0	0.00
Methane	16.042	86.960%	13.950	75.483%	76.144%	3,730,584	9,833	78.87	5,652	15	239.01
Ethane	30.069	9.696%	2.915	15.776%	15.914%	415,958	1,096	16.48	630	2	49.95
Propane	44.096	1.989%	0.877	4.746%	4.787%	85,328	225	4.96	129	0	15.03
i-Butane	58.122	0.248%	0.144	0.780%	0.787%	10,639	28	0.81	16	0	2.47
n-Butane	58.122	0.368%	0.214	1.157%	1.167%	15,787	42	1.21	24	0	3.66
i-Pentane	72.149	0.094%	0.068	0.367%	0.370%	4,033	11	0.38	6	0	1.16
n-Pentane	72.149	0.068%	0.049	0.265%	0.268%	2,917	8	0.28	4	0	0.84
n-Hexane	86.175	0.018%	0.015	0.083%	0.084%	768	2	0.09	1	0	0.26
Other Hexanes	86.175	0.040%	0.035	0.188%	0.190%	1,733	5	0.20	3	0	0.60
Heptanes (as n-Heptane)	100.202	0.027%	0.027	0.145%	0.146%	1,145	3	0.15	2	0	0.46
Benzene	78.114	0.001%	0.000	0.002%	0.002%	21	0	<0.01	0	0	0.01
Toluene	92.141	0.001%	0.001	0.005%	0.005%	43	0	0.01	0	0	0.02
Ethylbenzene	106.167	0.000%	0.000	0.001%	0.001%	4	0	<0.01	0	0	<0.01
Xylenes	106.167	0.001%	0.001	0.005%	0.005%	34	0	<0.01	0	0	0.01
Octanes (as n-Octane)	114.229	0.014%	0.016	0.089%	0.090%	618	2	0.09	1	0	0.28
2,2,4-Trimethylpentane	114.230	0.000%	0.000	0.000%	0.000%	0	0	0.00	0	0	0.00
Nonanes (as n-Nonane)	128.255	0.004%	0.006	0.030%	0.030%	184	0	0.03	0	0	0.09
Decanes (as n-Decane)	142.282	0.001%	0.002	0.010%	0.010%	56	0	0.01	0	0	0.03
TOTAL =		100.002%	**18.481**	100.000%	100.000%	4,290,103	11,308	104.49	6,500	17	316.64
TOTAL HC			**18.321**	**99.132%**	100.000%	4,269,854	11,255	103.58	6,469	17	313.89
TOTAL VOC =					**7.942%**	**123,312**	**325**	**8.23**	**187**	**0**	**24.93**
TOTAL HAPs =					**0.097%**	**871**	**2**	**0.10**	**1**	**0**	**0.30**

Notes:
1) Based on an estimated 60 blowdowns per compressor per year with 6,500 scf per blowdown.
2) Due to variable short-term emission rates, average lb/hr based on annual emissions for reference only. Hourly emissions estimated using emissions from 1 blowdown over course of 1 hour.
3) Molar volume conversion @ 60° F and 1 atm: 1 lb/mole = 379.4 scf

ATTACHMENT O: MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

Except as noted on Emissions Unit Data Sheets, AMS is not submitting any recommendations for monitoring, recordkeeping, reporting, or testing plans other than those typically established for the emissions units proposed in this application.

ATTACHMENT P: PUBLIC NOTICE

Note: Affidavit of Publication will be submitted upon receipt by AMS from the publisher.

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Appalachia Midstream Services, L.L.C. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a New Source Review (45 CSR 13) Modification for the Miller Compressor Station located in Marshall County, West Virginia. From Bannen, head southwest on Amos Hollow Road/County Road 89 toward Clark Hill for 1.1 miles. Turn left at Laurel Run. In 0.8 miles, turn right to stay on Laurel Run. In 0.4 miles, take slight left at Johnson Hill. Take the first left onto County Road 1/22/Johnson Ridge.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Nitrogen Oxides (NOx)	77.46 tons/yr
Carbon Monoxide (CO)	88.63 tons/yr
Volatile Organic Compounds (VOC)	74.54 tons/yr
Particulate Matter (PM)	8.83 tons/yr
Sulfur Dioxide (SO_2)	1.68 tons/yr
Acetaldehyde	0.92 tons/yr
Acrolein	0.67 tons/yr
Benzene	0.59 tons/yr
Ethylbenzene	0.07 tons/yr
Formaldehyde	9.96 tons/yr
Methanol	0.53 tons/yr
n-Hexane	0.85 tons/yr
Toluene	0.96 tons/yr
Xylenes	0.62 tons/yr
Methane	194.32 tons/yr
Carbon Dioxide	77,278.34 tons/yr
Nitrous Oxide	0.14 tons/yr
CO_2 Equivalent	82,169.39 tons/yr

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 XXth of March 2015

By: Appalachia Midstream Services, L.L.C.
Randy DeLaune
General Manager
P.O. Box 54382
Oklahoma City, OK 73154-1382

ATTACHMENT R: AUTHORITY OF CORPORATION

Note: The Authority Form designating Mr. Randy DeLaune, General Manager, signatory authority by Mr. John Michael Stice, President and Chief Operating Officer of Access Midstream Services, has already been submitted to the agency.

APPENDIX A: SUPPORT DOCUMENTS

Manufacture Specification Sheet

Catalyst Specification Sheet

GRI-GLYCalc ™ Input and Aggregate Report (Electric Pump)

GRI-GLYCalc ™ Input and Aggregate Report (Gas Pumps)

Representative Inlet Gas Analysis

G3516B

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
Miller CF 1/13/15

CATERPILLAR®

ENGINE SPEED (rpm):	1400	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	8:1	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	CAT WIDE RANGE WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 2 INLET (°F):	130		
AFTERCOOLER - STAGE 1 INLET (°F):	201	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	210	FUEL:	Miller CF
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	7.0-40.0
COOLING SYSTEM:	JW+OC+1AC, 2AC	FUEL METHANE NUMBER:	68.7
CONTROL SYSTEM:	ADEM3	FUEL LHV (Btu/scf):	1026
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	500
COMBUSTION:	LOW EMISSION	MAXIMUM INLET AIR TEMPERATURE(°F):	77
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5	STANDARD RATED POWER:	1380 bhp@1400rpm
SET POINT TIMING:	30		

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	1380	1380	1035	690
INLET AIR TEMPERATURE			°F	77	77	77	77
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	7437	7437	7966	8556
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	8226	8226	8810	9463
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(3)(4)	ft3/min	3144	3144	2467	1724
AIR FLOW	(WET)	(3)(4)	lb/hr	13943	13943	10937	7646
FUEL FLOW (60°F, 14.7 psia)			scfm	167	167	134	96
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	94.0	94.0	76.3	53.6
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	995	995	989	1009
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	9156	9156	7161	5081
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	14428	14428	11327	7925
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(8)(9)	g/bhp-hr	2.71	2.71	2.91	2.85
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	4.79	4.79	5.13	5.21
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	1.21	1.21	1.29	1.31
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	0.48	0.48	0.51	0.52
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.43	0.43	0.42	0.42
CO2		(8)(9)	g/bhp-hr	484	484	517	562
EXHAUST OXYGEN		(8)(11)	% DRY	9.1	9.1	8.8	8.3
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	23016	23016	21256	19733
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	6110	6110	5092	4074
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	4475	4475	3978	3363
HEAT REJ. TO A/C - STAGE 1 (1AC)		(12)(13)	Btu/min	9927	9927	8186	2728
HEAT REJ. TO A/C - STAGE 2 (2AC)		(12)(13)	Btu/min	5359	5359	5060	3333
COOLING SYSTEM SIZING CRITERIA							
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)		(13)(14)	Btu/min	41110			
TOTAL AFTERCOOLER CIRCUIT (2AC)		(13)(14)	Btu/min	5627			
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.							

CONDITIONS AND DEFINITIONS

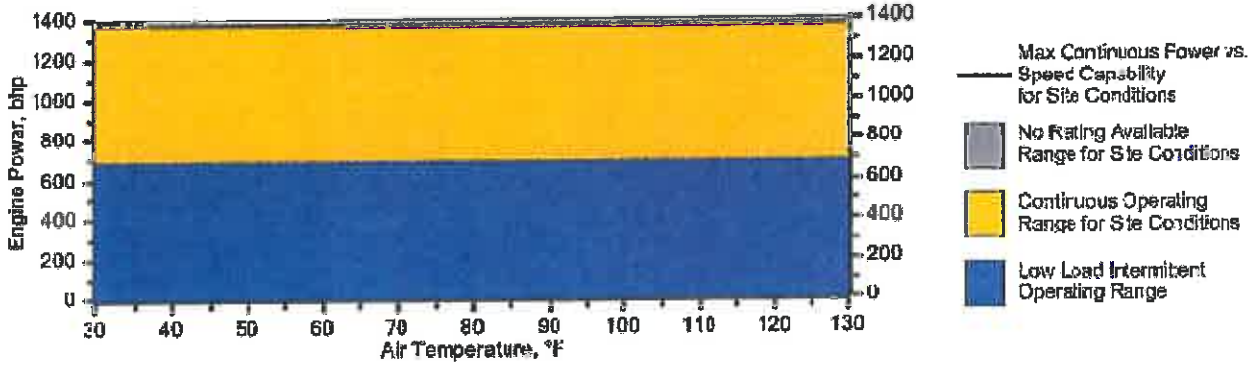
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

PREPARED BY: Chris Marley, Access Midstream
Data generated by Gas Engine Rating Pro Version 5.01.00
Ref. Data Set DM8800-07-001, Printed 13Jan2015

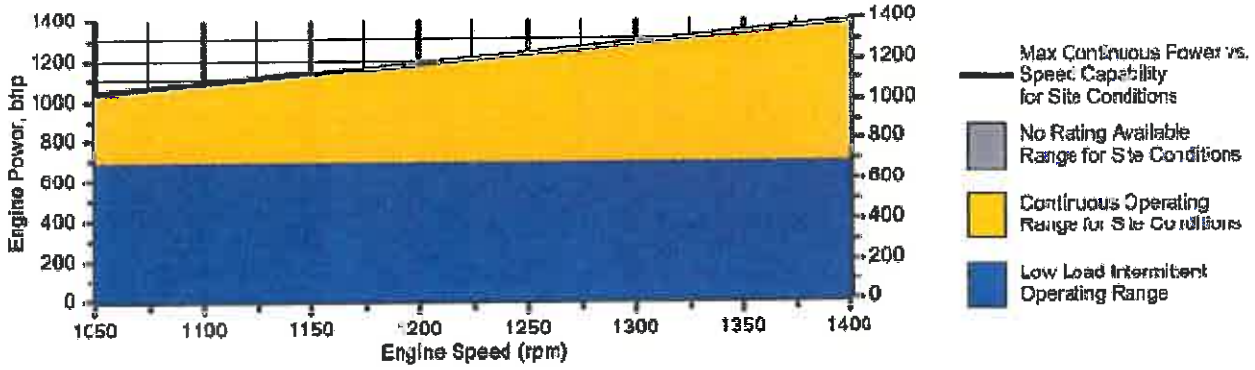
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 500 ft and 1400 rpm



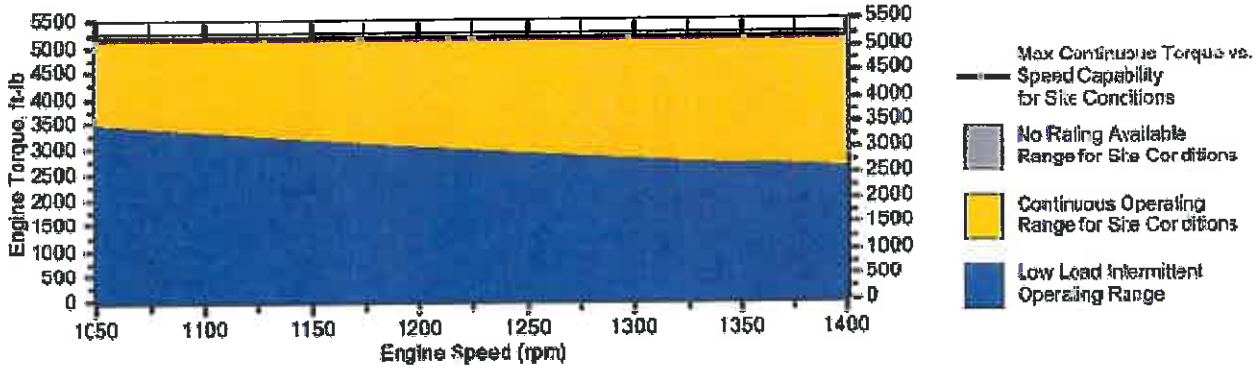
Engine Power vs. Engine Speed

Data represents speed sweep at 500 ft and 77 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 500 ft and 77 °F



Note: At site conditions of 500 ft and 77°F inlet air temp., constant torque can be maintained down to 1050 rpm. The minimum speed for loading at these conditions is 1050 rpm.

NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

2. Fuel consumption tolerance is ± 3.0% of full load data.

3. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

4. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

5. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

6. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

7. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

8. Emissions data is at engine exhaust flange prior to any after treatment.

9. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

10. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

11. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

12. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

13. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

14. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	86.9600	86.9600
Ethane	C2H6	9.6960	9.6960
Propane	C3H8	1.9890	1.9890
Isobutane	iso-C4H1O	0.2480	0.2480
Norbutane	nor-C4H1O	0.3680	0.3680
Isopentane	iso-C5H12	0.0940	0.0940
Norpentane	nor-C5H12	0.0680	0.0680
Hexane	C6H14	0.1050	0.1050
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.2960	0.2960
Carbon Dioxide	CO2	0.1760	0.1760
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup:	Miller CF
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	68.7
Lower Heating Value (Btu/scf):	1026
Higher Heating Value (Btu/scf):	1135
WOBBE Index (Btu/scf):	1285
THC: Free Inert Ratio:	210.86
Total % Inerts (% N2, CO2, He):	0.47%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	10.68
Stoich A/F Ratio (Mass/Mass):	16.74
Specific Gravity (Relative to Air):	0.638
Specific Heat Constant (K):	1.297

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

PREPARED BY: Chris Marley, Access Midstream
Data generated by Gas Engine Rating Pro Version 5.01.00
Ref. Data Set DM8800-07-001, Printed 13Jan2015

10497 Town & Country Way, Ste. 940
Houston, TX 77024
Office: 307.673.0883 | Direct: 307.675.5045
ohartz@emittechnologies.com

Prepared For:
Kijun Hong
WILLIAMS FIELD SERVICES

QUOTE: QUO-14653-L9T6

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3516B
Horsepower:	1380
RPM:	1400
Compression Ratio:	8.0
Exhaust Flow Rate:	9156 CFM
Exhaust Temperature:	995 °F
Reference:	DM8800-07
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr	Lb/Hr	Tons/Year
NOx:	0.50	1.52	6.66
CO:	2.71	8.24	36.11
THC:	4.79	14.57	63.83
NMHC	1.21	3.68	16.12
NMNEHC:	0.48	1.46	6.40
HCHO:	0.43	1.31	5.73
O2:	9.10 %		

POST CATALYST EMISSIONS

	g/bhp-hr
NOx:	Unaffected by Oxidation Catalyst
CO:	<0.50
VOC:	<0.26

CONTROL EQUIPMENT

Catalyst Housing

Model:	ELH-4200-1616F-4CEE-242
Manufacturer:	EMIT Technologies, Inc
Element Size:	Rectangle 24" x 15" x 3.5"
Housing Type:	4 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	9 (0.5" NPT)
Inlet Connections:	16" Flat Face Flange
Outlet Connections:	16" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA

Catalyst Element

Model:	RT-2415-H
Catalyst Type:	Oxidation, Premium Precious Group Metals
Substrate Type:	BRAZED
Manufacturer:	EMIT Technologies, Inc
Element Quantity:	2
Element Size:	Rectangle 24" x 15" x 3.5"

The information in this quotation, and any files transmitted with it, is confidential and may be legally privileged. It is intended only for the use of individual(s) within the company named above. If you are the intended recipient, be aware that your use of any confidential or personal information may be restricted by state and federal privacy laws

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WARRANTY

EMIT Technologies, Inc. warrants that the goods supplied will be free from defects in workmanship by EMIT Technologies, Inc. for a period of two (2) years from date of shipment. EMIT Technologies, Inc. will not be responsible for any defects which result from improper use, neglect, failure to properly maintain or which are attributable to defects, errors or omissions in any drawings, specifications, plans or descriptions, whether written or oral, supplied to EMIT Technologies, Inc. by Buyer.

Catalyst performance using an EMIT Air/Fuel ratio controller is dependent upon properly defined set-points, variable with engine and fuel gas composition. Air/fuel ratio controller performance is guaranteed, but not limited, to fuel gas with a HHV content of 1400 BTU/SCF.

Catalyst performance will be guaranteed for a period of 1 year from installation, or 8760 operating hours, whichever comes first. The catalyst shall be operated with an automatic air/fuel ratio controller. The performance guarantee shall not cover the effects of excessive ash masking due to operation at low load, improper engine maintenance, or inappropriate lubrication oil. The performance guarantee shall not cover the effects of continuous engine misfires (cylinder or ignition) exposing the catalyst to excessive exothermic reaction temperatures. In most cases, excluding thermal deactivation, catalyst performance is redeemable by means of proper washing (refer to EMIT Catalyst/Silencer Housing Manual for element wash information, or contact a local EMIT Sales representative).

The exhaust temperature operating range at the converter inlet is a minimum of 600°F for oxidation catalyst and 750 °F for NSCR catalyst, and a maximum of 1250°F.

If a properly functioning, high temperature shut down switch is not installed, thermal deactivation of catalyst at sustained temperatures above 1250°F is not covered. If excessive exposure to over oxygenation of NSCR catalyst occurs due to improperly functioning or non-existent Air/Fuel ratio control, then deactivation of catalyst is not warranted.

The catalyst conversion efficiencies (% reduction) will be guaranteed for engine loads of 50 to 100 percent. Standard Oxidation Catalyst conversion efficiencies (% reduction) will be guaranteed for fuel gas containing less than 1.5% mole fraction of non-methane, non-ethane hydrocarbons. Applications where fuel gas exceeds this level will require a Premium Oxidation Catalyst to maintain guaranteed VOC conversion efficiencies.

Engine lubrication oil shall contain less than 0.5 wt% Sulfated Ash with a maximum allowable specific oil consumption of 0.7 g/bhp-hr. The catalyst shall be limited to a maximum ash loading of 0.022 lb/ft3. Phosphorous and zinc additives are limited to 0.03 wt%. New or Reconstructed engines must operate for a minimum of 50 hours prior to catalyst installation, otherwise the warranty is void.

The catalyst must not be exposed to the following know poisoning agents, including: antimony, arsenic, chromium, copper, iron, lead, lithium, magnesium, mercury, nickel, phosphorous, potassium, silicon, sodium, sulfur, tin, and zinc. Total poison concentrations in the fuel gas must be limited to 0.25 ppm or less for catalyst to function properly.

Shipment - Promised shipping dates are approximate lead times from the point of manufacture and are not guaranteed. EMIT Technologies, Inc. will not be liable for any loss, damage or delay in manufacture or delivery resulting from any cause beyond its control including, but not limited to a period equal to the time lost by reason of that delay. All products will be crated as per best practice to prevent any damage during shipment. Unless otherwise specified, Buyer will pay for any special packing and shipping requirements. Acceptance of goods by common carrier constitutes delivery to Buyer. EMIT Technologies, Inc. shall not be responsible for goods damaged or lost in transit.

Terms: Credit is extended to purchaser for net 30 time period. If payment is not received in the net 30 timeframe, interest on the unpaid balance will accrue at a rate of 1.5% per month from the invoice date.

Order Cancellation Terms: Upon cancellation of an order once submittal of a Purchase Order has occurred, the customer will pay a 25% restocking fee for Catalyst Housings, Catalyst Elements, and Air/Fuel Ratio Controllers; 50% restocking fee for Cooler Top Solutions Exhaust System Accessories, and other Custom Built Products; 100% of all associated shipping costs incurred by EMIT; 100% of all project expenses incurred by EMIT for Field Services.

The information in this quotation, and any files transmitted with it, is confidential and may be legally privileged. It is intended only for the use of individual(s) within the company named above. If you are the intended recipient, be aware that your use of any confidential or personal information may be restricted by state and federal privacy laws

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Miller Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2014Dec R13 Mod change engines\Miller_GLYCalc_Electric.ddf
Date: December 15, 2014

DESCRIPTION:

Description: Three identical dehydration units
Gas analysis 9/3/2014
53.8 MMSCFD/15 gpm
Flash tank recycled to stabilizer feed drum,
still vent condenser/combustion controls

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 50.00 deg. F
Pressure: 1440.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1760
Nitrogen	0.2960
Methane	86.9600
Ethane	9.6960
Propane	1.9890
Isobutane	0.2480
n-Butane	0.3680
Isopentane	0.0940
n-Pentane	0.0680
n-Hexane	0.0179
Cyclohexane	0.0021
Other Hexanes	0.0404
Heptanes	0.0267
Methylcyclohexane	0.0042
2,2,4-Trimethylpentane	0.0004
Benzene	0.0005
Toluene	0.0010
Ethylbenzene	0.0001
Xylenes	0.0008
C8+ Heavies	0.0200

DRY GAS:

Flow Rate: 53.8 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 15.0 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 130.0 deg. F
Pressure: 70.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 120.0 deg. F
Pressure: 14.8 psia

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 0.0 %
Ambient Air Temperature: 60.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Miller Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2014Dec R13 Mod change engines\Miller_GLYCalc_Electric.ddf
Date: December 15, 2014

DESCRIPTION:

Description: Three identical dehydration units
Gas analysis 9/3/2014
53.8 MMSCFD/15 gpm
Flash tank recycled to stabilizer feed drum,
still vent condenser/combustion controls

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0975	2.341	0.4273
Ethane	0.1743	4.183	0.7634
Propane	0.1087	2.609	0.4762
Isobutane	0.0293	0.703	0.1283
n-Butane	0.0663	1.591	0.2904
Isopentane	0.0186	0.445	0.0813
n-Pentane	0.0200	0.480	0.0877
n-Hexane	0.0109	0.262	0.0479
Cyclohexane	0.0080	0.192	0.0351
Other Hexanes	0.0176	0.423	0.0773
Heptanes	0.0318	0.764	0.1395
Methylcyclohexane	0.0154	0.370	0.0675
2,2,4-Trimethylpentane	0.0002	0.004	0.0007
Benzene	0.0210	0.504	0.0920
Toluene	0.0525	1.259	0.2297
Ethylbenzene	0.0038	0.092	0.0168
Xylenes	0.0371	0.891	0.1626
C8+ Heavies	0.0002	0.005	0.0009
Total Emissions	0.7134	17.120	3.1245
Total Hydrocarbon Emissions	0.7134	17.120	3.1245
Total VOC Emissions	0.4415	10.597	1.9339
Total HAP Emissions	0.1255	3.012	0.5497
Total BTEX Emissions	0.1144	2.746	0.5011

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.9513	46.831	8.5467
Ethane	3.4882	83.717	15.2784
Propane	2.1825	52.380	9.5593
Isobutane	0.5901	14.164	2.5848
n-Butane	1.3387	32.128	5.8634
Isopentane	0.3802	9.125	1.6652

n-Pentane	0.4139	9.935	1.8131
n-Hexane	0.2348	5.634	1.0282
Cyclohexane	0.1768	4.242	0.7742
Other Hexanes	0.3718	8.923	1.6285
Heptanes	0.7654	18.371	3.3527
Methylcyclohexane	0.3746	8.990	1.6407
2,2,4-Trimethylpentane	0.0038	0.092	0.0168
Benzene	0.4807	11.537	2.1056
Toluene	1.4812	35.548	6.4875
Ethylbenzene	0.1649	3.957	0.7221
Xylenes	1.7372	41.692	7.6088
C8+ Heavies	0.3010	7.224	1.3183
Total Emissions	16.4371	394.490	71.9944
Total Hydrocarbon Emissions	16.4371	394.490	71.9944
Total VOC Emissions	10.9975	263.941	48.1692
Total HAP Emissions	4.1025	98.460	17.9689
Total BTEX Emissions	3.8639	92.734	16.9240

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	31.6789	760.294	138.7536
Ethane	15.6419	375.404	68.5113
Propane	4.8784	117.081	21.3673
Isobutane	0.8668	20.803	3.7965
n-Butane	1.5050	36.120	6.5919
Isopentane	0.3720	8.928	1.6294
n-Pentane	0.3234	7.761	1.4164
n-Hexane	0.1007	2.417	0.4412
Cyclohexane	0.0180	0.433	0.0790
Other Hexanes	0.2100	5.040	0.9198
Heptanes	0.1576	3.783	0.6904
Methylcyclohexane	0.0298	0.716	0.1307
2,2,4-Trimethylpentane	0.0016	0.038	0.0069
Benzene	0.0074	0.176	0.0322
Toluene	0.0144	0.346	0.0631
Ethylbenzene	0.0009	0.022	0.0040
Xylenes	0.0069	0.165	0.0300
C8+ Heavies	0.0057	0.137	0.0249
Total Emissions	55.8193	1339.664	244.4886
Total Hydrocarbon Emissions	55.8193	1339.664	244.4886
Total VOC Emissions	8.4986	203.965	37.2237
Total HAP Emissions	0.1318	3.164	0.5774
Total BTEX Emissions	0.0295	0.709	0.1294

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr

Methane	0.0975	2.341	0.4273
Ethane	0.1743	4.183	0.7634
Propane	0.1087	2.609	0.4762
Isobutane	0.0293	0.703	0.1283
n-Butane	0.0663	1.591	0.2904
Isopentane	0.0186	0.445	0.0813
n-Pentane	0.0200	0.480	0.0877
n-Hexane	0.0109	0.262	0.0479
Cyclohexane	0.0080	0.192	0.0351
Other Hexanes	0.0176	0.423	0.0773
Heptanes	0.0318	0.764	0.1395
Methylcyclohexane	0.0154	0.370	0.0675
2,2,4-Trimethylpentane	0.0002	0.004	0.0007
Benzene	0.0210	0.504	0.0920
Toluene	0.0525	1.259	0.2297
Ethylbenzene	0.0038	0.092	0.0168
Xylenes	0.0371	0.891	0.1626
C8+ Heavies	0.0002	0.005	0.0009
Total Emissions	0.7134	17.120	3.1245
Total Hydrocarbon Emissions	0.7134	17.120	3.1245
Total VOC Emissions	0.4415	10.597	1.9339
Total HAP Emissions	0.1255	3.012	0.5497
Total BTEX Emissions	0.1144	2.746	0.5011

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	147.3003	0.4273	99.71
Ethane	83.7897	0.7634	99.09
Propane	30.9266	0.4762	98.46
Isobutane	6.3813	0.1283	97.99
n-Butane	12.4552	0.2904	97.67
Isopentane	3.2946	0.0813	97.53
n-Pentane	3.2295	0.0877	97.29
n-Hexane	1.4694	0.0479	96.74
Cyclohexane	0.8532	0.0351	95.89
Other Hexanes	2.5483	0.0773	96.97
Heptanes	4.0431	0.1395	96.55
Methylcyclohexane	1.7714	0.0675	96.19
2,2,4-Trimethylpentane	0.0236	0.0007	97.05
Benzene	2.1378	0.0920	95.70
Toluene	6.5506	0.2297	96.49
Ethylbenzene	0.7261	0.0168	97.68
Xylenes	7.6388	0.1626	97.87
C8+ Heavies	1.3433	0.0009	99.93
Total Emissions	316.4829	3.1245	99.01
Total Hydrocarbon Emissions	316.4829	3.1245	99.01
Total VOC Emissions	85.3929	1.9339	97.74
Total HAP Emissions	18.5463	0.5497	97.04
Total BTEX Emissions	17.0533	0.5011	97.06

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	120.00	deg. F
Condenser Pressure:	14.81	psia
Condenser Duty:	5.81e-002	MM BTU/hr
Hydrocarbon Recovery:	0.17	bbls/day
Produced Water:	1.41	bbls/day
Ambient Temperature:	60.00	deg. F
Excess Oxygen:	0.00	%
Combustion Efficiency:	95.00	%
Supplemental Fuel Requirement:	5.81e-002	MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	5.00%	95.00%
Propane	4.98%	95.02%
Isobutane	4.96%	95.04%
n-Butane	4.95%	95.05%
Isopentane	4.88%	95.12%
n-Pentane	4.84%	95.16%
n-Hexane	4.65%	95.35%
Cyclohexane	4.53%	95.47%
Other Hexanes	4.75%	95.25%
Heptanes	4.16%	95.84%
Methylcyclohexane	4.11%	95.89%
2,2,4-Trimethylpentane	4.16%	95.84%
Benzene	4.37%	95.63%
Toluene	3.54%	96.46%
Ethylbenzene	2.33%	97.67%
Xylenes	2.14%	97.86%
C8+ Heavies	0.07%	99.93%

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:	0.30	lbs. H2O/MMSCF
Temperature:	50.0	deg. F
Pressure:	1440.0	psig
Dry Gas Flow Rate:	53.8000	MMSCF/day
Glycol Losses with Dry Gas:	0.6416	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	9.92	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	41.73	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.01%	96.99%
Carbon Dioxide	99.30%	0.70%
Nitrogen	99.94%	0.06%

Methane	99.96%	0.04%
Ethane	99.89%	0.11%
Propane	99.86%	0.14%
Isobutane	99.83%	0.17%
n-Butane	99.78%	0.22%
Isopentane	99.81%	0.19%
n-Pentane	99.75%	0.25%
n-Hexane	99.63%	0.37%
Cyclohexane	98.14%	1.86%
Other Hexanes	99.72%	0.28%
Heptanes	99.42%	0.58%
Methylcyclohexane	98.34%	1.66%
2,2,4-Trimethylpentane	99.80%	0.20%
Benzene	78.86%	21.14%
Toluene	72.54%	27.46%
Ethylbenzene	73.58%	26.42%
Xylenes	65.25%	34.75%
C8+ Heavies	99.85%	0.15%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 130.0 deg. F
Flash Pressure: 70.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.96%	0.04%
Carbon Dioxide	41.51%	58.49%
Nitrogen	5.75%	94.25%
Methane	5.80%	94.20%
Ethane	18.23%	81.77%
Propane	30.91%	69.09%
Isobutane	40.51%	59.49%
n-Butane	47.08%	52.92%
Isopentane	50.79%	49.21%
n-Pentane	56.36%	43.64%
n-Hexane	70.13%	29.87%
Cyclohexane	91.04%	8.96%
Other Hexanes	64.27%	35.73%
Heptanes	83.01%	16.99%
Methylcyclohexane	92.92%	7.08%
2,2,4-Trimethylpentane	71.35%	28.65%
Benzene	98.57%	1.43%
Toluene	99.11%	0.89%
Ethylbenzene	99.50%	0.50%
Xylenes	99.66%	0.34%
C8+ Heavies	98.37%	1.63%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead

Water	85.47%	14.53%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.98%	99.02%
n-Pentane	0.89%	99.11%
n-Hexane	0.71%	99.29%
Cyclohexane	3.51%	96.49%
Other Hexanes	1.56%	98.44%
Heptanes	0.60%	99.40%
Methylcyclohexane	4.30%	95.70%
2,2,4-Trimethylpentane	2.10%	97.90%
Benzene	5.07%	94.93%
Toluene	7.97%	92.03%
Ethylbenzene	10.46%	89.54%
Xylenes	12.96%	87.04%
C8+ Heavies	12.20%	87.80%

STREAM REPORTS:

WET GAS STREAM

Temperature: 50.00 deg. F
Pressure: 1454.70 psia
Flow Rate: 2.24e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.09e-002	2.22e+001
Carbon Dioxide	1.76e-001	4.58e+002
Nitrogen	2.96e-001	4.90e+002
Methane	8.69e+001	8.24e+004
Ethane	9.69e+000	1.72e+004
Propane	1.99e+000	5.18e+003
Isobutane	2.48e-001	8.52e+002
n-Butane	3.68e-001	1.26e+003
Isopentane	9.40e-002	4.01e+002
n-Pentane	6.80e-002	2.90e+002
n-Hexane	1.79e-002	9.12e+001
Cyclohexane	2.10e-003	1.04e+001
Other Hexanes	4.04e-002	2.06e+002
Heptanes	2.67e-002	1.58e+002
Methylcyclohexane	4.20e-003	2.44e+001
2,2,4-Trimethylpentane	4.00e-004	2.70e+000
Benzene	5.00e-004	2.31e+000
Toluene	1.00e-003	5.45e+000
Ethylbenzene	1.00e-004	6.28e-001
Xylenes	8.00e-004	5.02e+000
C8+ Heavies	2.00e-002	2.01e+002

Total Components	100.00	1.09e+005

DRY GAS STREAM

Temperature: 50.00 deg. F
Pressure: 1454.70 psia
Flow Rate: 2.24e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.29e-004	6.70e-001
Carbon Dioxide	1.75e-001	4.55e+002
Nitrogen	2.96e-001	4.90e+002
Methane	8.70e+001	8.24e+004
Ethane	9.69e+000	1.72e+004
Propane	1.99e+000	5.18e+003
Isobutane	2.48e-001	8.50e+002
n-Butane	3.67e-001	1.26e+003
Isopentane	9.39e-002	4.00e+002
n-Pentane	6.79e-002	2.89e+002
n-Hexane	1.78e-002	9.08e+001
Cyclohexane	2.06e-003	1.03e+001
Other Hexanes	4.03e-002	2.05e+002
Heptanes	2.66e-002	1.57e+002
Methylcyclohexane	4.13e-003	2.40e+001
2,2,4-Trimethylpentane	3.99e-004	2.70e+000
Benzene	3.94e-004	1.82e+000
Toluene	7.26e-004	3.95e+000
Ethylbenzene	7.36e-005	4.62e-001
Xylenes	5.22e-004	3.28e+000
C8+ Heavies	2.00e-002	2.01e+002
Total Components	100.00	1.09e+005

LEAN GLYCOL STREAM

Temperature: 50.00 deg. F
Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.32e+003
Water	1.50e+000	1.27e+002
Carbon Dioxide	3.79e-012	3.20e-010
Nitrogen	3.23e-013	2.73e-011
Methane	1.34e-017	1.13e-015
Ethane	1.07e-007	9.03e-006
Propane	3.40e-009	2.87e-007
Isobutane	5.18e-010	4.37e-008
n-Butane	8.35e-010	7.05e-008
Isopentane	4.48e-005	3.78e-003
n-Pentane	4.39e-005	3.70e-003
n-Hexane	2.00e-005	1.69e-003
Cyclohexane	7.63e-005	6.44e-003
Other Hexanes	6.96e-005	5.88e-003
Heptanes	5.49e-005	4.64e-003
Methylcyclohexane	2.00e-004	1.68e-002

2,2,4-Trimethylpentane	9.72e-007	8.21e-005
Benzene	3.04e-004	2.57e-002
Toluene	1.52e-003	1.28e-001
Ethylbenzene	2.28e-004	1.93e-002
Xylenes	3.06e-003	2.59e-001
C8+ Heavies	4.95e-004	4.18e-002
Total Components	100.00	8.44e+003

RICH GLYCOL STREAM

Temperature: 50.00 deg. F
Pressure: 1454.70 psia
Flow Rate: 1.52e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.74e+001	8.32e+003
Water	1.74e+000	1.48e+002
Carbon Dioxide	3.75e-002	3.20e+000
Nitrogen	3.20e-003	2.73e-001
Methane	3.94e-001	3.36e+001
Ethane	2.24e-001	1.91e+001
Propane	8.27e-002	7.06e+000
Isobutane	1.71e-002	1.46e+000
n-Butane	3.33e-002	2.84e+000
Isopentane	8.85e-003	7.56e-001
n-Pentane	8.68e-003	7.41e-001
n-Hexane	3.95e-003	3.37e-001
Cyclohexane	2.36e-003	2.01e-001
Other Hexanes	6.88e-003	5.88e-001
Heptanes	1.09e-002	9.28e-001
Methylcyclohexane	4.93e-003	4.21e-001
2,2,4-Trimethylpentane	6.41e-005	5.47e-003
Benzene	6.02e-003	5.14e-001
Toluene	1.90e-002	1.62e+000
Ethylbenzene	2.17e-003	1.85e-001
Xylenes	2.34e-002	2.00e+000
C8+ Heavies	4.08e-003	3.49e-001
Total Components	100.00	8.54e+003

FLASH TANK OFF GAS STREAM

Temperature: 130.00 deg. F
Pressure: 84.70 psia
Flow Rate: 1.03e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.08e-001	5.31e-002
Carbon Dioxide	1.57e+000	1.87e+000
Nitrogen	3.38e-001	2.58e-001
Methane	7.27e+001	3.17e+001
Ethane	1.91e+001	1.56e+001
Propane	4.07e+000	4.88e+000
Isobutane	5.49e-001	8.67e-001

n-Butane	9.53e-001	1.50e+000
Isopentane	1.90e-001	3.72e-001
n-Pentane	1.65e-001	3.23e-001
n-Hexane	4.30e-002	1.01e-001
Cyclohexane	7.89e-003	1.80e-002
Other Hexanes	8.97e-002	2.10e-001
Heptanes	5.79e-002	1.58e-001
Methylcyclohexane	1.12e-002	2.98e-002
2,2,4-Trimethylpentane	5.05e-004	1.57e-003
Benzene	3.46e-003	7.35e-003
Toluene	5.75e-003	1.44e-002
Ethylbenzene	3.20e-004	9.22e-004
Xylenes	2.38e-003	6.86e-003
C8+ Heavies	1.23e-003	5.69e-003
Total Components	100.00	5.80e+001

FLASH TANK GLYCOL STREAM

Temperature: 130.00 deg. F
Flow Rate: 1.51e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.80e+001	8.32e+003
Water	1.75e+000	1.48e+002
Carbon Dioxide	1.57e-002	1.33e+000
Nitrogen	1.85e-004	1.57e-002
Methane	2.30e-002	1.95e+000
Ethane	4.11e-002	3.49e+000
Propane	2.57e-002	2.18e+000
Isobutane	6.96e-003	5.90e-001
n-Butane	1.58e-002	1.34e+000
Isopentane	4.53e-003	3.84e-001
n-Pentane	4.92e-003	4.18e-001
n-Hexane	2.79e-003	2.36e-001
Cyclohexane	2.16e-003	1.83e-001
Other Hexanes	4.45e-003	3.78e-001
Heptanes	9.08e-003	7.70e-001
Methylcyclohexane	4.61e-003	3.91e-001
2,2,4-Trimethylpentane	4.61e-005	3.91e-003
Benzene	5.97e-003	5.06e-001
Toluene	1.90e-002	1.61e+000
Ethylbenzene	2.17e-003	1.84e-001
Xylenes	2.35e-002	2.00e+000
C8+ Heavies	4.04e-003	3.43e-001
Total Components	100.00	8.48e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 6.15e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.38e+001	2.15e+001
Carbon Dioxide	1.86e+000	1.33e+000
Nitrogen	3.46e-002	1.57e-002
Methane	7.51e+000	1.95e+000
Ethane	7.16e+000	3.49e+000
Propane	3.06e+000	2.18e+000
Isobutane	6.27e-001	5.90e-001
n-Butane	1.42e+000	1.34e+000
Isopentane	3.25e-001	3.80e-001
n-Pentane	3.54e-001	4.14e-001
n-Hexane	1.68e-001	2.35e-001
Cyclohexane	1.30e-001	1.77e-001
Other Hexanes	2.66e-001	3.72e-001
Heptanes	4.72e-001	7.65e-001
Methylcyclohexane	2.36e-001	3.75e-001
2,2,4-Trimethylpentane	2.07e-003	3.82e-003
Benzene	3.80e-001	4.81e-001
Toluene	9.92e-001	1.48e+000
Ethylbenzene	9.59e-002	1.65e-001
Xylenes	1.01e+000	1.74e+000
C8+ Heavies	1.09e-001	3.01e-001
Total Components	100.00	3.93e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 4.11e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.06e+001	999548.
Carbon Dioxide	5.83e-003	1.20e-003	58.
Nitrogen	1.80e-006	3.70e-007	0.
Methane	4.31e-004	8.87e-005	4.
Ethane	8.75e-004	1.80e-004	9.
Propane	5.62e-004	1.16e-004	6.
Isobutane	8.25e-005	1.70e-005	1.
n-Butane	2.48e-004	5.10e-005	2.
Isopentane	4.89e-005	1.01e-005	0.
n-Pentane	5.66e-005	1.17e-005	1.
n-Hexane	2.56e-005	5.27e-006	0.
Cyclohexane	1.06e-004	2.18e-005	1.
Other Hexanes	3.33e-005	6.86e-006	0.
Heptanes	4.14e-005	8.52e-006	0.
Methylcyclohexane	9.73e-005	2.00e-005	1.
2,2,4-Trimethylpentane	1.38e-007	2.85e-008	0.
Benzene	7.84e-003	1.61e-003	78.
Toluene	1.61e-002	3.32e-003	161.
Ethylbenzene	8.89e-004	1.83e-004	9.

Xylenes	1.19e-002	2.45e-003	119.
C8+ Heavies	1.73e-007	3.56e-008	0.
Total Components	100.00	2.06e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 5.09e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.54e-002	9.83e-004
Carbon Dioxide	2.37e-002	5.13e-004
Nitrogen	1.66e-004	3.60e-006
Methane	1.20e-002	2.59e-004
Ethane	1.09e-001	2.36e-003
Propane	3.62e-001	7.84e-003
Isobutane	1.94e-001	4.19e-003
n-Butane	5.87e-001	1.27e-002
Isopentane	4.15e-001	8.98e-003
n-Pentane	6.31e-001	1.36e-002
n-Hexane	7.50e-001	1.62e-002
Cyclohexane	7.62e-001	1.65e-002
Other Hexanes	8.76e-001	1.89e-002
Heptanes	5.94e+000	1.28e-001
Methylcyclohexane	3.07e+000	6.64e-002
2,2,4-Trimethylpentane	2.95e-002	6.39e-004
Benzene	2.74e+000	5.92e-002
Toluene	1.98e+001	4.29e-001
Ethylbenzene	4.06e+000	8.79e-002
Xylenes	4.59e+001	9.92e-001
C8+ Heavies	1.37e+001	2.97e-001
Total Components	100.00	2.16e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 14.81 psia
Flow Rate: 1.73e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.15e+001	9.47e-001
Carbon Dioxide	6.61e+000	1.33e+000
Nitrogen	1.23e-001	1.57e-002
Methane	2.67e+001	1.95e+000
Ethane	2.54e+001	3.49e+000
Propane	1.08e+001	2.17e+000
Isobutane	2.21e+000	5.86e-001
n-Butane	5.00e+000	1.33e+000
Isopentane	1.13e+000	3.71e-001
n-Pentane	1.22e+000	4.00e-001
n-Hexane	5.56e-001	2.19e-001
Cyclohexane	4.17e-001	1.60e-001
Other Hexanes	8.97e-001	3.53e-001

Heptanes	1.39e+000	6.37e-001
Methylcyclohexane	6.88e-001	3.08e-001
2,2,4-Trimethylpentane	6.11e-003	3.19e-003
Benzene	1.18e+000	4.20e-001
Toluene	2.50e+000	1.05e+000
Ethylbenzene	1.59e-001	7.68e-002
Xylenes	1.53e+000	7.43e-001
C8+ Heavies	5.43e-003	4.22e-003
Total Components	100.00	1.66e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 7.08e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	3.26e+001	9.75e-002
Ethane	3.11e+001	1.74e-001
Propane	1.32e+001	1.09e-001
Isobutane	2.70e+000	2.93e-002
n-Butane	6.12e+000	6.63e-002
Isopentane	1.38e+000	1.86e-002
n-Pentane	1.49e+000	2.00e-002
n-Hexane	6.80e-001	1.09e-002
Cyclohexane	5.11e-001	8.01e-003
Other Hexanes	1.10e+000	1.76e-002
Heptanes	1.70e+000	3.18e-002
Methylcyclohexane	8.41e-001	1.54e-002
2,2,4-Trimethylpentane	7.48e-003	1.59e-004
Benzene	1.44e+000	2.10e-002
Toluene	3.05e+000	5.25e-002
Ethylbenzene	1.94e-001	3.84e-003
Xylenes	1.88e+000	3.71e-002
C8+ Heavies	6.64e-003	2.11e-004
Total Components	100.00	7.13e-001

CONDENSER CONTROL CURVE DATA REPORT:

CONDENSER CONTROL EFFICIENCY CURVES

Note: Condenser curves computed for the range 40.0 F <= T <= 170.0 F. DO NOT EXTRAPOLATE BEYOND THIS RANGE!

Temp(F)	BTEX	Total HAP	VOC
40.0	94.47	93.07	55.65
45.0	93.38	91.80	54.09
50.0	92.03	90.25	52.36
55.0	90.55	88.60	50.68
60.0	88.86	86.73	48.93
65.0	86.93	84.63	47.10
70.0	84.74	82.29	45.18
75.0	82.24	79.66	43.16
80.0	79.42	76.74	41.04

85.0	76.23	73.49	38.81
90.0	72.65	69.87	36.45
95.0	68.62	65.86	33.98
100.0	64.11	61.41	31.37
105.0	59.09	56.50	28.64
110.0	53.51	51.08	25.77
115.0	47.35	45.13	22.76
120.0	40.62	38.67	19.63
125.0	33.44	31.80	16.43
130.0	26.62	25.29	13.48
135.0	19.52	18.54	10.47
140.0	13.33	12.66	7.84
145.0	8.56	8.12	5.73
150.0	5.16	4.90	4.05
155.0	2.64	2.50	2.48
160.0	0.76	0.72	0.81
165.0	0.09	0.08	0.03
170.0	0.07	0.07	0.03

ANNUAL AIR-COOLED CONDENSER PERFORMANCE:

ANNUAL AIR-COOLED CONDENSER PERFORMANCE

Nearest Site for Air Temperature Data: Elkins, WV

Ambient Air Dry Bulb Temperature (deg. F)	Frequency (%)	Condenser Outlet Temperature (deg. F)
<=50	49.57	<=70
51-55	8.52	71-75
56-60	9.28	76-80
61-65	10.35	81-85
66-70	8.85	86-90
71-75	6.15	91-95
76-80	4.62	96-100
81-85	2.09	101-105
86-90	0.52	106-110
91-95	0.06	111-115
96-100	0.00	116-120
>100	0.00	>120

Condenser outlet temperature approach to ambient: 20.00 deg. F

Annual air-cooled condenser emissions and control efficiency:

	Uncontrolled emissions tons/year	Controlled emissions tons/year	% Control
Benzene	2.106	1.076	48.88
BTEX	16.924	3.483	79.42
Total HAP	17.969	4.161	76.84
VOC	48.169	28.224	41.41

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Miller Compressor Station - Gas Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2014Dec R13 Mod change engines\Miller_GLYCalc_Gas.ddf
Date: December 15, 2014

DESCRIPTION:

Description: Three identical dehydration units
Gas analysis 9/3/2014
53.8 MMSCFD/15 gpm
Flash tank recycled to stabilizer feed drum,
still vent condenser/combustion controls

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 50.00 deg. F
Pressure: 1440.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.1760
Nitrogen	0.2960
Methane	86.9600
Ethane	9.6960
Propane	1.9890
Isobutane	0.2480
n-Butane	0.3680
Isopentane	0.0940
n-Pentane	0.0680
n-Hexane	0.0179
Cyclohexane	0.0021
Other Hexanes	0.0404
Heptanes	0.0267
Methylcyclohexane	0.0042
2,2,4-Trimethylpentane	0.0004
Benzene	0.0005
Toluene	0.0010
Ethylbenzene	0.0001
Xylenes	0.0008
C8+ Heavies	0.0200

DRY GAS:

Flow Rate: 53.8 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 15.0 gpm

PUMP:

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

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 130.0 deg. F
Pressure: 70.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 120.0 deg. F
Pressure: 14.8 psia

Control Device: Combustion Device
Destruction Efficiency: 95.0 %
Excess Oxygen: 0.0 %
Ambient Air Temperature: 60.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Miller Compressor Station - Gas Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Miller - WV\2014Dec R13 Mod change engines\Miller_GLYCalc_Gas.ddf
Date: December 15, 2014

DESCRIPTION:

Description: Three identical dehydration units
Gas analysis 9/3/2014
53.8 MMSCFD/15 gpm
Flash tank recycled to stabilizer feed drum,
still vent condenser/combustion controls

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.1139	2.733	0.4987
Ethane	0.0974	2.337	0.4265
Propane	0.0598	1.436	0.2621
Isobutane	0.0155	0.371	0.0677
n-Butane	0.0318	0.764	0.1394
Isopentane	0.0104	0.250	0.0456
n-Pentane	0.0101	0.242	0.0442
n-Hexane	0.0057	0.137	0.0250
Cyclohexane	0.0047	0.112	0.0205
Other Hexanes	0.0094	0.227	0.0413
Heptanes	0.0178	0.427	0.0780
Methylcyclohexane	0.0094	0.226	0.0413
2,2,4-Trimethylpentane	0.0001	0.003	0.0005
Benzene	0.0165	0.396	0.0723
Toluene	0.0366	0.878	0.1602
Ethylbenzene	0.0023	0.056	0.0102
Xylenes	0.0223	0.535	0.0977
C8+ Heavies	0.0004	0.008	0.0015
Total Emissions	0.4641	11.139	2.0328
Total Hydrocarbon Emissions	0.4641	11.139	2.0328
Total VOC Emissions	0.2529	6.069	1.1076
Total HAP Emissions	0.0835	2.005	0.3659
Total BTEX Emissions	0.0777	1.865	0.3404

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.2779	54.670	9.9773
Ethane	1.9509	46.821	8.5449
Propane	1.2068	28.964	5.2859
Isobutane	0.3140	7.536	1.3753
n-Butane	0.6505	15.612	2.8491
Isopentane	0.2199	5.276	0.9629

n-Pentane	0.2156	5.173	0.9441
n-Hexane	0.1326	3.183	0.5809
Cyclohexane	0.1148	2.755	0.5028
Other Hexanes	0.2114	5.073	0.9258
Heptanes	0.5095	12.228	2.2317
Methylcyclohexane	0.2762	6.629	1.2097
2,2,4-Trimethylpentane	0.0032	0.078	0.0142
Benzene	0.4287	10.289	1.8777
Toluene	1.3779	33.070	6.0353
Ethylbenzene	0.1591	3.820	0.6971
Xylenes	1.6955	40.693	7.4265
C8+ Heavies	1.0081	24.195	4.4155
Total Emissions	12.7527	306.064	55.8566
Total Hydrocarbon Emissions	12.7527	306.064	55.8566
Total VOC Emissions	8.5238	204.572	37.3344
Total HAP Emissions	3.7971	91.132	16.6315
Total BTEX Emissions	3.6613	87.871	16.0365

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	392.9925	9431.819	1721.3069
Ethane	92.7717	2226.521	406.3401
Propane	28.5959	686.302	125.2501
Isobutane	4.8800	117.119	21.3743
n-Butane	7.7385	185.724	33.8946
Isopentane	2.2907	54.978	10.0335
n-Pentane	1.7938	43.051	7.8568
n-Hexane	0.6028	14.468	2.6403
Cyclohexane	0.1258	3.020	0.5511
Other Hexanes	1.2731	30.556	5.5764
Heptanes	1.1073	26.574	4.8498
Methylcyclohexane	0.2352	5.644	1.0300
2,2,4-Trimethylpentane	0.0140	0.336	0.0613
Benzene	0.0695	1.668	0.3045
Toluene	0.1415	3.397	0.6199
Ethylbenzene	0.0094	0.225	0.0411
Xylenes	0.0705	1.692	0.3088
C8+ Heavies	0.1818	4.364	0.7965
Total Emissions	534.8941	12837.458	2342.8361
Total Hydrocarbon Emissions	534.8941	12837.458	2342.8361
Total VOC Emissions	49.1299	1179.118	215.1891
Total HAP Emissions	0.9078	21.786	3.9760
Total BTEX Emissions	0.2909	6.982	1.2743

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr

Methane	0.1139	2.733	0.4987
Ethane	0.0974	2.337	0.4265
Propane	0.0598	1.436	0.2621
Isobutane	0.0155	0.371	0.0677
n-Butane	0.0318	0.764	0.1394
Isopentane	0.0104	0.250	0.0456
n-Pentane	0.0101	0.242	0.0442
n-Hexane	0.0057	0.137	0.0250
Cyclohexane	0.0047	0.112	0.0205
Other Hexanes	0.0094	0.227	0.0413
Heptanes	0.0178	0.427	0.0780
Methylcyclohexane	0.0094	0.226	0.0413
2,2,4-Trimethylpentane	0.0001	0.003	0.0005
Benzene	0.0165	0.396	0.0723
Toluene	0.0366	0.878	0.1602
Ethylbenzene	0.0023	0.056	0.0102
Xylenes	0.0223	0.535	0.0977
C8+ Heavies	0.0004	0.008	0.0015
Total Emissions	0.4641	11.139	2.0328
Total Hydrocarbon Emissions	0.4641	11.139	2.0328
Total VOC Emissions	0.2529	6.069	1.1076
Total HAP Emissions	0.0835	2.005	0.3659
Total BTEX Emissions	0.0777	1.865	0.3404

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	1731.2842	0.4987	99.97
Ethane	414.8850	0.4265	99.90
Propane	130.5360	0.2621	99.80
Isobutane	22.7496	0.0677	99.70
n-Butane	36.7437	0.1394	99.62
Isopentane	10.9964	0.0456	99.59
n-Pentane	8.8010	0.0442	99.50
n-Hexane	3.2212	0.0250	99.22
Cyclohexane	1.0539	0.0205	98.06
Other Hexanes	6.5021	0.0413	99.36
Heptanes	7.0815	0.0780	98.90
Methylcyclohexane	2.2397	0.0413	98.16
2,2,4-Trimethylpentane	0.0755	0.0005	99.35
Benzene	2.1821	0.0723	96.69
Toluene	6.6552	0.1602	97.59
Ethylbenzene	0.7382	0.0102	98.62
Xylenes	7.7353	0.0977	98.74
C8+ Heavies	5.2120	0.0015	99.97
Total Emissions	2398.6928	2.0328	99.92
Total Hydrocarbon Emissions	2398.6928	2.0328	99.92
Total VOC Emissions	252.5236	1.1076	99.56
Total HAP Emissions	20.6075	0.3659	98.22
Total BTEX Emissions	17.3108	0.3404	98.03

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	120.00 deg. F
Condenser Pressure:	14.81 psia
Condenser Duty:	3.81e-002 MM BTU/hr
Hydrocarbon Recovery:	0.28 bbls/day
Produced Water:	1.40 bbls/day
Ambient Temperature:	60.00 deg. F
Excess Oxygen:	0.00 %
Combustion Efficiency:	95.00 %
Supplemental Fuel Requirement:	3.81e-002 MM BTU/hr

Component	Emitted	Destroyed
Methane	5.00%	95.00%
Ethane	4.99%	95.01%
Propane	4.96%	95.04%
Isobutane	4.92%	95.08%
n-Butane	4.89%	95.11%
Isopentane	4.74%	95.26%
n-Pentane	4.68%	95.32%
n-Hexane	4.31%	95.69%
Cyclohexane	4.08%	95.92%
Other Hexanes	4.47%	95.53%
Heptanes	3.49%	96.51%
Methylcyclohexane	3.41%	96.59%
2,2,4-Trimethylpentane	3.48%	96.52%
Benzene	3.85%	96.15%
Toluene	2.66%	97.34%
Ethylbenzene	1.46%	98.54%
Xylenes	1.32%	98.68%
C8+ Heavies	0.03%	99.97%

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:	0.30 lbs. H2O/MMSCF
Temperature:	50.0 deg. F
Pressure:	1440.0 psig
Dry Gas Flow Rate:	53.8000 MMSCF/day
Glycol Losses with Dry Gas:	0.6416 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	9.92 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	41.73 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.01%	96.99%
Carbon Dioxide	99.30%	0.70%
Nitrogen	99.94%	0.06%

Methane	99.96%	0.04%
Ethane	99.89%	0.11%
Propane	99.86%	0.14%
Isobutane	99.83%	0.17%
n-Butane	99.78%	0.22%
Isopentane	99.81%	0.19%
n-Pentane	99.75%	0.25%
n-Hexane	99.63%	0.37%
Cyclohexane	98.14%	1.86%
Other Hexanes	99.72%	0.28%
Heptanes	99.42%	0.58%
Methylcyclohexane	98.34%	1.66%
2,2,4-Trimethylpentane	99.80%	0.20%
Benzene	78.86%	21.14%
Toluene	72.54%	27.46%
Ethylbenzene	73.58%	26.42%
Xylenes	65.25%	34.75%
C8+ Heavies	99.85%	0.15%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 130.0 deg. F
Flash Pressure: 70.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.62%	0.38%
Carbon Dioxide	6.27%	93.73%
Nitrogen	0.57%	99.43%
Methane	0.58%	99.42%
Ethane	2.06%	97.94%
Propane	4.05%	95.95%
Isobutane	6.05%	93.95%
n-Butane	7.75%	92.25%
Isopentane	8.89%	91.11%
n-Pentane	10.89%	89.11%
n-Hexane	18.22%	81.78%
Cyclohexane	49.07%	50.93%
Other Hexanes	14.58%	85.42%
Heptanes	31.71%	68.29%
Methylcyclohexane	55.48%	44.52%
2,2,4-Trimethylpentane	19.14%	80.86%
Benzene	86.73%	13.27%
Toluene	91.41%	8.59%
Ethylbenzene	95.00%	5.00%
Xylenes	96.52%	3.48%
C8+ Heavies	85.24%	14.76%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead

Water	85.71%	14.29%
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	1.69%	98.31%
n-Pentane	1.69%	98.31%
n-Hexane	1.26%	98.74%
Cyclohexane	5.31%	94.69%
Other Hexanes	2.70%	97.30%
Heptanes	0.90%	99.10%
Methylcyclohexane	5.75%	94.25%
2,2,4-Trimethylpentane	2.48%	97.52%
Benzene	5.65%	94.35%
Toluene	8.52%	91.48%
Ethylbenzene	10.79%	89.21%
Xylenes	13.23%	86.77%
C8+ Heavies	3.98%	96.02%

STREAM REPORTS:

WET GAS STREAM

Temperature: 50.00 deg. F
Pressure: 1454.70 psia
Flow Rate: 2.24e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.09e-002	2.22e+001
Carbon Dioxide	1.76e-001	4.58e+002
Nitrogen	2.96e-001	4.90e+002
Methane	8.69e+001	8.24e+004
Ethane	9.69e+000	1.72e+004
Propane	1.99e+000	5.18e+003
Isobutane	2.48e-001	8.52e+002
n-Butane	3.68e-001	1.26e+003
Isopentane	9.40e-002	4.01e+002
n-Pentane	6.80e-002	2.90e+002
n-Hexane	1.79e-002	9.12e+001
Cyclohexane	2.10e-003	1.04e+001
Other Hexanes	4.04e-002	2.06e+002
Heptanes	2.67e-002	1.58e+002
Methylcyclohexane	4.20e-003	2.44e+001
2,2,4-Trimethylpentane	4.00e-004	2.70e+000
Benzene	5.00e-004	2.31e+000
Toluene	1.00e-003	5.45e+000
Ethylbenzene	1.00e-004	6.28e-001
Xylenes	8.00e-004	5.02e+000
C8+ Heavies	2.00e-002	2.01e+002

Total Components	100.00	1.09e+005

DRY GAS STREAM

Temperature: 50.00 deg. F
Pressure: 1454.70 psia
Flow Rate: 2.24e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.29e-004	6.70e-001
Carbon Dioxide	1.75e-001	4.55e+002
Nitrogen	2.96e-001	4.90e+002
Methane	8.70e+001	8.24e+004
Ethane	9.69e+000	1.72e+004
Propane	1.99e+000	5.18e+003
Isobutane	2.48e-001	8.50e+002
n-Butane	3.67e-001	1.26e+003
Isopentane	9.39e-002	4.00e+002
n-Pentane	6.79e-002	2.89e+002
n-Hexane	1.78e-002	9.08e+001
Cyclohexane	2.06e-003	1.03e+001
Other Hexanes	4.03e-002	2.05e+002
Heptanes	2.66e-002	1.57e+002
Methylcyclohexane	4.13e-003	2.40e+001
2,2,4-Trimethylpentane	3.99e-004	2.70e+000
Benzene	3.94e-004	1.82e+000
Toluene	7.26e-004	3.95e+000
Ethylbenzene	7.36e-005	4.62e-001
Xylenes	5.22e-004	3.28e+000
C8+ Heavies	2.00e-002	2.01e+002
Total Components	100.00	1.09e+005

LEAN GLYCOL STREAM

Temperature: 50.00 deg. F
Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.32e+003
Water	1.50e+000	1.27e+002
Carbon Dioxide	3.79e-012	3.20e-010
Nitrogen	3.23e-013	2.73e-011
Methane	1.34e-017	1.13e-015
Ethane	1.07e-007	9.03e-006
Propane	3.40e-009	2.87e-007
Isobutane	5.18e-010	4.37e-008
n-Butane	8.35e-010	7.05e-008
Isopentane	4.48e-005	3.78e-003
n-Pentane	4.39e-005	3.70e-003
n-Hexane	2.00e-005	1.69e-003
Cyclohexane	7.63e-005	6.44e-003
Other Hexanes	6.96e-005	5.88e-003
Heptanes	5.49e-005	4.64e-003
Methylcyclohexane	2.00e-004	1.68e-002

2,2,4-Trimethylpentane	9.72e-007	8.21e-005
Benzene	3.04e-004	2.57e-002
Toluene	1.52e-003	1.28e-001
Ethylbenzene	2.28e-004	1.93e-002
Xylenes	3.06e-003	2.59e-001
C8+ Heavies	4.95e-004	4.18e-002
Total Components	100.00	8.44e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 50.00 deg. F
Pressure: 1454.70 psia
Flow Rate: 1.63e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.22e+001	8.32e+003
Water	1.64e+000	1.48e+002
Carbon Dioxide	5.78e-002	5.21e+000
Nitrogen	2.69e-002	2.42e+000
Methane	4.38e+000	3.95e+002
Ethane	1.05e+000	9.47e+001
Propane	3.30e-001	2.98e+001
Isobutane	5.76e-002	5.19e+000
n-Butane	9.30e-002	8.39e+000
Isopentane	2.79e-002	2.51e+000
n-Pentane	2.23e-002	2.01e+000
n-Hexane	8.17e-003	7.37e-001
Cyclohexane	2.74e-003	2.47e-001
Other Hexanes	1.65e-002	1.49e+000
Heptanes	1.80e-002	1.62e+000
Methylcyclohexane	5.86e-003	5.28e-001
2,2,4-Trimethylpentane	1.92e-004	1.73e-002
Benzene	5.81e-003	5.24e-001
Toluene	1.83e-002	1.65e+000
Ethylbenzene	2.08e-003	1.88e-001
Xylenes	2.24e-002	2.02e+000
C8+ Heavies	1.37e-002	1.23e+000
Total Components	100.00	9.02e+003

FLASH TANK OFF GAS STREAM

Temperature: 130.00 deg. F
Pressure: 84.70 psia
Flow Rate: 1.09e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.08e-001	5.60e-001
Carbon Dioxide	3.86e-001	4.88e+000
Nitrogen	2.99e-001	2.41e+000
Methane	8.51e+001	3.93e+002
Ethane	1.07e+001	9.28e+001
Propane	2.25e+000	2.86e+001
Isobutane	2.92e-001	4.88e+000

n-Butane	4.63e-001	7.74e+000
Isopentane	1.10e-001	2.29e+000
n-Pentane	8.64e-002	1.79e+000
n-Hexane	2.43e-002	6.03e-001
Cyclohexane	5.20e-003	1.26e-001
Other Hexanes	5.13e-002	1.27e+000
Heptanes	3.84e-002	1.11e+000
Methylcyclohexane	8.32e-003	2.35e-001
2,2,4-Trimethylpentane	4.26e-004	1.40e-002
Benzene	3.09e-003	6.95e-002
Toluene	5.34e-003	1.42e-001
Ethylbenzene	3.07e-004	9.38e-003
Xylenes	2.31e-003	7.05e-002
C8+ Heavies	3.71e-003	1.82e-001
Total Components	100.00	5.43e+002

FLASH TANK GLYCOL STREAM

Temperature: 130.00 deg. F
Flow Rate: 1.51e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.81e+001	8.32e+003
Water	1.74e+000	1.48e+002
Carbon Dioxide	3.85e-003	3.27e-001
Nitrogen	1.63e-004	1.38e-002
Methane	2.69e-002	2.28e+000
Ethane	2.30e-002	1.95e+000
Propane	1.42e-002	1.21e+000
Isobutane	3.70e-003	3.14e-001
n-Butane	7.67e-003	6.50e-001
Isopentane	2.64e-003	2.24e-001
n-Pentane	2.59e-003	2.19e-001
n-Hexane	1.58e-003	1.34e-001
Cyclohexane	1.43e-003	1.21e-001
Other Hexanes	2.56e-003	2.17e-001
Heptanes	6.06e-003	5.14e-001
Methylcyclohexane	3.46e-003	2.93e-001
2,2,4-Trimethylpentane	3.91e-005	3.31e-003
Benzene	5.36e-003	4.54e-001
Toluene	1.78e-002	1.51e+000
Ethylbenzene	2.10e-003	1.78e-001
Xylenes	2.31e-002	1.95e+000
C8+ Heavies	1.24e-002	1.05e+000
Total Components	100.00	8.48e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.67e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.85e+001	2.11e+001
Carbon Dioxide	4.97e-001	3.27e-001
Nitrogen	3.30e-002	1.38e-002
Methane	9.50e+000	2.28e+000
Ethane	4.34e+000	1.95e+000
Propane	1.83e+000	1.21e+000
Isobutane	3.62e-001	3.14e-001
n-Butane	7.49e-001	6.50e-001
Isopentane	2.04e-001	2.20e-001
n-Pentane	2.00e-001	2.16e-001
n-Hexane	1.03e-001	1.33e-001
Cyclohexane	9.13e-002	1.15e-001
Other Hexanes	1.64e-001	2.11e-001
Heptanes	3.40e-001	5.10e-001
Methylcyclohexane	1.88e-001	2.76e-001
2,2,4-Trimethylpentane	1.89e-003	3.23e-003
Benzene	3.67e-001	4.29e-001
Toluene	1.00e+000	1.38e+000
Ethylbenzene	1.00e-001	1.59e-001
Xylenes	1.07e+000	1.70e+000
C8+ Heavies	3.96e-001	1.01e+000
Total Components	100.00	3.42e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 4.09e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.04e+001	999607.
Carbon Dioxide	1.99e-003	4.06e-004	20.
Nitrogen	2.19e-006	4.48e-007	0.
Methane	6.97e-004	1.43e-004	7.
Ethane	6.79e-004	1.39e-004	7.
Propane	4.29e-004	8.78e-005	4.
Isobutane	6.04e-005	1.24e-005	1.
n-Butane	1.65e-004	3.38e-005	2.
Isopentane	3.81e-005	7.79e-006	0.
n-Pentane	3.96e-005	8.10e-006	0.
n-Hexane	1.86e-005	3.81e-006	0.
Cyclohexane	8.62e-005	1.76e-005	1.
Other Hexanes	2.48e-005	5.07e-006	0.
Heptanes	3.22e-005	6.58e-006	0.
Methylcyclohexane	8.28e-005	1.69e-005	1.
2,2,4-Trimethylpentane	1.36e-007	2.78e-008	0.
Benzene	8.58e-003	1.75e-003	86.
Toluene	1.56e-002	3.20e-003	156.
Ethylbenzene	7.49e-004	1.53e-004	7.

Xylenes	9.98e-003	2.04e-003	100.
C8+ Heavies	4.02e-007	8.23e-008	0.
Total Components	100.00	2.04e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 8.14e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	4.12e-002	1.43e-003
Carbon Dioxide	7.87e-003	2.73e-004
Nitrogen	1.45e-004	5.03e-006
Methane	1.95e-002	6.75e-004
Ethane	8.82e-002	3.06e-003
Propane	2.82e-001	9.78e-003
Isobutane	1.44e-001	4.98e-003
n-Butane	3.97e-001	1.37e-002
Isopentane	3.32e-001	1.15e-002
n-Pentane	4.02e-001	1.39e-002
n-Hexane	5.29e-001	1.83e-002
Cyclohexane	6.12e-001	2.12e-002
Other Hexanes	6.51e-001	2.25e-002
Heptanes	4.43e+000	1.53e-001
Methylcyclohexane	2.53e+000	8.77e-002
2,2,4-Trimethylpentane	2.83e-002	9.81e-004
Benzene	2.79e+000	9.68e-002
Toluene	1.86e+001	6.43e-001
Ethylbenzene	3.25e+000	1.13e-001
Xylenes	3.60e+001	1.25e+000
C8+ Heavies	2.89e+001	1.00e+000
Total Components	100.00	3.46e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 14.81 psia
Flow Rate: 1.25e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.15e+001	6.82e-001
Carbon Dioxide	2.25e+000	3.26e-001
Nitrogen	1.50e-001	1.38e-002
Methane	4.32e+001	2.28e+000
Ethane	1.97e+001	1.95e+000
Propane	8.26e+000	1.20e+000
Isobutane	1.62e+000	3.09e-001
n-Butane	3.33e+000	6.37e-001
Isopentane	8.79e-001	2.08e-001
n-Pentane	8.50e-001	2.02e-001
n-Hexane	4.04e-001	1.14e-001
Cyclohexane	3.38e-001	9.36e-002
Other Hexanes	6.67e-001	1.89e-001

Heptanes	1.08e+000	3.56e-001
Methylcyclohexane	5.84e-001	1.88e-001
2,2,4-Trimethylpentane	6.00e-003	2.25e-003
Benzene	1.29e+000	3.30e-001
Toluene	2.42e+000	7.32e-001
Ethylbenzene	1.33e-001	4.65e-002
Xylenes	1.28e+000	4.46e-001
C8+ Heavies	1.26e-002	7.03e-003
Total Components	100.00	1.03e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.37e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	5.02e+001	1.14e-001
Ethane	2.29e+001	9.74e-002
Propane	9.60e+000	5.98e-002
Isobutane	1.88e+000	1.55e-002
n-Butane	3.87e+000	3.18e-002
Isopentane	1.02e+000	1.04e-002
n-Pentane	9.88e-001	1.01e-002
n-Hexane	4.69e-001	5.71e-003
Cyclohexane	3.93e-001	4.68e-003
Other Hexanes	7.75e-001	9.44e-003
Heptanes	1.26e+000	1.78e-002
Methylcyclohexane	6.79e-001	9.42e-003
2,2,4-Trimethylpentane	6.97e-003	1.13e-004
Benzene	1.49e+000	1.65e-002
Toluene	2.81e+000	3.66e-002
Ethylbenzene	1.55e-001	2.32e-003
Xylenes	1.49e+000	2.23e-002
C8+ Heavies	1.46e-002	3.51e-004
Total Components	100.00	4.64e-001

CONDENSER CONTROL CURVE DATA REPORT:

CONDENSER CONTROL EFFICIENCY CURVES

Note: Condenser curves computed for the range 40.0 F <= T <= 170.0 F. DO NOT EXTRAPOLATE BEYOND THIS RANGE!

Temp(F)	BTEX	Total HAP	VOC
40.0	95.62	94.83	69.49
45.0	94.79	93.91	68.32
50.0	93.87	92.89	67.16
55.0	92.78	91.70	65.90
60.0	91.54	90.36	64.57
65.0	90.14	88.85	63.17
70.0	88.55	87.17	61.68
75.0	86.75	85.28	60.11
80.0	84.73	83.18	58.44

85.0	82.48	80.87	56.68
90.0	79.74	78.08	54.64
95.0	76.87	75.18	52.62
100.0	73.69	71.98	50.47
105.0	70.15	68.45	48.18
110.0	66.24	64.57	45.76
115.0	61.93	60.31	43.19
120.0	57.22	55.68	40.48
125.0	52.10	50.66	37.62
130.0	46.60	45.27	34.64
135.0	40.77	39.59	31.55
140.0	34.73	33.71	28.38
145.0	28.69	27.83	25.21
150.0	22.87	22.18	22.09
155.0	17.51	16.98	19.04
160.0	12.96	12.57	16.10
165.0	8.74	8.48	12.73
170.0	4.73	4.59	8.29

ANNUAL AIR-COOLED CONDENSER PERFORMANCE:

ANNUAL AIR-COOLED CONDENSER PERFORMANCE

Nearest Site for Air Temperature Data: Elkins, WV

Ambient Air Dry Bulb Temperature (deg. F)	Frequency (%)	Condenser Outlet Temperature (deg. F)
<=50	49.57	<=70
51-55	8.52	71-75
56-60	9.28	76-80
61-65	10.35	81-85
66-70	8.85	86-90
71-75	6.15	91-95
76-80	4.62	96-100
81-85	2.09	101-105
86-90	0.52	106-110
91-95	0.06	111-115
96-100	0.00	116-120
>100	0.00	>120

Condenser outlet temperature approach to ambient: 20.00 deg. F

Annual air-cooled condenser emissions and control efficiency:

	Uncontrolled emissions tons/year	Controlled emissions tons/year	% Control
Benzene	1.878	0.805	57.12
BTEX	16.036	2.452	84.71
Total HAP	16.632	2.791	83.22
VOC	37.334	15.435	58.66

element

Element Materials Technology
2129 West Willow Street
Scott, LA
70583-5301 USA

P 337 232 3568
F 337 232 3621
T 888 786 7555
info.scott@element.com
element.com

GAS ANALYSIS REPORT NO.: 15-091114-42 (361816) DATE: 09/11/14

FOR: ACCESS MIDSTREAM
ATTN: DEE BAILEY
190 MIDSTREAM WAY
JANE LEW WV 26378

SAMPLE IDENTIFICATION:
COMPANY: ACCESS MIDSTREAM
FIELD:
LEASE: MILLER CF INLET
STA #:

SAMPLE DATA: DATE: 09/03/14 10:00 BY: R. L.
PSIG: 897 TEMP: 103 DEG.F. DP: N/P LBS H20

REMARKS:

CYL #1458

SAMPLE TYPE: SPOT EFFECTIVE DATE: 10/01/14

HYDROCARBON ANALYSIS - METHOD GPA 2261-00 LAB ANALYST: MP

COMPONENT NAME		MOL PERCENT	GPM @ 14.730 PSIA
HYDROGEN SULFIDE	(H2S)	0.000	
CARBON DIOXIDE	(CO2)	0.176	
NITROGEN	(N2)	0.296	
METHANE	(C1)	86.960	
ETHANE	(C2)	9.696	2.592
PROPANE	(C3)	1.989	0.548
ISO-BUTANE	(IC4)	0.248	0.081
N-BUTANE	(NC4)	0.368	0.116
ISO-PENTANE	(IC5)	0.094	0.034
N-PENTANE	(NC5)	0.068	0.025
HEXANES PLUS	(C6+)	0.105	0.044
TOTAL		100.000	

MOL WEIGHT: 18.47
BTU/LB: 23248.0

ETHANE + GPM: 3.440
PROPANE + GPM: 0.848
ISO-PENTANE + GPM: 0.103

COMPRESSIBILITY FACTOR: 0.9973
SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1): 0.640

BTU/CUFT. (REAL) 60 DEG.F. - PSIA:	14.650	14.696	14.730	15.025
DRY:	1131.4	1135.0	1137.6	1160.4
SAT:	1111.6	1115.2	1117.8	1140.6

QUALITY OFFICER: Lisa Vernon

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2129 WEST WILLOW SCOTT LA 70583 337-232-3568

DATE: 09/11/14

SAMPLE IDENTIFICATION

COMPANY: ACCESS MIDSTREAM
FIELD:
LEASE: MILLER CF INLET
STA #:

SAMPLE DATE: 09/03/14
(361816)

CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
METHANE	0.0000	0.0000
ETHANE	0.0000	0.0000
PROPANE	0.0000	0.0000
ISO-BUTANE	0.0000	0.0000
N-BUTANE	0.0000	0.0000
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.0000	0.0000
ISOPENTANE	0.0000	0.0000
N-PENTANE	0.0000	0.0000
2,2-DIMETHYLBUTANE (NEOHEXANE)	0.0042	0.0195
2,3-DIMETHYLBUTANE CYCLOPENTANE	0.0044	0.0186
2-METHYLPENTANE	0.0198	0.0884
3-METHYLPENTANE	0.0120	0.0561
N-HEXANE	0.0179	0.0836
2,2-DIMETHYLPENTANE	0.0009	0.0048
METHYLCYCLOPENTANE	0.0026	0.0120
2,4-DIMETHYLPENTANE	0.0001	0.0005
2,2,3-TRIMETHYLBUTANE	0.0003	0.0018
BENZENE	0.0005	0.0021
3,3-DIMETHYLPENTANE	0.0006	0.0032
CYCLOHEXANE	0.0021	0.0095
2-METHYLHEXANE	0.0053	0.0288
2,3-DIMETHYLPENTANE	0.0017	0.0093
1,1-DIMETHYLCYCLOPENTANE 3-METHYLHEXANE	0.0057	0.0307
1,t3-DIMETHYLCYCLOPENTANE	0.0002	0.0013
1,c3-DIMETHYLCYCLOPENTANE 3-ETHYLPENTANE	0.0007	0.0038

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
1,t2-DIMETHYLCYCLOPENTANE 2,2,4-TRIMETHYLPENTANE	0.0004	0.0021
N-HEPTANE	0.0056	0.0304
METHYLCYCLOHEXANE 1,1,3-TRIMETHYLCYCLOPENTANE 2,2-DIMETHYLHEXANE	0.0042	0.0226
1,C2-DIMETHYLCYCLOPENTANE	0.0000	0.0002
2,5-DIMETHYLHEXANE	0.0004	0.0026
2,4-DIMETHYLHEXANE 2,2,3-TRIMETHYLPENTANE ETHYLCYCLOPENTANE	0.0009	0.0050
1,t2,c4-TRIMETHYLCYCLOPENTANE 3,3-DIMETHYLHEXANE	0.0003	0.0019
1,t2,c3-TRIMETHYLCYCLOPENTANE	0.0001	0.0003
2,3,4-TRIMETHYLPENTANE	0.0000	0.0003
TOLUENE	0.0010	0.0050
2,3-DIMETHYLHEXANE	0.0004	0.0023
1,1,2-TRIMETHYLCYCLOPENTANE	0.0001	0.0005
2-METHYLHEPTANE	0.0015	0.0096
4-METHYLHEPTANE	0.0006	0.0039
3,4-DIMETHYLHEXANE	0.0002	0.0012
3-METHYLHEPTANE 3-ETHYLHEXANE	0.0019	0.0119
1,c3-DIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOPENTANE 1,c2,t4-TRIMETHYLCYCLOPENTANE	0.0006	0.0035
1,t4-DIMETHYLCYCLOHEXANE	0.0002	0.0014
2,2,5-TRIMETHYLHEXANE	0.0000	0.0003
1,1-DIMETHYLCYCLOHEXANE 1,methyl-t3-ETHYLCYCLOPENTANE	0.0001	0.0007
1-methyl-c3-ETHYLCYCLOPENTANE	0.0001	0.0004
1-methyl-t2-ETHYLCYCLOPENTANE 2,2,4-TRIMETHYLHEXANE	0.0000	0.0002
1-methyl-1-ETHYLCYCLOPENTANE CYCLOHEPTANE N-OCTANE	0.0017	0.0106
1,T2-DIMETHYLCYCLOCHEXANE	0.0001	0.0008

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
UNKNOWN	0.0000	0.0000
1,t3-DIMETHYLCYCLOHEXANE 1,c4-DIMETHYLCYCLOHEXANE 1,c2,c3-TRIMETHYLCYCLOPENTANE	0.0001	0.0009
2,4,4-TRIMETHYLHEXANE	0.0000	0.0001
ISOPROPYLCYCLOPENTANE	0.0000	0.0001
UNKNOWN	0.0000	0.0003
2,2-DIMETHYLHEPTANE	0.0001	0.0005
2,4-DIMETHYLHEPTANE 1-methyl-c2-ETHYLCYCLOPENTANE	0.0002	0.0010
2,2,3-TRIMETHYLHEXANE	0.0000	0.0002
1,c2-DIMETHYLCYCLOHEXANE 2,6-DIMETHYLHEPTANE	0.0002	0.0010
N-PROPYLCYCLOPENTANE 1,c3,c5-TRIMETHYLCYCLOHEXANE	0.0000	0.0003
2,5-DIMETHYLHEPTANE 3,5-DIMETHYLHEPTANE ETHYLCYCLOHEXANE	0.0005	0.0032
1,1,3-TRIMETHYLCYCLOHEXANE 2,3,3-TRIMETHYLHEXANE 3,3-DIMETHYLHEPTANE	0.0001	0.0008
1,1,4-TRIMETHYLCYCLOHEXANE	0.0000	0.0001
UNKNOWN	0.0000	0.0000
2,3,4-TRIMETHYLHEXANE	0.0000	0.0004
ETHYLBENZENE	0.0001	0.0005
1,t2,t4-TRIMETHYLCYCLOHEXANE 1,c3,t5-TRIMETHYLCYCLOHEXANE 2,3-DIMETHYLHEPTANE	0.0002	0.0012
M-XYLENE P-XYLENE 3,4-DIMETHYLHEPTANE	0.0007	0.0042
2-METHYLOCTANE 4-METHYLOCTANE	0.0008	0.0053
UNKNOWN	0.0000	0.0000
3-METHYLOCTANE	0.0005	0.0036
UNKNOWN	0.0000	0.0000
1,t2,c3-TRIMETHYLCYCLOHEXANE 1,t2,c4-TRIMETHYLCYCLOHEXANE	0.0000	0.0002

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
O-XYLENE	0.0001	0.0006
1,1,2-TRIMETHYLCYCLOHEXANE	0.0000	0.0003
UNKNOWN	0.0001	0.0004
ISOBUTYLCYCLOPENTANE	0.0000	0.0001
N-NONANE	0.0006	0.0038
UNKNOWN	0.0000	0.0000
1,c2,c3-TRIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOHEXANE	0.0000	0.0000
UNKNOWN	0.0000	0.0001
ISOPROPYLBENZENE	0.0000	0.0002
2,2-DIMETHYLOCTANE	0.0000	0.0002
ISOPROPYLCYCLOHEXANE CYCLOOCTANE	0.0001	0.0007
UNKNOWN	0.0000	0.0001
N-BUTYLCYCLOPENTANE N-PROPYLCYCLOHEXANE	0.0001	0.0006
3,3-DIMETHYLOCTANE	0.0000	0.0002
UNKNOWN	0.0000	0.0000
N-PROPYLBENZENE	0.0001	0.0009
UNKNOWN	0.0000	0.0002
m-ETHYLTOLUENE	0.0000	0.0002
p-ETHYLTOLUENE 2,3-DIMETHYLOCTANE	0.0000	0.0003
4-METHYLNONANE 5-METHYLNONANE 1,3,5-TRIMETHYLBENZENE	0.0002	0.0011
2-METHYLNONANE	0.0002	0.0015
3-ETHYLOCTANE	0.0001	0.0009
O-ETHYLTOLUENE 3-METHYLNONANE	0.0001	0.0009
UNKNOWN	0.0000	0.0000
1,2,4-TRIMETHYLBENZENE t-BUTYLBENZENE METHYLCYCLOOCTANE	0.0000	0.0001
tert-BUTYLCYCLOHEXANE	0.0001	0.0005

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
ISO-BUTYLCYCLOHEXANE	0.0000	0.0001
N-DECANE	0.0002	0.0015
ISOBUTYLBENZENE	0.0000	0.0000
sec-BUTYLBENZENE	0.0000	0.0003
UNKNOWN	0.0000	0.0001
1-METHYL-3-ISOPROPYLBENZENE	0.0000	0.0002
1,2,3-TRIMETHYLBENZENE 1-METHYL-4-ISOPROPYLBENZENE	0.0000	0.0002
UNKNOWN	0.0000	0.0000
1-METHYL-2-ISOPROPYLBENZENE	0.0000	0.0003
UNKNOWN	0.0000	0.0000
N-BUTYLCYCLOHEXANE	0.0000	0.0002
UNKNOWN	0.0000	0.0002
1,3-DIETHYLBENZENE 1-METHYL-3-PROPYLBENZENE	0.0000	0.0001
1,2-DIETHYLBENZENE N-BUTYLBENZENE 1-METHYL-4-PROPYLBENZENE	0.0000	0.0001
1,4-DIETHYLBENZENE	0.0000	0.0002
1-METHYL-2-PROPYLBENZENE	0.0000	0.0003
1,4-DIMETHYL-2-ETHYLBENZENE	0.0000	0.0003
UNKNOWN	0.0000	0.0003
1,2-DIMETHYL-4-ETHYLBENZENE	0.0000	0.0001
1,3-DIMETHYL-2-ETHYLBENZENE	0.0000	0.0003
UNKNOWN	0.0000	0.0000
1,2-DIMETHYL-3-ETHYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
N-UNDECANE	0.0001	0.0009
UNKNOWN	0.0000	0.0000
1,2,4,5-TETRAMETHYLBENZENE	0.0000	0.0000
1,2,3,5-TETRAMETHYLBENZENE	0.0000	0.0001
UNKNOWN	0.0000	0.0001
1,2,3,4-TETRAMETHYLBENZENE CYCLODECANE	0.0000	0.0000

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
UNKNOWN	0.0000	0.0002
NAPHTHALENE	0.0000	0.0001
N-DODECANE	0.0000	0.0003
ISOTRIDECANES PLUS	0.0000	0.0000
TOTALS	0.1050	0.5360

TOTAL HEXANES	=	0.0583	0.2662
TOTAL HEPTANES	=	0.0267	0.1403
TOTAL OCTANES	=	0.0144	0.0852
TOTAL NONANES	=	0.0043	0.0291
TOTAL DECANES PLUS	=	0.0013	0.0152

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DATE: 09/11/14

SAMPLE IDENTIFICATION

COMPANY: ACCESS MIDSTREAM
FIELD:
LEASE: MILLER CF INLET
STA #:

SAMPLE DATE: 09/03/14
(361816)

CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
METHANE	0.000	0.000
ETHANE	0.000	0.000
PROPANE	0.000	0.000
ISO-BUTANE	0.000	0.000
N-BUTANE	0.000	0.000
2,2-DIMETHYLPROPANE (NEOPENTANE)	0.000	0.000
ISOPENTANE	0.000	0.000
N-PENTANE	0.000	0.000
2,2-DIMETHYLBUTANE (NEOHEXANE)	3.957	3.630
2,3-DIMETHYLBUTANE CYCLOPENTANE	4.183	3.478
2-METHYLPENTANE	17.937	16.441
3-METHYLPENTANE	11.411	10.466
N-HEXANE	17.013	15.594
2,2-DIMETHYLPENTANE	0.846	0.903
METHYLCYCLOPENTANE	2.510	2.244
2,4-DIMETHYLPENTANE	0.085	0.088
2,2,3-TRIMETHYLBUTANE	0.310	0.328
BENZENE	0.461	0.385
3,3-DIMETHYLPENTANE	0.564	0.601
CYCLOHEXANE	1.983	1.772
2-METHYLHEXANE	5.038	5.370
2,3-DIMETHYLPENTANE	1.626	1.731
1,1-DIMETHYLCYCLOPENTANE 3-METHYLHEXANE	5.386	5.733
1,t3-DIMETHYLCYCLOPENTANE	0.235	0.244

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,c3-DIMETHYLCYCLOPENTANE 3-ETHYLPENTANE	0.677	0.707
1,t2-DIMETHYLCYCLOPENTANE 2,2,4-TRIMETHYLPENTANE	0.367	0.388
N-HEPTANE	5.320	5.668
METHYLCYCLOHEXANE 1,1,3-TRIMETHYLCYCLOPENTANE 2,2-DIMETHYLHEXANE	3.985	4.225
1,C2-DIMETHYLCYCLOPENTANE	0.028	0.034
2,5-DIMETHYLHEXANE	0.404	0.493
2,4-DIMETHYLHEXANE 2,2,3-TRIMETHYLPENTANE ETHYLCYCLOPENTANE	0.855	0.933
1,t2,c4-TRIMETHYLCYCLOPENTANE 3,3-DIMETHYLHEXANE	0.291	0.349
1,t2,c3-TRIMETHYLCYCLOPENTANE	0.056	0.065
2,3,4-TRIMETHYLPENTANE	0.047	0.061
TOLUENE	0.949	0.934
2,3-DIMETHYLHEXANE	0.348	0.428
1,1,2-TRIMETHYLCYCLOPENTANE	0.075	0.086
2-METHYLHEPTANE	1.476	1.795
4-METHYLHEPTANE	0.602	0.736
3,4-DIMETHYLHEXANE	0.179	0.216
3-METHYLHEPTANE 3-ETHYLHEXANE	1.823	2.219
1,c3-DIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOPENTANE 1,c2,t4-TRIMETHYLCYCLOPENTANE	0.545	0.650
1,t4-DIMETHYLCYCLOHEXANE	0.216	0.258
2,2,5-TRIMETHYLHEXANE	0.038	0.049
1,1-DIMETHYLCYCLOHEXANE 1,methyl-t3-ETHYLCYCLOPENTANE	0.113	0.138
1-methyl-c3-ETHYLCYCLOPENTANE	0.056	0.069
1-methyl-t2-ETHYLCYCLOPENTANE 2,2,4-TRIMETHYLHEXANE	0.019	0.030
1-methyl-1-ETHYLCYCLOPENTANE CYCLOHEPTANE N-OCTANE	1.635	1.984

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,T2-DIMETHYLCYCLOCHEXANE	0.122	0.148
UNKNOWN	0.000	0.001
1,t3-DIMETHYLCYCLOHEXANE 1,c4-DIMETHYLCYCLOHEXANE 1,c2,c3-TRIMETHYLCYCLOPENTANE	0.141	0.171
2,4,4-TRIMETHYLHEXANE	0.009	0.011
ISOPROPYLCYCLOPENTANE	0.009	0.014
UNKNOWN	0.038	0.052
2,2-DIMETHYLHEPTANE	0.066	0.092
2,4-DIMETHYLHEPTANE 1-methyl-c2-ETHYLCYCLOPENTANE	0.150	0.188
2,2,3-TRIMETHYLHEXANE	0.028	0.043
1,c2-DIMETHYLCYCLOHEXANE 2,6-DIMETHYLHEPTANE	0.160	0.194
N-PROPYLCYCLOPENTANE 1,c3,c5-TRIMETHYLCYCLOHEXANE	0.047	0.058
2,5-DIMETHYLHEPTANE 3,5-DIMETHYLHEPTANE ETHYLCYCLOHEXANE	0.498	0.598
1,1,3-TRIMETHYLCYCLOHEXANE 2,3,3-TRIMETHYLHEXANE 3,3-DIMETHYLHEPTANE	0.103	0.144
1,1,4-TRIMETHYLCYCLOHEXANE	0.019	0.024
UNKNOWN	0.000	0.006
2,3,4-TRIMETHYLHEXANE	0.047	0.067
ETHYLBENZENE	0.075	0.088
1,t2,t4-TRIMETHYLCYCLOHEXANE 1,c3,t5-TRIMETHYLCYCLOHEXANE 2,3-DIMETHYLHEPTANE	0.169	0.221
M-XYLENE P-XYLENE 3,4-DIMETHYLHEPTANE	0.696	0.786
2-METHYLOCTANE 4-METHYLOCTANE	0.733	0.997
UNKNOWN	0.000	0.006
3-METHYLOCTANE	0.489	0.664
UNKNOWN	0.000	0.006

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,t2,c3-TRIMETHYLCYCLOHEXANE	0.028	0.040
1,t2,c4-TRIMETHYLCYCLOHEXANE		
O-XYLENE	0.094	0.104
1,1,2-TRIMETHYLCYCLOHEXANE	0.038	0.053
UNKNOWN	0.056	0.079
ISOBUTYLCYCLOPENTANE	0.019	0.027
N-NONANE	0.526	0.712
UNKNOWN	0.000	0.000
1,c2,c3-TRIMETHYLCYCLOHEXANE	0.000	0.000
1,c2,t3-TRIMETHYLCYCLOHEXANE		
UNKNOWN	0.009	0.014
ISOPROPYLBENZENE	0.038	0.046
2,2-DIMETHYLOCTANE	0.028	0.042
ISOPROPYLCYCLOHEXANE	0.103	0.129
CYCLOOCTANE		
UNKNOWN	0.019	0.021
N-BUTYLCYCLOPENTANE	0.094	0.121
N-PROPYLCYCLOHEXANE		
3,3-DIMETHYLOCTANE	0.019	0.034
UNKNOWN	0.000	0.000
N-PROPYLBENZENE	0.132	0.168
UNKNOWN	0.028	0.038
m-ETHYLTOLUENE	0.028	0.036
p-ETHYLTOLUENE	0.047	0.064
2,3-DIMETHYLOCTANE		
4-METHYLNONANE	0.150	0.207
5-METHYLNONANE		
1,3,5-TRIMETHYLBENZENE		
2-METHYLNONANE	0.188	0.280
3-ETHYLOCTANE	0.113	0.164
O-ETHYLTOLUENE	0.113	0.159
3-METHYLNONANE		
UNKNOWN	0.009	0.009
1,2,4-TRIMETHYLBENZENE	0.019	0.023
t-BUTYLBENZENE		
METHYLCYCLOOCTANE		

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
tert-BUTYLCYCLOHEXANE	0.056	0.084
ISO-BUTYLCYCLOHEXANE	0.009	0.012
N-DECANE	0.188	0.280
ISOBUTYLBENZENE	0.000	0.002
sec-BUTYLBENZENE	0.038	0.055
UNKNOWN	0.009	0.018
1-METHYL-3-ISOPROPYLBENZENE	0.028	0.046
1,2,3-TRIMETHYLBENZENE	0.028	0.037
1-METHYL-4-ISOPROPYLBENZENE		
UNKNOWN	0.000	0.007
1-METHYL-2-ISOPROPYLBENZENE	0.038	0.047
UNKNOWN	0.009	0.009
N-BUTYLCYCLOHEXANE	0.019	0.031
UNKNOWN	0.019	0.034
1,3-DIETHYLBENZENE	0.019	0.022
1-METHYL-3-PROPYLBENZENE		
1,2-DIETHYLBENZENE	0.009	0.017
N-BUTYLBENZENE		
1-METHYL-4-PROPYLBENZENE		
1,4-DIETHYLBENZENE	0.028	0.041
1-METHYL-2-PROPYLBENZENE	0.038	0.055
1,4-DIMETHYL-2-ETHYLBENZENE	0.038	0.051
UNKNOWN	0.038	0.059
1,2-DIMETHYL-4-ETHYLBENZENE	0.009	0.015
1,3-DIMETHYL-2-ETHYLBENZENE	0.047	0.063
UNKNOWN	0.000	0.006
1,2-DIMETHYL-3-ETHYLBENZENE	0.000	0.001
UNKNOWN	0.000	0.005
N-UNDECANE	0.103	0.167
UNKNOWN	0.000	0.002
1,2,4,5-TETRAMETHYLBENZENE	0.000	0.004
1,2,3,5-TETRAMETHYLBENZENE	0.009	0.012
UNKNOWN	0.009	0.020

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,2,3,4-TETRAMETHYLBENZENE	0.000	0.003
CYCLODECANE		
UNKNOWN	0.019	0.041
NAPHTHALENE	0.019	0.023
N-DODECANE	0.028	0.059
ISOTRIDECANES PLUS	0.000	0.000
TOTALS	100.000	100.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1)	3.2456
MOLECULAR WEIGHT	93.99
COMPRESSIBILITY FACTOR	0.8744
SUMMATION FACTOR	0.0924
CU. FT. VAPOR/GAL @ 14.696 PSIA & 60 DEG. F.	23.727
CU. FT. VAPOR/GAL @ 14.730 PSIA & 60 DEG. F.	23.672
BTU/CU.FT. @ 14.696 PSIA, DRY	5122.60
BTU/CU.FT. @ 14.730 PSIA, DRY	5134.50
BTU/LB	20676

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