Appalachia
MIDSTREAM SERVICES

September 09, 2015

Appalachia Midstream Services LLC
Sand Hill Station
051-00145
R13-2913A
Joe K Jerry

VIA UPS

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

RECEIVED
SEP 14 2015
WV DEP / DIV OF AIR QUALITY

Re: Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
R13 Permit Modification Application
Permit No. R13-2913
Plant ID No. 051-00145

Dear Mr. Benedict:

Appalachia Midstream Services, L.L.C. (AMS), is authorization to operate the Sand Hill Compressor 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:

- Reduce control efficiencies claimed for the oxidative catalysts
- Revise emissions from the dehydration units, fugitives, and blowdowns using updated gas analysis
- Revise greenhouse gas emissions using the current Global Warming Potential multipliers.

The enclosed package contains the required application forms, emissions calculations and supporting documentation for the referenced project. A check in the amount $1,000 is also enclosed for the application fees. The public notice for the proposed construction will be published in *The Intelligencer*. AMS will forward the Affidavit of Publication to your attention once it is received from the publisher.

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

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, L.L.C.

SAND HILL COMPRESSOR STATION

MODIFICATION PERMIT APPLICATION

SUBMITTED TO WVDEP DIVISION OF AIR QUALITY
SEPTEMBER 2015

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INTRODUCTION

Appalachia Midstream Services, L.L.C. (AMS), operates the Sand Hill Compressor Station (Sand Hill) in Marshall County under Permit No. R13-2913 issued on July 23, 2012. With this application and in accordance with the West Virginia Air Pollution Control Act and Title 45 Series 13 (45CSR13), AMS requests to update emissions at the facility using a recent gas analysis and the most recent Global Warming Potential multipliers as well as decrease the carbon monoxide and volatile organic compound control efficiencies. Sand Hill is authorized to operate twelve (12) 1,380-hp Caterpillar G3516B ultra lean-burn compressor engines equipped with oxidation catalysts, one (1) 805-hp Capstone C600 microturbine generator, three (3) 55.0-MMSCFD triethylene glycol (TEG) dehydration units equipped with condenser controls, three (3) 1.0-mmBtu/hr TEG reboilers, two (2) 0.5-mmBtu/hr heater treater burners, eight (8) 400-bbl condensate storage tanks, two (2) 400-bbl produced water storage tanks, condensate and produced water truck loading, compressor blowdowns, and fugitive emissions.

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 criteria air pollutants, hazardous air pollutants, and greenhouse gas emissions from the proposed equipment are presented in Attachment N.

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

Each TEG dehydration unit has a capacity of 55.0 million standard cubic feet per day (MMSCFD) and has one (1) 1.0-mmBtu/hr TEG reboiler for glycol regeneration. Each unit is equipped with a primary electric glycol pump with a maximum capacity of 22 gallons per minute (gpm). In addition, each TEG dehydration unit has two (2) gas injection glycol pumps, each with a maximum capacity of 7.5 gallons per minute, for a total maximum capacity of 15 gpm. Still vent vapors from each TEG dehydration unit will be controlled by an air-cooled condenser. Non-condensables from the regenerator overheads will be routed to the reboiler and burned with 98% destruction efficiency. Flash tank off-gases from each unit will be routed to their respective TEG reboiler to be burned as fuel. Any excess flash tank vapors not burned as fuel will be

recycled/recompressed for 100% control efficiency. The TEG reboilers will be equipped with a burner management system to ensure a constant flame for combustion of the vapors. Potential emissions from the TEG dehydration units were based on the GRI-GLYCalc™ results for the electric pumps since the emissions were higher than those using the backup gas pumps. A 10% safety factor was added to GRI-GLYCalc™ results to account for potential fluctuations in gas composition. GRI-GLYCalc™ Input Summary and Aggregate Calculations reports for both the electric and gas pump scenarios are enclosed.

TEG reboiler and heater treater burner emissions were calculated using AP-42/EPA emission factors for natural gas combustion.

Working and breathing emissions from the condensate and produced water tanks were calculated using EPA TANKS 4.0.9d software. Flashing emissions were estimated using ProMax process simulation software. Emissions from the tanks are controlled by electric-driven vapor recovery compressor units. Gasoline RVP 15 was selected as representative of tank contents and used to model emissions. Although the produced water tanks are presumed to have negligible hydrocarbons, 1% of the total produced water throughput was modeled as Gasoline RVP 15 to conservatively estimate emissions.

Condensate and produced water truck loading emissions were calculated using AP-42 Section 5.2-4 Equation 1 for Petroleum Liquid Loading Losses and the physical properties of Gasoline RVP 15 from EPA TANKS 4.0.9d data.

Fugitive emissions for the facility are based on calculation methodologies presented in EPA-453/R-95-017, Protocol for Equipment Leak Emissions Estimates and a representative gas analysis.

Documentation supporting the emissions calculations, including manufacturer specification sheets, a catalyst specification sheet, GRI-GLYCalc reports, and a 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)*: **Sand Hill 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: **Proposed – From Dallas: 3 miles west on Stone Church Road, 1.3 miles south on Golden Road, east into location.**

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: **213112**
11A. DAQ Plant ID No. (for existing facilities only): **051-00145**	11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): **R13-2913**

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 Dallas: 3 miles west on Stone Church Road, 1.3 miles south on Golden Road, then east into location.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
N/A	**Dallas**	**Marshall**
12.E. UTM Northing (KM): **4,426.286**	12F. UTM Easting (KM): **537.993**	12G. UTM Zone: **17S**

13. Briefly describe the proposed change(s) at the facility:
AMS requests to update emissions at the facility using a recent gas analysis and the most recent Global Warming Potential multipliers as well as decrease the carbon monoxide and volatile organic compound control efficiencies.

14A. Provide the date of anticipated installation or change:	14B. Date of anticipated Start-Up if a permit is granted:
– If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: 02/26/2015 (gas analysis date)	**N/A**

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). **¼ mile**

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	☐ Haul Road Emissions	☐ Quarry
☒ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☒ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify: Engines, Turbine, TEG Dehydration Units, Heater Treaters, and Blowdowns

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

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

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

☐ Other Collectors, specify

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 Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

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

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

35A. **Certification of Information.** To certify this permit application, a Responsible Official (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 Don Wicburg *(Please use blue ink)* DATE: 9/3/2015 *(Please use blue ink)*

35B. Printed name of signee: **Don Wicburg**		35C. Title: **VP Northeast**
35D. E-mail: **Don.Wicburg@Williams.com**	36E. Phone: **304-843-3158**	36F. FAX:
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.

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.

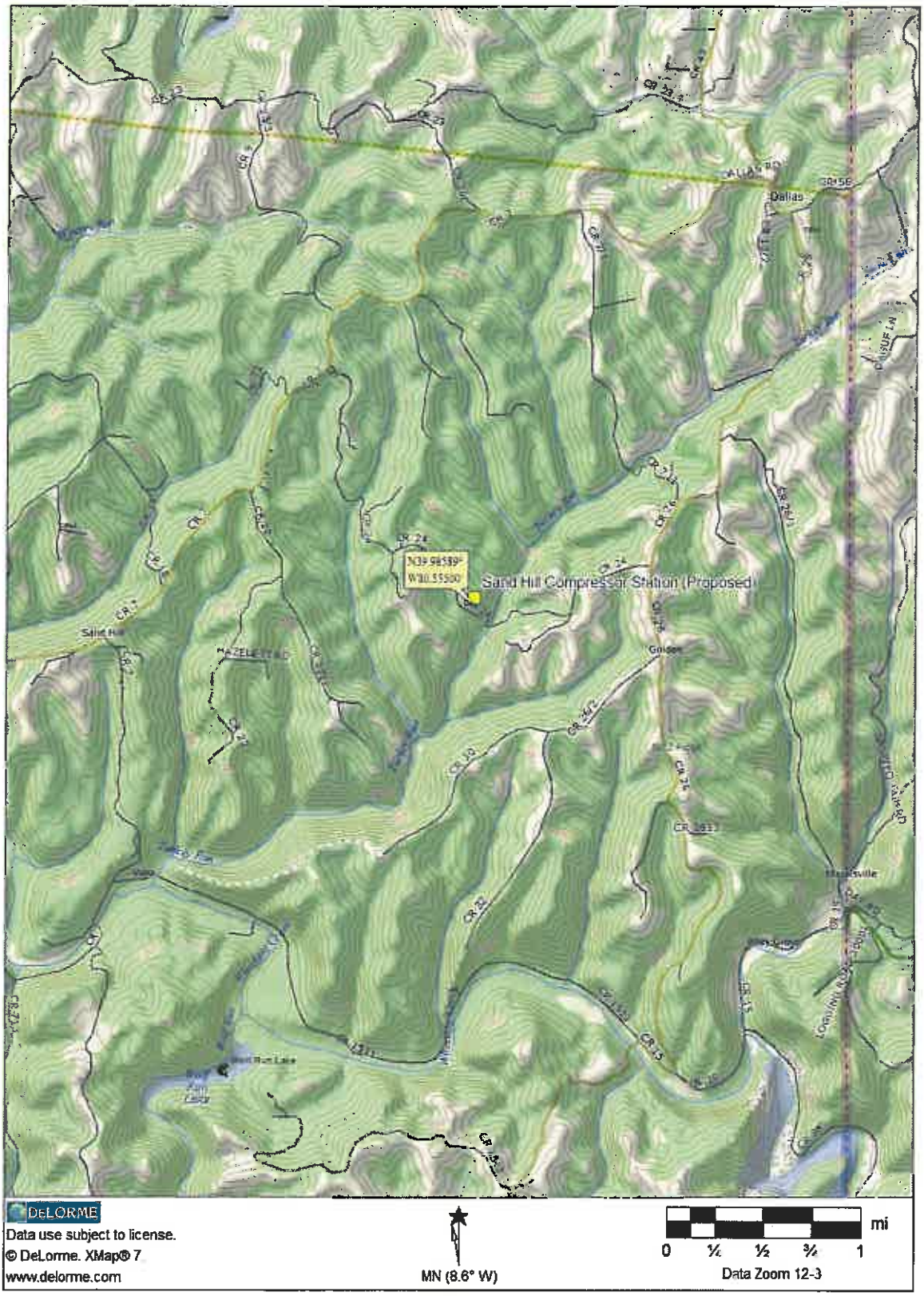
This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

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



Sand Hill Compressor Station
Figure 1: Area Map
Marshall County, West Virginia
September 2015

ATTACHMENT C: INSTALLATION/START-UP SCHEDULE

No new equipment is proposed with this application.

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:

Potential emissions associated with the 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. The proposed facility is not a natural gas processing plant; therefore, this Subpart is not applicable.

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 Caterpillar G3516B compressor engines are four-stroke, lean-burn natural gas-fired spark ignition (SI) internal combustion 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 generator has a heat input less than 10-mmBtu/hr and is therefore not subject to this subpart.

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 is a minor (area) source of hazardous air pollutants. Even though the TEG dehydration units at this facility are considered affected sources, they will be 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 will be 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:

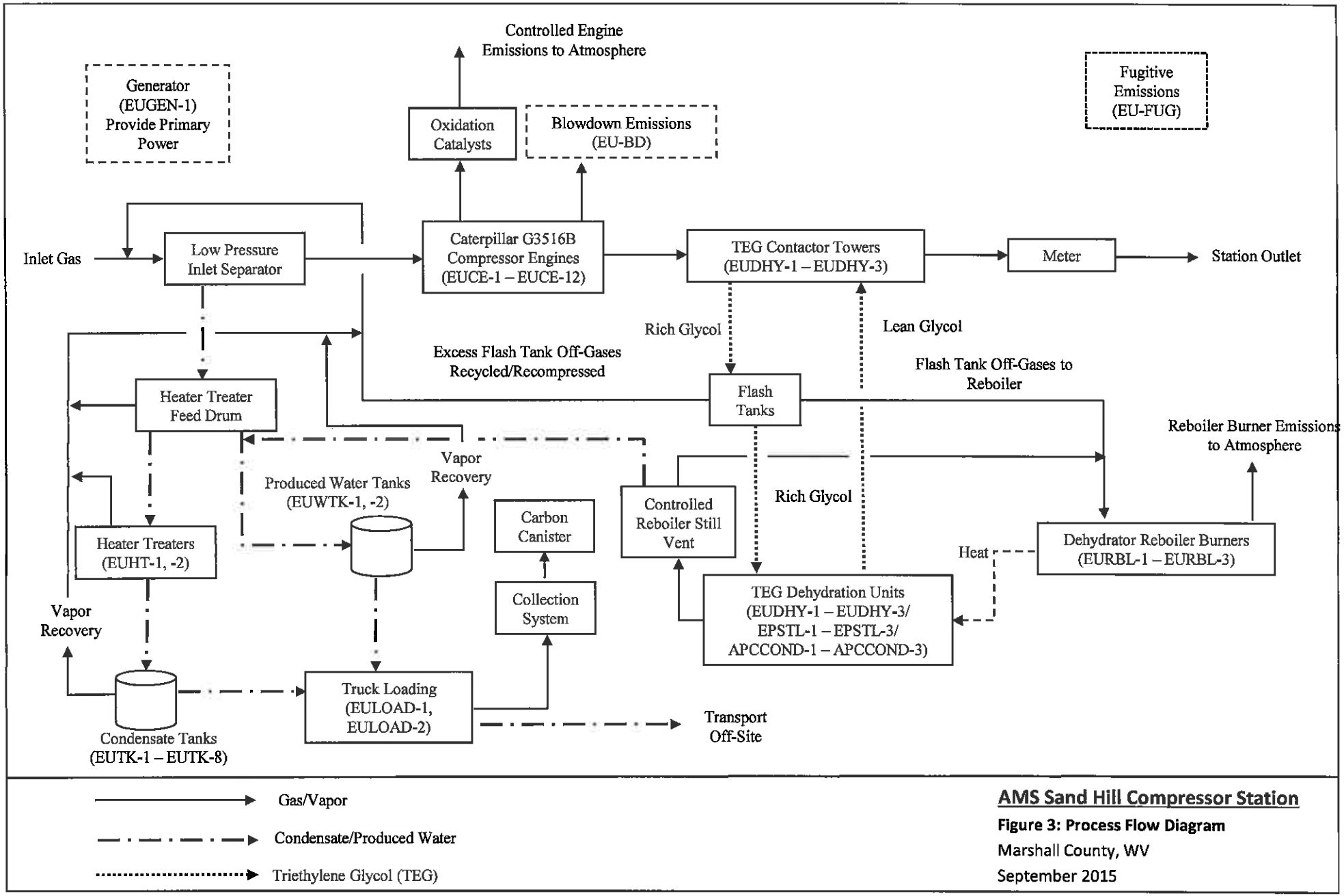
The original rule, published on February 26, 2004, initially affected new (constructed or reconstructed after December 19, 2002) reciprocating internal combustion engines (RICE) with a site-rating greater than 500 brake horsepower (HP) located at a major source of HAP emissions. On January 18, 2008, 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, lean-burn stationary RICE were constructed after the June 12, 2006 effective date for new stationary RICE at area sources and are subject to this subpart. The engines meet the requirements of this subpart by compliance with Subpart JJJJ. No further requirements apply for these engines under this subpart.

ATTACHMENT E: PLOT PLAN

A plot plan was previously submitted for this facility. No equipment changes are included in this application.

ATTACHMENT F: PROCESS FLOW DIAGRAM



AMS Sand Hill Compressor Station

Figure 3: Process Flow Diagram

Marshall County, WV

September 2015

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 at low pressure through a two-phase low pressure inlet separator that will gravity separate the inlet stream into two streams: gas and hydrocarbon/water liquids. Low-pressure inlet gas is compressed via three-stage reciprocating compressors with interstage cooling. Discharge from the compressors passes through filter/coalescer separators to remove any condensed or entrained liquids present. After the inlet gas passes through compressors, it goes through the dehydration process before exiting the facility via a sales pipeline. A portion of the discharge gas will be removed prior to outlet metering for use as fuel gas.

Triethylene glycol (TEG) dehydration units are used to remove water from the gas. The units are comprised of both a glycol contactor skid and a glycol regeneration skid. 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 remove the water and regenerate the glycol. The heat is supplied by a natural gas-fired reboiler that exhausts to the atmosphere. Overhead still column emissions from the glycol regeneration skid are controlled by an air-cooled condenser. The non-condensables from the still column overheads are routed to the reboiler and burned with 98% destruction efficiency. Flash tank off-gases from the glycol regeneration skid are also routed to the reboiler to be burned as fuel with 98% destruction efficiency. The TEG reboilers are equipped with a burner management system to ensure a constant flame for combustion of the vapors. Any excess vapors not burned as fuel are recycled/recompressed for 100% control efficiency.

After dehydration, fuel gas is pulled from the discharge side of the process. A fuel gas skid (not an emission source) reduces the pressure of a portion of the discharge gas to a pressure suitable for use by fuel-burning equipment. Pertaining to the fuel gas skid, there is no hydrocarbon liquid recovery by design.

Inlet liquids flow from the two-phase low-pressure inlet separator to a heater-treater feed drum, a three-phase low pressure separator. Heavy liquids (water) are separated and sent to atmospheric produced water storage tanks. Produced water is transported off site via truck. Liquid hydrocarbons (condensate) flows from the feed drum to the heater treater. Any vapors evolved from the liquid to the feed drum are routed to the electric-driven flash gas compressor and recycled to the two-phase low pressure inlet separator. After stabilization, condensate is sent to atmospheric condensate storage tanks. Produced condensate is transported off site via truck. Vapors evolved from truck loading (both produced water and condensate) are captured and routed to an activated carbon canister with at least 95% control efficiency.

The facility contains several liquid recycle streams to reduce emissions. All high pressure liquids are cascaded to lower pressure separators to capture gases evolved as a result of pressure reduction. All liquids formed by gas cooling in the inter-stage coolers of the three-stage reciprocating compressors are cascaded to lower pressure scrubbers on the compressor skid.

The facility will also contain several gas recycle streams. All atmospheric tank emissions are controlled by vapor recovery compression. The vapor recovery compressors discharge in the flash gas compressor. The flash gas compressors compress these gases and discharge into the two-phase low pressure inlet separator. Overhead gases from the heater treater feed drum and heater treater are also routed to the flash gas compressor and recycled to the two-phase low pressure inlet separator.

The generator provides electric power to the vapor recovery and flash gas compressors, electric glycol pumps, and other electrical equipment. Fugitive emissions from component leaks also occur.

Please note that the compressor station has two primary suction pressure operating points, 125 psig and 50 psig. The discharge pressure range is 900 – 1,200 psig. The facility initially operates at 125 psig suction pressure and will continue to do so until such time that field production volumes decline. At that time, the suction pressure will be lowered to 50 psig, resulting in a diminished facility capacity.

ATTACHMENT H: MATERIAL SAFETY DATA SHEETS (MSDS)

MSDS were previously submitted.

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	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-2	EPCE-2	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-3	EPCE-3	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-4	EPCE-4	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-5	EPCE-5	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-6	EPCE-6	Caterpillar G3516B Engine	2012	1,380-hp	Modification	Oxid. Cat.
EUCE-7	EPCE-7	Caterpillar G3516B Engine	2014	1,380-hp	Modification	Oxid. Cat.
EUCE-8	EPCE-8	Caterpillar G3516B Engine	2014	1,380-hp	Modification	Oxid. Cat.
EUCE-9	EPCE-9	Caterpillar G3516B Engine	2014	1,380-hp	Modification	Oxid. Cat.
EUCE-10	EPCE-10	Caterpillar G3516B Engine	TBD	1,380-hp	Modification	Oxid. Cat.
EUCE-11	EPCE-11	Caterpillar G3516B Engine	TBD	1,380-hp	Modification	Oxid. Cat.
EUCE-12	EPCE-12	Caterpillar G3516B Engine	TBD	1,380-hp	Modification	Oxid. Cat.
EUGEN-1	EPGEN-1	Capstone C600 Microturbine Generator	2012	805-hp	N/A	N/A
EUDHY-1	EPSTL-1	TEG Dehydration Unit Still Vent	2012	55.0-MMSCFD	Modification	APCCOND-1
EUDHY-1	EPRBL-1	TEG Reboiler	2012	1.0-mmBtu/hr	N/A	N/A
EUDHY-2	EPSTL-2	TEG Dehydration Unit Still Vent	2014	55.0-MMSCFD	Modification	APCCOND-2
EUDHY-2	EPRBL-2	TEG Reboiler	2014	1.0-mmBtu/hr	N/A	N/A
EUDHY-3	EPSTL-3	TEG Dehydration Unit Still Vent	TBD	55.0-MMSCFD	Modification	APCCOND-3
EUDHY-3	EPRBL-3	TEG Reboiler	TBD	1.0-mmBtu/hr	N/A	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]
EUHT-1	EPHT-1	Heater Treater Burner	2012	0.5-mmBtu/hr	N/A	N/A
EUHT-2	EPHT-2	Heater Treater Burner	TBD	0.5-mmBtu/hr	N/A	N/A
EUTK-1	EPTK-1	Condensate Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUTK-2	EPTK-2	Condensate Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUTK-3	EPTK-3	Condensate Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUTK-4	EPTK-4	Condensate Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUTK-5	EPTK-5	Condensate Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUTK-6	EPTK-6	Condensate Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUTK-7	EPTK-7	Condensate Storage Tank	TBD	400-bbl	N/A	Vapor Recovery Unit
EUTK-8	EPTK-8	Condensate Storage Tank	TBD	400-bbl	N/A	Vapor Recovery Unit
EUWTK-9	EPWTK-9	Produced Water Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EUWTK-10	EPWTK-10	Produced Water Storage Tank	2012	400-bbl	N/A	Vapor Recovery Unit
EULOAD-1	EPLOAD-1	Condensate Truck Loading	2012	N/A	N/A	APC-CARBTROL
EULOAD-2	EPLOAD-2	Produced Water Truck Loading	2012	N/A	N/A	APC-CARBTROL
EU-FUG	EP-FUG	Fugitive Emissions	2012	N/A	Modification	N/A
EU-BD	EP-BD	Blowdown Emissions	2012	N/A	Modification	N/A

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-1	Upward vertical stack	EUCE-1	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-2	Upward vertical stack	EUCE-2	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-3	Upward vertical stack	EUCE-3	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-4	Upward vertical stack	EUCE-4	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-5	Upward vertical stack	EUCE-5	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-6	Upward vertical stack	EUCE-6	Caterpillar G3516B Compressor Engine	-	Oxidation Catalyst	-	-	NOx	1.52	6.66	1.52	6.66	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-7	Upward vertical stack	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	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-8	Upward vertical stack	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	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-9	Upward vertical stack	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	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-10	Upward vertical stack	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	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPCE-11	Upward vertical stack	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	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			

EPCE-12	Upward vertical stack	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	9.07	39.71	1.36	5.96			
								VOC	3.29	14.39	0.82	3.60			
								PM_{TOT}	0.12	0.54	0.12	0.54			
								SO_2	0.01	0.03	0.01	0.03			
								Acetaldehyde	0.10	0.45	0.10	0.45			
								Acrolein	0.06	0.28	0.06	0.28			
								Benzene	0.01	0.02	0.01	0.02			
								Ethylbenzene	<0.01	<0.01	<0.01	<0.01			
								Formaldehyde	1.19	5.20	0.06	0.27			
								n-Hexane	0.01	0.06	0.01	0.06			
								Methanol	0.03	0.14	0.03	0.14			
								Toluene	0.01	0.02	0.01	0.02			
								Xylenes	<0.01	0.01	<0.01	0.01			
								CO_2	1,566.80	6,862.58	1,566.80	6,862.58			
								CH_4	0.03	0.12	0.03	0.12			
								N_2O	<0.01	0.01	<0.01	0.01			
EPGEN-1	Upward vertical stack	EPGEN-1	Microturbine Generator	-	None	-	-	NOx	0.25	1.09	-	-	Gas/Vapor	O (Manufacturer Data/AP-42\EPA)	-
								CO	0.62	2.70					
								VOC	0.02	0.07					
								PM_{TOT}	0.05	0.22					
								SO_2	0.03	0.11					
								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	880.15	3,855.04					
								CH_4	0.02	0.08					
								N_2O	<0.01	0.01					
EPSTL-1	Upward vertical stack	EUDHY-1	Glycol Dehydrator Still Vent	APCCOND-1	Condenser	-	-	VOC	47.36	207.45	0.38	1.68	Gas/Vapor	O (GRI GLYCalc)	-
								Benzene	1.29	5.64	0.01	0.02			
								Toluene	0.12	0.52	<0.01	<0.01			
								Ethylbenzene	0.00	0.00	0.00	0.00			
								Xylenes	0.21	0.92	<0.01	<0.01			
								n-Hexane	1.94	8.50	0.01	0.04			
								CO_2	0.01	0.02	<0.01	<0.01			
								CH_4	1.51	6.62	0.03	0.13			

EPRBL-1	Upward vertical stack	EUDHY-1	Glycol Dehydrator Reboiler	-	-	-	-	NOx CO VOC PM_{TOT} SO_2 n-Hexane Formaldehyde Benzene Toluene CO_2 CH_4 N_2O	0.08 0.06 <0.01 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 116.98 <0.01 <0.01	0.33 0.28 0.02 0.03 <0.01 0.01 <0.01 <0.01 <0.01 512.36 0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPSTL-2	Upward vertical stack	EUDHY-2	Glycol Dehydrator Still Vent	APCCOND-2	Condenser	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	47.36 1.29 0.12 0.00 0.21 1.94 0.01 1.51	207.45 5.64 0.52 0.00 0.92 8.50 0.02 6.62	0.38 0.01 <0.01 0.00 <0.01 0.01 <0.01 0.03	1.68 0.02 <0.01 0.00 <0.01 0.04 <0.01 0.13	Gas/Vapor	O (GRI GLYCalc)	-
EPRBL-2	Upward vertical stack	EUDHY-2	Glycol Dehydrator Reboiler	-	-	-	-	NOx CO VOC PM_{TOT} SO_2 n-Hexane Formaldehyde Benzene Toluene CO_2 CH_4 N_2O	0.08 0.06 <0.01 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 116.98 <0.01 <0.01	0.33 0.28 0.02 0.03 <0.01 0.01 <0.01 <0.01 <0.01 512.36 0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPSTL-3	Upward vertical stack	EUDHY-3	Glycol Dehydrator Still Vent	APCCOND-3	Condenser	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	47.36 1.29 0.12 0.00 0.21 1.94 0.01 1.51	207.45 5.64 0.52 0.00 0.92 8.50 0.02 6.62	0.38 0.01 <0.01 0.00 <0.01 0.01 <0.01 0.03	1.68 0.02 <0.01 0.00 <0.01 0.04 <0.01 0.13	Gas/Vapor	O (GRI GLYCalc)	-

EPRBL-3	Upward vertical stack	EUDHY-3	Glycol Dehydrator Reboiler	-	-	-	-	NOx CO VOC PM_{TOT} SO_2 n-Hexane Formaldehyde Benzene Toluene CO_2 CH_4 N_2O	0.08 0.06 <0.01 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 116.98 <0.01 <0.01	0.33 0.28 0.02 0.03 <0.01 0.01 <0.01 <0.01 <0.01 512.36 0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPHT-1	Upward vertical stack	EUHT-1	Hot Oil Heater	-	-	-	-	NOx CO VOC PM_{TOT} SO_2 n-Hexane CO_2 CH_4 N_2O	0.04 0.03 <0.01 <0.01 <0.01 <0.01 58.49 <0.01 <0.01	0.17 0.14 0.01 0.01 <0.01 <0.01 256.18 <0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPHT-2	Upward vertical stack	EUHT-2	Hot Oil Heater	-	-	-	-	NOx CO VOC PMTOT SO_2 n-Hexane CO_2 CH_4 N_2O	0.04 0.03 <0.01 <0.01 <0.01 <0.01 58.49 <0.01 <0.01	0.17 0.14 0.01 0.01 <0.01 <0.01 256.18 <0.01 <0.01	-	-	Gas/Vapor	O (AP-42)	-
EPTK-1 – EPTK-8	Tank Vent	EUTK-1 – EUTK-8	Eight (8) 400-bbl Condensate Tanks	Vapor Recovery Unit	Vapor Recovery	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane	-	612.25 0.31 1.63 1.45 5.52 21.80	-	12.25 0.01 0.03 0.03 0.11 0.44	Gas/Vapor	O (TANKS 4.0.9d)	-

EPWTK-1 – EPWTK-2	Tank Vent	EUWTK-1 – EUWTK-2	Two (2) 400-bbl Produced Water Tanks	Vapor Recovery Unit	Vapor Recovery	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane	-	90.32 0.05 0.24 0.21 0.81 3.22	-	1.81 <0.01 <0.01 <0.01 0.02 0.06	Gas/Vapor	O (TANKS 4.0.9d)	-
EPLOAD-1	Fugitive	EULOAD-1	Condensate Truck Loading	APC-CARBTROL	Carbon Canister	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	-	24.33 0.01 0.06 0.06 0.22 0.87 0.01 7.31	-	8.15 <0.01 0.02 0.02 0.07 0.29 <0.01 2.45	Gas/Vapor	O (AP-42)	-
EPLOAD-2	Fugitive	EULOAD-2	Produced Water Truck Loading	APC-CARBTROL	Carbon Canister	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	-	0.04 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 0.01	-	0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	Gas/Vapor	O (AP-42)	-
EP-FUG	Fugitive	EU-FUG	Fugitive Emissions	-	-	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	-	11.89 <0.01 <0.01 <0.01 0.01 0.26 0.09 25.52	-	-	Gas/Vapor	O (API)	-
EP-BD	Fugitive	EU-BD	Blowdown Emissions	-	-	-	-	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	-	11.88 <0.01 <0.01 0.00 0.00 0.24 0.10 27.73	-	-	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-1	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-2	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-3	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-4	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-5	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-6	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-7	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-8	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-9	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-10	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-11	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPCE-12	1.0	1,012	9,240	195.8	~1,100	20 (est.)	4,426.286	537.993
EPSTL-1	N/A	212	N/A	N/A	~1,100	N/A	4,426.286	537.993

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
EPRBL-1	~1.3	350 – 400	N/A	N/A	~1,100	N/A	4,426.286	537.993
EPSTL-2	N/A	212	N/A	N/A	~1,100	N/A	4,426.286	537.993
EPRBL-2	~1.3	350 – 400	N/A	N/A	~1,100	N/A	4,426.286	537.993
EPSTL-3	N/A	212	N/A	N/A	~1,100	N/A	4,426.286	537.993
EPRBL-3	~1.3	350 – 400	N/A	N/A	~1,100	N/A	4,426.286	537.993
EP-HT-1	0.7	~450	N/A	N/A	~1,100	N/A	4,426.286	537.993
EP-HT-2	0.7	~450	N/A	N/A	~1,100	N/A	4,426.286	537.993
EPTK-1 – EPTK-8	N/A	Ambient	N/A	N/A	~1,100	20	4,426.286	537.993
EPWTK-1 – EPWTK-2	N/A	Ambient	N/A	N/A	~1,100	20	4,426.286	537.993
EPLOAD-1	N/A	Ambient	N/A	N/A	~1,100	N/A	4,426.286	537.993
EPLOAD-2	N/A	Ambient	N/A	N/A	~1,100	N/A	4,426.286	537.993
EP-FUG	N/A	Ambient	N/A	N/A	~1,100	N/A	4,426.286	537.993
EP-BD	N/A	Ambient	N/A	N/A	~1,100	20 (est.)	4,426.286	537.993

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

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 - Condensate	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	Does not apply	24.33 0.01 0.06 0.06 0.22 0.87 0.01 7.31	Does not apply	7.30 <0.01 0.02 0.02 0.07 0.26 <0.01 0.26	O – AP-42
Loading/Unloading Operations – Produced Water	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	Does not apply	0.04 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 0.01	Does not apply	<0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	O – AP-42
Wastewater Treatment Evaporation & Operations						

Equipment Leaks	VOC Benzene Toluene Ethylbenzene Xylenes n-Hexane CO_2 CH_4	Does not apply	11.89 <0.01 <0.01 <0.01 0.01 0.26 0.09 25.52	Does not apply	N/A	O – AP-42
General Clean-up VOC Emissions						
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. With the exception of fugitive emissions (which are calculated by mass balance), emissions calculation methodologies are intended to calculate metric tons (tonnes) for the purposes of emissions reporting to EPA. These values were converted to tons for consistency with other pollutants.

ATTACHMENT L: EMISSION UNIT DATA SHEETS

EUDS - General: Compressor Engines

EUDS - General: Microturbine

EUDS - General: Dehydration Units

EUDS - General: Heater Treater Burners

EUDS - General: Blowdowns

EUDS - Chemical Process (Leak Sources)

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 twelve (12) identical 1,380-hp Caterpillar G3516B Compressor Engine w/ Oxidation Catalysts (EUCE-1 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*.

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 8,984 Btu per horsepower-hour for 8,760 hours per year at maximum horsepower rating, which equals 82.03 million cubic feet per year per unit at 1,324 Btu per standard cubic foot. Actual fuel heating value may vary.

(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: 12.40 × 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:

@ 1,012 °F and 14.7 psia

a.	NO_X	1.52 lb/hr	grains/ACF
b.	SO_2	0.01 lb/hr	grains/ACF
c.	CO	9.07 lb/hr	grains/ACF
d.	PM_{10}	<0.01 lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	3.29 lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
	Total HAPs	1.41 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
		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
5.1.16. Requirements for Use of Catalytic Reduction Devices *The permittee shall monitor the temperature to the inlet of the catalyst and, in accordance with manufacturer's specifications, a high temperature alarm shall shut off the engine before thermal deactivation of the catalyst occurs. If the engine shuts off due to high temperature, the permittee shall also check for thermal deactivation of the catalyst before normal operations are resumed. At least once per calendar quarter, the permittee shall conduct strip checks of NO_x and CO emissions from the engines when operating under representative conditions for that period. Strip checks shall be conducted using the following procedure:* *i. Samples of pollutant concentrations should be taken from sample ports in the stack or using a "Shepherd's hook" from a location in the stack such that a representative concentration is measured and bias (e.g., air leakage at weep holes) is prevented. The use of stainless steel tubing ran from sampling site to ground level may be used. A single sampling location near the center of the duct may be selected.* *ii. The emissions check should produce at least one test strip of concentration data for each of O_2, NO, NO_2 and CO. The analyzer should be run for a minimum of 5 minutes to allow readings to stabilize. Then run analyzer for 5 minutes and verify stability in concentrations. Print a representative test strip on the analyzer.* *iii. With this test strip include (when available) unit number or lease name, rpm, manifold pressure, compressor suction and discharge pressures and any other information that may help determine horsepower during test.* *iv. Records of the strip checks must be maintained.*	As required by NSPS Subpart JJJJ

REPORTING	TESTING
As required by NSPS Subpart JJJJ	As required by NSPS Subpart JJJJ

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*): EUGEN-1

1. Name or type and model of proposed affected source: 805-hp Capstone C600 Microturbine Generator
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. 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*.

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 9,347 Btu per horsepower-hour for 8,760 hours per year at maximum horsepower rating, which equals 49.78 million cubic feet per year per unit at 1,324 Btu per standard cubic foot. Actual fuel heating value may vary.

(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: 7.52 × 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:

@ 535 °F and 14.7 psia

a.	NO_X	0.25 lb/hr	grains/ACF
b.	SO_2	0.03 lb/hr	grains/ACF
c.	CO	0.62 lb/hr	grains/ACF
d.	PM_{10}	0.01 lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	0.02 lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
	Total HAPs	0.01 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
		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 triethylene glycol (TEG) dehydration units (EUDHY-1, EUDHY-2 and EUDHY-3)
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 55.0 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 (including flash tank off-gas from the dehydration unit) is used for the reboiler fuel (maximum 1.0 million Btu per hour or 6.62 million cubic feet per year per reboiler based on a higher heating value of 1,324 Btu per standard cubic foot). Actual heating value may vary.

(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 14.7 psia

a. NO_X	0.08	lb/hr	grains/ACF
b. SO_2	<0.01	lb/hr	grains/ACF
c. CO	0.06	lb/hr	grains/ACF
d. PM_{10}	<0.01	lb/hr	grains/ACF
e. Hydrocarbons		lb/hr	grains/ACF
f. VOCs	47.3619*	lb/hr	grains/ACF
g. Pb	N/A	lb/hr	grains/ACF
h. Specify other(s)			
Total HAPs	3.5819*	lb/hr	grains/ACF
**Still vent (EPSTL) + reboiler (EPRBL) emissions with electric pump use.*		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 55.0 MMSCFD based on an annual average. b. The lean glycol flow rate of the glycol dehydration unit will not exceed 22 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 combusted. 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 recycled/recompressed.	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
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 two (2) identical heater treater burners (EUHT-1 and EUHT-2).
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 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 burner fuel (maximum 0.5 million Btu per hour or 3.31 million cubic feet per year per reboiler based on a higher heating value of 1,324 Btu per standard cubic foot). Actual heating value may vary.

(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 0.5-mmBtu/hr natural gas-fired burner (EUHT-1 and EUHT-2, 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: 0.5 × 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:

@ 350 – 400 °F and 14.7 psia

a.	NO_X	0.04	lb/hr	grains/ACF
b.	SO_2	<0.01	lb/hr	grains/ACF
c.	CO	0.03	lb/hr	grains/ACF
d.	PM_{10}	<0.01	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	<0.01	lb/hr	grains/ACF
g.	Pb	N/A	lb/hr	grains/ACF
h.	Specify other(s)			
	Total HAPs	<0.01	lb/hr	grains/ACF
			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*): 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*.

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	Variable lb/hr rate lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
	Total HAPs	Variable lb/hr rate lb/hr	grains/ACF
		lb/hr	grains/ACF
	Note: 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 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)
   1389

3. List raw materials and ☒ attach MSDSs Previously submitted
   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.

   The facility is not a natural gas processing plant (SIC 1321) and is therefore not subject to New Source Performance Standards (NSPS) Subpart KKK requirements for a leak detection and repair (LDAR) monitoring program.

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]	4	N/A	N/A	800
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC	931	N/A	N/A	18,700
	Light Liquid VOC	30	N/A	N/A	1,140
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves[11]	Gas VOC	26	N/A	N/A	1,020
	Non VOC				
Open-ended Lines[12]	VOC				0
	Non-VOC				
Sampling Connections[13]	VOC				40
	Non-VOC				
Compressors	VOC	12	N/A	N/A	480
	Non-VOC				
Flanges	VOC	945 (Gas + Light Liq.)	N/A	N/A	1,640
	Non-VOC				
Other	VOC				
	Non-VOC				

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

Note: Component counts shown above are estimated.

Revision 03/2007

Notes for Leak Source Data Sheet

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

2. By monitoring frequency, give the number of sources routinely monitored for leaks, using a portable detection device that measures concentration in ppm. Do not include monitoring by visual or soap-bubble leak detection methods. "M/Q(M)/Q/SA/A/O" means the time period between inspections as follows:

   Monthly/Quarterly, with Monthly follow-up of repaired leakers/Quarterly/Semi-annual/Annually/Other (specify time period)

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

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

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

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

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

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

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

9. LIST CO, H_2S, mineral acids, NO, NO_2, SO_3, etc. DO NOT LIST CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.

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

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

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

13. Do not include closed-purge sampling connections.

ATTACHMENT M: AIR POLLUTION CONTROL DEVICE SHEET

APCDS – CONDENSER

GRI-GLYCALC ™ CONDENSER CONTROL EFFICIENCY CURVES REPORTS

GRI-GLYCALC ™ CONDENSER VENT STREAMS

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: N/A Model No.	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: 56.8 ft^3/min ***Regenerator Overheads Stream – Electric Pump**	19. Gas flow rate: 56.8 ft^3/min ***Regenerator Overheads Stream – Electric Pump**
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	*See Question 36			
Total Concentration in ppmv		-		

Emission Gas (Vapor) Stream

27. **Before Condenser (Regenerator Overheads)**
Inlet vapor flow rate: 56.8 ft^3/min
Influent vapor temperature: 212 °F
Effluent vapor temperature: 120 °F

28. **After Condenser (Condenser Vent Stream)**
Inlet vapor flow rate: 4.2 ft^3/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	47.36	19.14	N/A	N/A
B Benzene	N/A	N/A	1.29	0.23	N/A	N/A
C Toluene	N/A	N/A	0.12	0.01	N/A	N/A
D Ethylbenzene	N/A	N/A	0.00	0.00	N/A	N/A
E Xylenes	N/A	N/A	0.21	<0.01	N/A	N/A
F n-Hexane	N/A	N/A	1.94	0.41	N/A	N/A
G						
Total of the POLLUTANT lb/hr			47.36	19.14		

Inlet = Regenerator Overheads Stream – Electric Pump. (See Note)
Outlet = Condenser Vent Stream – Electric Pump. Non-condensables 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 55.0 MMSCFD based on an annual average. b. The lean glycol flow rate of the glycol dehydration unit will not exceed 22 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 combusted. 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 recycled/recompressed.	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

Note: Units will be equipped with one (1) 22 gpm electric pump and two (2) 7.5 gpm gas pumps (total = 15 gpm) to be used as back-ups. Emissions from the electric pumps serve as the basis for the potential emissions since they are greater than potential emissions using the gas pumps.

GRI-GLYCalc VERSION 4.0 - CONDENSER CONTROL CURVE EFFICIENCY REPORT

Case Name: Sand Hill Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Electric - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 08, 2015

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	89.16	87.59	63.78
45.0	87.03	85.16	62.02
50.0	84.64	82.40	60.29
55.0	81.97	79.33	58.58
60.0	79.03	75.97	56.89
65.0	75.86	72.33	55.24
70.0	72.47	68.46	53.63
75.0	68.91	64.41	52.05
80.0	65.22	60.24	50.53
85.0	61.44	56.01	49.06
90.0	57.64	51.80	47.64
95.0	53.84	47.65	46.29
100.0	50.10	43.64	45.01
105.0	46.46	39.79	43.81
110.0	42.92	36.14	42.67
115.0	39.52	32.72	41.61
120.0	36.27	29.52	40.62
125.0	33.16	26.55	39.70
130.0	30.20	23.80	38.83
135.0	27.38	21.25	38.01
140.0	24.70	18.90	37.23
145.0	22.14	16.71	36.45
150.0	19.71	14.69	35.65
155.0	17.19	12.66	34.72
160.0	14.90	10.85	33.66
165.0	12.63	9.10	32.25
170.0	10.36	7.39	30.21

GRI-GLYCalc VERSION 4.0 - STREAM REPORT

Case Name: Sand Hill Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Electric - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 08, 2015

CONDENSER VENT STREAM

Temperature: 52.00 deg. F
Pressure: 14.08 psia
Flow Rate: 2.50e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.39e+000	1.64e-001
Carbon Dioxide	1.79e+000	5.18e-001
Nitrogen	7.75e-002	1.43e-002
Methane	1.43e+001	1.51e+000
Ethane	2.89e+001	5.71e+000
Propane	2.56e+001	7.42e+000
Isobutane	4.38e+000	1.67e+000
n-Butane	1.53e+001	5.85e+000
Isopentane	2.32e+000	1.10e+000
n-Pentane	3.29e+000	1.56e+000
n-Hexane	7.17e-001	4.07e-001
Cyclohexane	3.04e-001	1.68e-001
Other Hexanes	8.91e-001	5.05e-001
Heptanes	8.51e-002	5.61e-002
Methylcyclohexane	1.93e-001	1.24e-001
2,2,4-Trimethylpentane	2.55e-003	1.92e-003
Benzene	4.99e-001	2.57e-001
Toluene	1.02e-002	6.19e-003
Xylenes	4.12e-003	2.87e-003
C8+ Heavies	8.66e-003	9.71e-003
Total Components	100.00	2.71e+001

GRI-GLYCalc VERSION 4.0 - CONDENSER CONTROL CURVE EFFICIENCY REPORT

Case Name: Sand Hill Compressor Station - Gas Pumps
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Gas - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 08, 2015

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	91.43	90.29	75.96
45.0	89.91	88.55	74.79
50.0	88.21	86.59	73.63
55.0	86.42	84.54	72.55
60.0	84.35	82.14	71.38
65.0	82.08	79.53	70.23
70.0	79.62	76.71	69.07
75.0	76.99	73.70	67.93
80.0	74.19	70.51	66.79
85.0	71.26	67.18	65.67
90.0	68.20	63.74	64.56
95.0	65.04	60.22	63.46
100.0	61.80	56.66	62.39
105.0	58.52	53.09	61.34
110.0	55.22	49.54	60.32
115.0	51.91	46.04	59.32
120.0	48.61	42.61	58.35
125.0	45.35	39.28	57.42
130.0	42.12	36.06	56.51
135.0	38.95	32.95	55.62
140.0	35.83	29.96	54.74
145.0	32.76	27.09	53.87
150.0	29.74	24.32	52.97
155.0	26.76	21.65	52.00
160.0	23.82	19.07	50.89
165.0	20.65	16.36	49.43
170.0	17.62	13.81	47.47

GRI-GLYCalc VERSION 4.0 - STREAM REPORT

Case Name: Sand Hill Compressor Station - Gas Pumps
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Gas - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 08, 2015

CONDENSER VENT STREAM

Temperature: 52.00 deg. F
Pressure: 14.08 psia
Flow Rate: 1.16e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.39e+000	7.64e-002
Carbon Dioxide	9.34e-001	1.25e-001
Nitrogen	1.30e-001	1.11e-002
Methane	2.80e+001	1.37e+000
Ethane	2.68e+001	2.46e+000
Propane	2.16e+001	2.91e+000
Isobutane	3.48e+000	6.16e-001
n-Butane	1.12e+001	1.99e+000
Isopentane	1.76e+000	3.87e-001
n-Pentane	2.36e+000	5.20e-001
n-Hexane	5.32e-001	1.40e-001
Cyclohexane	2.57e-001	6.60e-002
Other Hexanes	6.45e-001	1.70e-001
Heptanes	7.74e-002	2.37e-002
Methylcyclohexane	1.77e-001	5.31e-002
2,2,4-Trimethylpentane	2.17e-003	7.57e-004
Benzene	5.69e-001	1.35e-001
Toluene	1.13e-002	3.18e-003
Xylenes	4.97e-003	1.61e-003
C8+ Heavies	1.16e-002	6.03e-003
Total Components	100.00	1.11e+001

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.
Sand Hill Compressor Station
Table 1a: 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 Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-1*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-2*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-3*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-4*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-5*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-6*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-7*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-8*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-9*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-10*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-11*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-12*	*1.52*	*6.66*	*1.36*	*5.96*	*0.88*	*3.86*	*0.01*	*0.03*	*0.12*	*0.54*
805-hp Capstone C600 Microturbine Generator	EPGEN-1	0.25	1.09	0.62	2.70	0.02	0.07	0.03	0.11	0.05	0.22
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-1*	-	-	-	-	*0.42*	*1.84*	-	-	-	-
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-2*	-	-	-	-	*0.42*	*1.84*	-	-	-	-
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-3*	-	-	-	-	*0.42*	*1.84*	-	-	-	-
1.0-mmBtu/hr TEG Reboiler	EPRBL-1	0.08	0.33	0.06	0.28	<0.01	0.02	<0.01	<0.01	0.01	0.03
1.0-mmBtu/hr TEG Reboiler	EPRBL-2	0.08	0.33	0.06	0.28	<0.01	0.02	<0.01	<0.01	0.01	0.03
1.0-mmBtu/hr TEG Reboiler	EPRBL-3	0.08	0.33	0.06	0.28	<0.01	0.02	<0.01	<0.01	0.01	0.03
0.5-mmBtu/hr Heater Treater Burner	EPHT-1	0.04	0.17	0.03	0.14	<0.01	0.01	<0.01	<0.01	<0.01	0.01
0.5-mmBtu/hr Heater Treater Burner	EPHT-2	0.04	0.17	0.03	0.14	<0.01	0.01	<0.01	<0.01	<0.01	0.01
Eight (8) Condensate Storage Tanks	EPTK-1 - EPTK-8	-	-	-	-	2.80	12.25	-	-	-	-
Two (2) Produced Water Storage Tanks	EPWTK-1 - EPWTK-2	-	-	-	-	0.41	1.81	-	-	-	-
Condensate Truck Loading	EPLOAD-1	-	-	-	-	-	8.15	-	-	-	-
Produced Water Truck Loading	EPLOAD-2	-	-	-	-	-	0.01	-	-	-	-
Fugitive Emissions - Revise	*EP-FUG*	-	-	-	-	-	*11.89*	-	-	-	-
Blowdowns - Revise	*EP-BD*	-	-	-	-	-	*11.88*	-	-	-	-
Revised Total =		**18.80**	**82.37**	**17.19**	**75.30**	**15.09**	**98.04**	**0.11**	**0.50**	**1.56**	**6.84**
Currently Permitted Total =		**18.80**	**82.35**	**3.13**	**13.74**	**12.52**	**81.93**	**0.11**	**0.50**	**1.55**	**6.78**
Change in Emissions =		**0.00**	**0.02**	**14.06**	**61.56**	**2.57**	**16.11**	**0.00**	**0.00**	**0.01**	**0.05**

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

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 1b: 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 Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-1*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-2*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-3*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-4*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-5*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-6*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-7*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-8*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-9*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-10*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-11*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-12*	*0.10*	*0.06*	*0.01*	*<0.01*	*0.06*	*0.03*	*0.01*	*0.01*	*<0.01*	*0.29*
805-hp Capstone C600 Microturbine Generator	EPGEN-1	<0.01	<0.01	<0.01	<0.01	0.01	-	-	<0.01	<0.01	0.01
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-1*	-	-	*0.01*	*0.00*	-	-	*0.01*	*<0.01*	*<0.01*	*0.01*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-2*	-	-	*0.01*	*0.00*	-	-	*0.01*	*<0.01*	*<0.01*	*0.01*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-3*	-	-	*0.01*	*0.00*	-	-	*0.01*	*<0.01*	*<0.01*	*0.01*
1.0-mmBtu/hr TEG Reboiler	EPRBL-1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr TEG Reboiler	EPRBL-2	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr TEG Reboiler	EPRBL-3	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
0.5-mmBtu/hr Heater Treater Burner	EPHT-1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
0.5-mmBtu/hr Heater Treater Burner	EPHT-2	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Eight (8) Condensate Storage Tanks	EPTK-1 - EPTK-8	-	-	<0.01	0.01	-	-	0.10	0.01	0.03	0.14
Two (2) Produced Water Storage Tanks	EPWTK-1 - EPWTK-2	-	-	<0.01	<0.01	-	-	0.01	<0.01	<0.01	0.02
Condensate Truck Loading	EPLOAD-1	-	-	-	-	-	-	-	-	-	-
Produced Water Truck Loading	EPLOAD-2	-	-	-	-	-	-	-	-	-	-
Fugitive Emissions - Revise	*EP-FUG*	-	-	-	-	-	-	-	-	-	-
Blowdowns - Revise	*EP-BD*	-	-	-	-	-	-	-	-	-	-
Revised Total =		**1.24**	**0.76**	**0.08**	**0.01**	**0.74**	**0.37**	**0.31**	**0.07**	**0.06**	**3.66**
Currently Permitted Total =		1.24	0.76	0.07	0.01	0.74	0.37	0.30	0.08	0.06	3.63
Change in Emissions =		0.00	0.00	**0.01**	0.00	0.00	0.00	**0.01**	-0.01	-0.01	**0.02**

Appalachia Midstream Services, L.L.C.
Sand Hill 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 Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-1*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-2*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-3*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-4*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-5*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-6*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-7*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-8*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-9*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-10*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-11*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-12*	*0.45*	*0.28*	*0.02*	*<0.01*	*0.27*	*0.14*	*0.06*	*0.02*	*0.01*	*1.25*
805-hp Capstone C600 Microturbine Generator	EPGEN-1	<0.01	<0.01	<0.01	<0.01	0.02	-	-	<0.01	<0.01	0.03
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-1*	-	-	*0.02*	*0.00*	-	-	*0.04*	*<0.01*	*<0.01*	*0.06*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-2*	-	-	*0.02*	*0.00*	-	-	*0.04*	*<0.01*	*<0.01*	*0.06*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-3*	-	-	*0.02*	*0.00*	-	-	*0.04*	*<0.01*	*<0.01*	*0.06*
1.0-mmBtu/hr TEG Reboiler	EPRBL-1	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
1.0-mmBtu/hr TEG Reboiler	EPRBL-2	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
1.0-mmBtu/hr TEG Reboiler	EPRBL-3	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
0.5-mmBtu/hr Heater Treater Burner	EPHT-1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
0.5-mmBtu/hr Heater Treater Burner	EPHT-2	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Eight (8) Condensate Storage Tanks	EPTK-1 - EPTK-8	-	-	0.01	0.03	-	-	0.44	0.03	0.11	0.61
Two (2) Produced Water Storage Tanks	EPWTK-1 - EPWTK-2	-	-	<0.01	<0.01	-	-	0.06	<0.01	0.02	0.09
Condensate Truck Loading	EPLOAD-1	-	-	<0.01	0.02	-	-	0.29	0.02	0.07	0.41
Produced Water Truck Loading	EPLOAD-2	-	-	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Fugitive Emissions - Revise	*EP-FUG*	-	-	*<0.01*	*<0.01*	-	-	*0.26*	*<0.01*	*0.01*	*0.28*
Blowdowns - Revise	*EP-BD*	-	-	*<0.01*	*<0.01*	-	-	*0.24*	*<0.01*	*<0.01*	*0.24*
Revised Total =		**5.45**	**3.35**	**0.38**	**0.08**	**3.22**	**1.63**	**2.15**	**0.33**	**0.34**	**16.93**
Currently Permitted Total =		5.43	3.34	0.33	0.08	3.22	1.62	1.94	0.37	0.35	16.69
Change in Emissions =		**0.02**	**0.01**	**0.05**	0.00	0.00	**0.01**	**0.21**	-0.04	-0.01	**0.24**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 1c: Summary of Greenhouse Gas Emissions - Metric Tons Per Year (Tonnes)

Equipment	Point ID	Carbon Dioxide (CO_2)		Methane (CH_4)		Nitrous Oxide (N_2O)		Methane (CH_4) as $CO_{2\,Eq.}$		Nitrous Oxide (N_2O) as $CO_{2\,Eq.}$		Total CO_2 + $CO_{2\,Eq.}$	
		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 Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-1*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-2*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-3*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-4*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-5*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-6*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-7*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-8*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-9*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-10*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-11*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-12*	*1,566.80*	*6,225.63*	*0.03*	*0.11*	*<0.01*	*0.01*	*0.68*	*2.72*	*0.81*	*3.24*	*1,568.30*	*6,231.58*
805-hp Capstone C800 Microturbine Generator	EPGEN-1	880.15	3,497.23	0.02	0.07	<0.01	0.01	0.41	1.65	0.49	1.96	881.06	3,500.24
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-1*	*<0.01*	*<0.01*	*0.03*	*0.13*	-	-	*0.83*	*3.29*	-	-	*0.83*	*3.29*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-2*	*<0.01*	*<0.01*	*0.03*	*0.13*	-	-	*0.83*	*3.29*	-	-	*0.83*	*3.29*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-3*	*<0.01*	*<0.01*	*0.03*	*0.13*	-	-	*0.83*	*3.29*	-	-	*0.83*	*3.29*
1.0-mmBtu/hr TEG Reboiler	EPRBL-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*
1.0-mmBtu/hr TEG Reboiler	EPRBL-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*
1.0-mmBtu/hr TEG Reboiler	EPRBL-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*
0.5-mmBtu/hr Heater Treater Burner	EPHT-1	*58.49*	*232.40*	<0.01	<0.01	<0.01	<0.01	*0.03*	*0.11*	*0.03*	*0.13*	*58.55*	*232.64*
0.5-mmBtu/hr Heater Treater Burner	EPHT-2	*58.49*	*232.40*	<0.01	<0.01	<0.01	<0.01	*0.03*	*0.11*	*0.03*	*0.26*	*58.55*	*232.77*
Eight (8) Condensate Storage Tanks	EPTK-1 - EPTK-8	0.14	0.57	5.04	20.05	-	-	126.12	501.14	-	-	126.26	501.71
Two (2) Produced Water Storage Tanks	EPWTK-1 - EPWTK-2	0.02	0.09	0.78	3.08	-	-	19.40	77.10	-	-	19.43	77.19
Condensate Truck Loading	EPLOAD-1	-	<0.01	-	2.22	-	-	-	*55.54*	-	-	-	*55.54*
Produced Water Truck Loading	EPLOAD-2	-	<0.01	-	<0.01	-	-	-	*0.09*	-	-	-	*0.09*
Fugitive Emissions - Revise	*EP-FUG*	-	*0.08*	-	*23.15*	-	-	-	*578.71*	-	-	-	*578.80*
Blowdowns - Revise	*EP-BD*	-	*0.09*	-	*25.16*	-	-	-	*628.94*	-	-	-	*629.03*
Revised Total =		**20,149.81**	**80,064.81**	**6.27**	**75.48**	**0.04**	**0.14**	**156.64**	**1,886.50**	**10.53**	**41.97**	**20,317.18**	**81,993.28**
Currently Permitted Total =		20,769.43	82,526.87	6.28	78.60	0.04	0.14	131.66	1,650.48	10.92	43.52	20,912.21	84,220.87
Change in Emissions =		-619.62	-2,462.06	-0.01	-3.14	0.00	0.00	**24.98**	**236.02**	-0.39	-1.55	-595.03	-2,227.59

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 1d: Summary of Greenhouse Gas Emissions - Short Tons Per Year (Tons)

Equipment	Point ID	Carbon Dioxide (CO_2)		Methane (CH_4)		Nitrous Oxide (N_2O)		Methane (CH_4) as $CO_{2\,eq.}$		Nitrous Oxide (N_2O) as $CO_{2\,eq.}$		Total CO_2 + $CO_{2\,eq.}$	
		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 Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-1*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-2*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-3*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-4*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-5*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-6*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-7*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-8*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-9*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-10*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-11*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
1,380-hp Caterpillar G3516B Engine w/ Oxid. Cat. - Revise	*EPCE-12*	*1,566.80*	*6,862.58*	*0.03*	*0.12*	*<0.01*	*0.01*	*0.68*	*2.99*	*0.81*	*3.57*	*1,568.30*	*6,869.14*
805-hp Capstone C600 Microturbine Generator	EPGEN-1	830.15	3,855.04	0.02	0.08	<0.01	0.01	*0.41*	*1.82*	*0.49*	*2.16*	*881.06*	*3,859.01*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-1*	*<0.01*	*<0.01*	*0.03*	*0.15*	-	-	*0.83*	*3.63*	-	-	*0.83*	*3.63*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-2*	*<0.01*	*<0.01*	*0.03*	*0.15*	-	-	*0.83*	*3.63*	-	-	*0.83*	*3.63*
55.0-MMSCFD TEG Dehydration Unit Still Vent - Revise	*EPSTL-3*	*<0.01*	*<0.01*	*0.03*	*0.15*	-	-	*0.83*	*3.63*	-	-	*0.83*	*3.63*
1.0-mmBtu/hr TEG Reboiler	EPRBL-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*
1.0-mmBtu/hr TEG Reboiler	EPRBL-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*
1.0-mmBtu/hr TEG Reboiler	EPRBL-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*
0.5-mmBtu/hr Heater Treater Burner	EPHT-1	*58.49*	*256.18*	<0.01	<0.01	<0.01	<0.01	*0.03*	*0.12*	*0.03*	*0.14*	*58.55*	*256.44*
0.5-mmBtu/hr Heater Treater Burner	EPHT-2	*58.49*	*256.18*	<0.01	<0.01	<0.01	<0.01	*0.03*	*0.12*	*0.03*	*0.14*	*58.55*	*256.44*
Eight (8) Condensate Storage Tanks	EPTK-1 - EPTK-8	0.14	0.63	5.04	22.10	-	-	*126.12*	*552.41*	-	-	*126.26*	*553.04*
Two (2) Produced Water Storage Tanks	EPWTK-1 - EPWTK-2	0.02	0.10	0.78	3.40	-	-	*19.40*	*84.99*	-	-	*19.43*	*85.08*
Condensate Truck Loading	EPLOAD-1	-	<0.01	-	2.45	-	-	-	*61.22*	-	-	-	*61.22*
Produced Water Truck Loading	EPLOAD-2	-	<0.01	-	<0.01	-	-	-	*0.09*	-	-	-	*0.09*
Fugitive Emissions - Revise	*EP-FUG*	-	*0.09*	-	*25.52*	-	-	-	*637.92*	-	-	-	*638.01*
Blowdowns - Revise	*EP-BD*	-	*0.10*	-	*27.73*	-	-	-	*693.29*	-	-	-	*693.39*
Revised Total =		**20,149.81**	**83,258.35**	**6.27**	**83.18**	**0.04**	**0.16**	**156.84**	**2,079.51**	**10.53**	**46.12**	**20,317.18**	**90,381.98**
Currently Permitted Total =		20,769.43	90,970.30	6.28	83.64	0.04	0.16	131.86	1,819.35	10.92	47.82	20,912.21	92,837.47
Change in Emissions =		-619.62	-7,713.95	-0.01	-3.46	0.00	0.00	**24.98**	**260.16**	-0.39	-1.70	-595.03	-2,455.49

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2a(1): Engine Emissions Calculations - Criteria Air Pollutants

Equipment Information

Point ID:	EPCE-1	EPCE-2	EPCE-3	EPCE-4	EPCE-5	EPCE-6
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)[1]:	8,984	8,984	8,984	8,984	8,984	8,984
Fuel Use (scfh):	9,364	9,364	9,364	9,364	9,364	9,364
Fuel Use (mmBtu/hr):	12.40	12.40	12.40	12.40	12.40	12.40
Exhaust Flow (acfm):	9,240	9,240	9,240	9,240	9,240	9,240
Exhaust Temp (°F):	1,012	1,012	1,012	1,012	1,012	1,012
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760
Fuel HHV (Btu/scf):	1,324	1,324	1,324	1,324	1,324	1,324
Uncontrolled Manufacturer Emission Factors						
NOx (g/hp-hr):	0.50	0.50	0.50	0.50	0.50	0.50
CO (g/hp-hr):	2.98	2.98	2.98	2.98	2.98	2.98
VOC (g/hp-hr):	1.08	1.08	1.08	1.08	1.08	1.08
CO Control Eff. %	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%
VOC Control Eff. %	75.00%	75.00%	75.00%	75.00%	75.00%	75.00%
Controlled Manufacturer Emission Factors[2]						
CO (g/hp-hr):	0.45	0.45	0.45	0.45	0.45	0.45
VOC (g/hp-hr):	0.27	0.27	0.27	0.27	0.27	0.27

Uncontrolled Criteria Air Pollutant Emissions

Point ID:	EPCE-1		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	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	9.07	39.71	9.07	39.71	9.07	39.71	9.07	39.71	9.07	39.71	9.07	39.71
VOC	3.29	14.39	3.29	14.39	3.29	14.39	3.29	14.39	3.29	14.39	3.29	14.39
SO_2	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
$PM_{10/2.5}$	<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}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54
PM_{TOT}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2a(1): Engine Emissions Calculations - Criteria Air Pollutants (Continued)

Controlled Criteria Air Pollutant Emissions

Point ID:	EPCE-1		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	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	1.36	5.96	1.36	5.96	1.36	5.96	1.36	5.96	1.36	5.96	1.36	5.96
VOC	0.82	3.60	0.82	3.60	0.82	3.60	0.82	3.60	0.82	3.60	0.82	3.60
SO_2	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
$PM_{10/2.5}$	<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}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54
PM_{TOT}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54

AP-42 Table 3.2-2 (7/2000) Emission Factors

SO_2	5.88E-04
$PM_{10/2.5}$	7.71E-05
PM_{COND}	9.91E-03
PM_{TOT}	9.99E-03

Notes:
1) 10% safety factor added to manufacturer fuel use to account for potential fluctuations in fuel heating value.
2) Oxidation Catalyst does not reduce NOx emissions.

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2b(1): Engine Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Point ID:	EPCE-1	EPCE-2	EPCE-3	EPCE-4	EPCE-5	EPCE-6
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)1:	8,984	8,984	8,984	8,984	8,984	8,984
Fuel Use (scfh):	9,364	9,364	9,364	9,364	9,364	9,364
Fuel Use (mmBtu/hr):	12.40	12.40	12.40	12.40	12.40	12.40
Exhaust Flow (acfm):	9,240	9,240	9,240	9,240	9,240	9,240
Exhaust Temp (°F):	1,012	1,012	1,012	1,012	1,012	1,012
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760

Note: No reduction taken for oxidation catalyst control on any HAP other than formaldehyde.

Uncontrolled Hazardous Air Pollutant (HAP) Emissions

Point ID:	EPCE-1		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	lb/hr	tons/yr
Acetaldehyde	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45
Acrolein	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28
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	1.19	5.20	1.19	5.20	1.19	5.20	1.19	5.20	1.19	5.20	1.19	5.20
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	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
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 =	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2b(1): Engine Emissions Calculations - Hazardous Air Pollutants (Continued)

Controlled Hazardous Air Pollutant (HAP) Emissions

Point ID:	EPCE-1		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	lb/hr	tons/yr
Acetaldehyde	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45
Acrolein	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28
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	0.06	0.27	0.06	0.27	0.06	0.27	0.06	0.27	0.06	0.27	0.06	0.27
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	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
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 =	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**

AP-42 Table 3.2-2 (7/2000) Emission Factors

Acetaldehyde	8.36E-03
Acrolein	5.14E-03
Benzene	4.40E-04
Ethylbenzene	3.97E-05
n-Hexane	1.11E-03
Methanol	2.50E-03
Toluene	4.08E-04
Xylenes	1.84E-04

Uncontrolled Formaldehyde Manufacturer Emission Factor (g/hp-hr) = 0.39
Formaldehyde Manufacturer Emission Factor (g/hp-hr) with 95% Control Efficiency = 0.02

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2c(1): Engine Emissions Calculations - Greenhouse Gas Emissions

Equipment Information

Point ID:	EPCE-1	EPCE-2	EPCE-3	EPCE-4	EPCE-5	EPCE-6
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)1:	8,984	8,984	8,984	8,984	8,984	8,984
Fuel Use (scfh):	9,364	9,364	9,364	9,364	9,364	9,364
Fuel Use (mmBtu/hr):	12.40	12.40	12.40	12.40	12.40	12.40
Exhaust Flow (acfm):	9,240	9,240	9,240	9,240	9,240	9,240
Exhaust Temp (°F):	1,012	1,012	1,012	1,012	1,012	1,012
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760

Greenhouse Gas (GHG) Emissions - Metric Tons (Tonnes)

Point ID:	EPCE-1		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	lb/hr	tonnes/yr
CO_2	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63
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	0.68	2.72	0.68	2.72	0.68	2.72	0.68	2.72	0.68	2.72	0.68	2.72
N_2O as CO_2e	0.81	3.24	0.81	3.24	0.81	3.24	0.81	3.24	0.81	3.24	0.81	3.24
Total CO_2 + CO_2e	**1,568.30**	**6,231.58**	**1,568.30**	**6,231.58**	**1,568.30**	**6,231.58**	**1,568.30**	**6,231.58**	**1,568.30**	**6,231.58**	**1,568.30**	**6,231.58**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2c(1): Engine Emissions Calculations - Greenhouse Gas Emissions (Continued)

Greenhouse Gas (GHG) Emissions - Short Tons (Tons)

Point ID:	EPCE-1		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	lb/hr	tons/yr
CO_2	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58
CH_4	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12
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	0.68	2.99	0.68	2.99	0.68	2.99	0.68	2.99	0.68	2.99	0.68	2.99
N_2O as CO_2e	0.81	3.57	0.81	3.57	0.81	3.57	0.81	3.57	0.81	3.57	0.81	3.57
Total CO_2 + CO_2e	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**

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

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

Carbon Dioxide (CO_2) Manufacturer Data (g/hp-hr) + 1% for Oxidation Catalyst = 515

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2a(2): Engine Emissions Calculations - Criteria Air Pollutants

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):	8,984	8,984	8,984	8,984	8,984	8,984
Fuel Use (scfh):	9,364	9,364	9,364	9,364	9,364	9,364
Fuel Use (mmBtu/hr)[1]:	12.40	12.40	12.40	12.40	12.40	12.40
Exhaust Flow (acfm):	9,240	9,240	9,240	9,240	9,240	9,240
Exhaust Temp (°F):	1,012	1,012	1,012	1,012	1,012	1,012
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760
Fuel HHV (Btu/scf):	1,324	1,324	1,324	1,324	1,324	1,324
Uncontrolled Manufacturer Emission Factors						
NOx (g/hp-hr):	0.50	0.50	0.50	0.50	0.50	0.50
CO (g/hp-hr):	2.98	2.98	2.98	2.98	2.98	2.98
VOC (g/hp-hr):	1.08	1.08	1.08	1.08	1.08	1.08
CO Control Eff. %	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%
VOC Control Eff. %	75.00%	75.00%	75.00%	75.00%	75.00%	75.00%
Controlled Manufacturer Emission Factors[2]						
CO (g/hp-hr):	0.45	0.45	0.45	0.45	0.45	0.45
VOC (g/hp-hr):	0.27	0.27	0.27	0.27	0.27	0.27

Uncontrolled Criteria Air Pollutant 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**
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	9.07	39.71	9.07	39.71	9.07	39.71	9.07	39.71	9.07	39.71	9.07	39.71
VOC	3.29	14.39	3.29	14.39	3.29	14.39	3.29	14.39	3.29	14.39	3.29	14.39
SO_2	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
$PM_{10/2.5}$	<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}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54
PM_{TOT}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2a(2): Engine Emissions Calculations - Criteria Air Pollutants (Continued)

Controlled Criteria Air Pollutant 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
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	1.36	5.96	1.36	5.96	1.36	5.96	1.36	5.96	1.36	5.96	1.36	5.96
VOC	0.82	3.60	0.82	3.60	0.82	3.60	0.82	3.60	0.82	3.60	0.82	3.60
SO_2	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
$PM_{10/2.5}$	<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}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54
PM_{TOT}	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54	0.12	0.54

AP-42 Table 3.2-2 (7/2000) Emission Factors

SO_2	5.88E-04
$PM_{10/2.5}$	7.71E-05
PM_{COND}	9.91E-03
PM_{TOT}	9.99E-03

Notes:
1) 10% safety factor added to manufacturer fuel use to account for potential fluctuations in fuel heating value.
2) Oxidation Catalyst does not reduce NOx emissions.

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2b(2): Engine Emissions Calculations - Hazardous Air Pollutants

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):	8,984	8,984	8,984	8,984	8,984	8,984
Fuel Use (scfh):	9,364	9,364	9,364	9,364	9,364	9,364
Fuel Use (mmBtu/hr)1:	12.40	12.40	12.40	12.40	12.40	12.40
Exhaust Flow (acfm):	9,240	9,240	9,240	9,240	9,240	9,240
Exhaust Temp (°F):	1,012	1,012	1,012	1,012	1,012	1,012
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760

Note: No reduction taken for oxidation catalyst control on any HAP other than formaldehyde.

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	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45
Acrolein	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28
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	1.19	5.20	1.19	5.20	1.19	5.20	1.19	5.20	1.19	5.20	1.19	5.20
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	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
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 =	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**	**1.41**	**6.18**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2b(2): 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	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45	0.10	0.45
Acrolein	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28	0.06	0.28
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	0.06	0.27	0.06	0.27	0.06	0.27	0.06	0.27	0.06	0.27	0.06	0.27
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	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14	0.03	0.14
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 =	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**	**0.29**	**1.25**

AP-42 Table 3.2-2 (7/2000) Emission Factors

Acetaldehyde	8.36E-03
Acrolein	5.14E-03
Benzene	4.40E-04
Ethylbenzene	3.97E-05
n-Hexane	1.11E-03
Methanol	2.50E-03
Toluene	4.08E-04
Xylenes	1.84E-04

Uncontrolled Formaldehyde Manufacturer Emission Factor (g/hp-hr) = 0.39
Formaldehyde Manufacturer Emission Factor (g/hp-hr) with 95% Control Efficiency = 0.02

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2c(2): Engine Emissions Calculations - Greenhouse Gas Emissions

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):	8,984	8,984	8,984	8,984	8,984	8,984
Fuel Use (scfh):	9,364	9,364	9,364	9,364	9,364	9,364
Fuel Use (mmBtu/hr)1:	12.40	12.40	12.40	12.40	12.40	12.40
Exhaust Flow (acfm):	9,240	9,240	9,240	9,240	9,240	9,240
Exhaust Temp (°F):	1,012	1,012	1,012	1,012	1,012	1,012
Operating Hours:	8,760	8,760	8,760	8,760	8,760	8,760

Greenhouse Gas (GHG) Emissions - Metric Tons (Tonnes)

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	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63	1,566.80	6,225.63
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	0.68	2.72	0.68	2.72	0.68	2.72	0.68	2.72	0.68	2.72	0.68	2.72
N_2O as CO_2e	0.81	3.24	0.81	3.24	0.81	3.24	0.81	3.24	0.81	3.24	0.81	3.24
Total CO_2 + CO_2e	1,568.30	6,231.58	1,568.30	6,231.58	1,568.30	6,231.58	1,568.30	6,231.58	1,568.30	6,231.58	1,568.30	6,231.58

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 2c(2): Engine Emissions Calculations - Greenhouse Gas Emissions (Continued)

Greenhouse Gas (GHG) Emissions - Short Tons (Tons)

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	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58	1,566.80	6,862.58
CH_4	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12	0.03	0.12
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	0.68	2.99	0.68	2.99	0.68	2.99	0.68	2.99	0.68	2.99	0.68	2.99
N_2O as CO_2e	0.81	3.57	0.81	3.57	0.81	3.57	0.81	3.57	0.81	3.57	0.81	3.57
Total CO_2 + CO_2e	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**	**1,568.30**	**6,869.14**

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

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

Carbon Dioxide (CO_2) Manufacturer Data (g/hp-hr) + 1% for Oxidation Catalyst = 515

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 3a: Generator Emissions Calculations - Criteria Air Pollutants

Equipment Information

Point ID:	**EPGEN-1**
Make:	Capstone
Model:	C600
Design Class:	Turbine
Controls:	None
Horsepower (hp):	805
Fuel Use (Btu/hp-hr)[1]:	9,347
Fuel Use (scfh):	5,683
Fuel Use (mmBtu/hr):	7.52
Operating Hours:	8,760
Exhaust Temp (°F):	535
Fuel HHV (Btu/scf):	1,324

Manufacturer Emission Factors[2]

NOx (g/hp-hr):	0.14

Uncontrolled Criteria Air Pollutant Emissions

Point ID: **EPGEN-1**

Pollutant	lb/hr	tons/yr
NOx	0.25	1.09
CO	0.62	2.70
VOC	0.02	0.07
SO_2	0.03	0.11
$PM_{10/2.5}$	0.01	0.06
PM_{COND}	0.04	0.15
PM_{TOT}	0.05	0.22

AP-42 Table 3.1-1, 3.1-2a (4/2000) Emission Factors (lb/mmBtu)

CO	8.20E-02
VOC	2.10E-03
SO_2	3.40E-03
$PM_{10/2.5}$	1.90E-03
PM_{COND}	4.70E-03
PM_{TOT}	6.60E-03

Notes:
1) 10% safety factor added to manufacturer fuel use to account for potential fluctuations in fuel heating value.
2) All other pollutants calculated using AP-42 emission factors

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 3b: Generator Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Point ID:	**EPGEN-1**
Make:	Capstone
Model:	C600
Design Class:	Turbine
Controls:	None
Horsepower (hp):	805
Fuel Use (Btu/hp-hr)1:	9,347
Fuel Use (scfh):	5,683
Fuel Use (mmBtu/hr):	7.52
Exhaust Temp (°F):	535
Operating Hours:	8,760
HAP Control Eff. %	0.00%

Uncontrolled Hazardous Air Pollutant Emissions

Point ID: **EPGEN-1**

Pollutant	lb/hr	tons/yr
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
Methanol	-	-
n-Hexane	-	-
Toluene	<0.01	<0.01
Xylenes	<0.01	<0.01
Total HAPs =	**0.01**	**0.03**

AP-42 Table 3.1-1, 3.1-2a (4/2000) Emission Factors (lb/mmBtu)

Acetaldehyde	4.00E-05
Acrolein	6.40E-06
Benzene	1.20E-05
Ethylbenzene	3.20E-05
Formaldehyde	7.10E-04
n-Hexane	-
Methanol	-
Toluene	1.30E-04
Xylenes	6.40E-05

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 3c: Generator Emissions Calculations - Greenhouse Gas Emissions

Equipment Information

Point ID:	**EPGEN-1**
Make:	Capstone
Model:	C600
Design Class:	Turbine
Controls:	None
Horsepower (hp):	805
Fuel Use (Btu/hp-hr)1:	9,347
Fuel Use (scfh):	5,683
Fuel Use (mmBtu/hr):	7.52
Operating Hours:	8,760
Exhaust Temp (°F):	535
Fuel HHV (Btu/scf):	1,324

Greenhouse Gas (GHG) Emissions - Metric Tons (Tonnes)

Point ID: **EPGEN-1**

Pollutant	lb/hr	tonnes/yr
CO_2	880.15	3,497.23
CH_4	0.02	0.07
N_2O	<0.01	0.01
CH_4 as CO_2e	0.41	1.65
N_2O as CO_2e	0.49	1.96
Total CO_2 + CO_2e	**881.06**	**3,500.84**

Greenhouse Gas (GHG) Emissions - Short Tons (Tons)

Point ID: **EPGEN-1**

Pollutant	lb/hr	tons/yr
CO_2	880.15	3,855.04
CH_4	0.02	0.08
N_2O	<0.01	0.01
CH_4 as CO_2e	0.41	1.82
N_2O as CO_2e	0.49	2.16
Total CO_2 + CO_2e	**881.06**	**3,859.01**

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.
Sand Hill Compressor Station
Table 4a: Glycol Dehydration Unit Emissions - Criteria and Hazardous Air Pollutants

Equipment Information

Parameter	Units	Value (Each)
Point ID:	-	EPSTL-1 - EPSTL-3
Extended Gas Analysis Date	-	2/26/2015
Maximum Throughput	MMSCFD	55.00
Operating Hours	Hours/Year	8,760
Wet Gas Temperature	°F	103
Wet Gas Pressure	psig	900
Wet Gas Water Content	lb H_2O/MMSCF	Saturated
Dry Gas Water Content	lb H_2O/MMSCF	7.00
Pump Type	Electric/Gas	Note 1
Electric Pump Lean Glycol Flow Rate	gpm	22
Gas Pump Lean Glycol Flow Rate	gpm	15
Regenerator Still Vent Controls	-	Note 2
Condenser Temperature	°F	52
Condenser Pressure	psig	14.08
Flash Tank Temperature	°F	120
Flash Tank Pressure	psig	50
Flash Tank Controls	Yes/No	Note 3
Combustion Device Efficiency	%	98%

Notes:
1) Units will be equipped with one (1) 22 gpm electric pump and two (2) 7.5 gpm gas pumps (total = 15 gpm) to be used as back-up pumps.
2) Each unit will be equipped with BTEX condenser for still vent emissions controls. Non-condensables (condenser vent stream) will be routed to the reboiler for combustion. Reboiler is equipped with burner management system to ensure constant flame for destruction of gases.
3) Flash tank off-gases are routed to the reboiler for combustion. Excess flash tank off-gases will be recycled/recompressed for an ultimate 100% control efficiency.
4) GRI-GLYCalc Input Summary and Aggregate Calculations Reports attached. 10% safety factor added to GRI-GLYCalc results to account for potential fluctuations in gas composition. Potential emissions for the electric pumps serve as the basis for the potential VOC and HAP emissions since they are greater than potential emissions using the gas pumps.

Potential Emissions

Point ID:	EPSTL-1 - EPSTL-3 (Each)		EPSTL-1 - EPSTL-3 (Total)	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr
2, 2, 4-Trimethylpentane	<0.01	<0.01	<0.01	<0.01
n-Hexane	0.01	0.04	0.03	0.12
Benzene	0.01	0.02	0.02	0.07
Toluene	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	0.00	0.00	0.00	0.00
Xylenes	<0.01	<0.01	<0.01	<0.01
Total HAPs =	**0.01**	**0.07**	**0.04**	**0.20**
Total VOC =	**0.42**	**1.84**	**1.26**	**5.53**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 4a: Glycol Dehydration Unit Emissions - Criteria and Hazardous Air Pollutants (Continued)

GRI-GLYCalc Results (Electric Pump) - For Reference Only

Controlled Regenerator Emissions

Pollutant	lb/hr	tons/yr
2, 2, 4-Trimethylpentane	<0.0001	0.0002
n-Hexane	0.0081	0.0356
Benzene	0.0051	0.0225
Toluene	0.0001	0.0005
Ethylbenzene	0.0000	0.0000
Xylenes	0.0001	0.0003
Total HAPs =	**0.0135**	**0.0591**
Total VOC =	**0.3829**	**1.6772**

Uncontrolled Regenerator Emissions

EPSTL-1 - EPSTL-3 (Each)

Pollutant	lb/hr	tons/yr
2, 2, 4-Trimethylpentane	0.0239	0.1045
n-Hexane	1.9408	8.5008
Benzene	1.2883	5.6426
Toluene	0.1191	0.5217
Ethylbenzene	0.0000	0.0000
Xylenes	0.2098	0.9189
Total HAPs =	**3.5819**	**15.6885**
Total VOC =	**47.3619**	**207.4452**

GRI-GLYCalc Results (Gas Pumps) - For Reference Only

Controlled Regenerator Emissions

Pollutant	lb/hr	tons/yr
2, 2, 4-Trimethylpentane	<0.0001	0.0001
n-Hexane	0.0028	0.0123
Benzene	0.0027	0.0119
Toluene	0.0001	0.0003
Ethylbenzene	0.0000	0.0000
Xylenes	<0.0001	0.0001
Total HAPs =	**0.0056**	**0.0247**
Total VOC =	**0.1405**	**0.6154**

Uncontrolled Regenerator Emissions

EPSTL-1 - EPSTL-3 (Each)

Pollutant	lb/hr	tons/yr
2, 2, 4-Trimethylpentane	0.0125	0.0547
n-Hexane	0.8475	3.7119
Benzene	0.8825	3.8654
Toluene	0.0856	0.3748
Ethylbenzene	0.0000	0.0000
Xylenes	0.1635	0.7160
Total HAPs =	**1.9916**	**8.7228**
Total VOC =	**26.2769**	**115.0927**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 4b: Condenser Vent Stream Heat Content - Electric Pump - 55 mmscfd

Flash tank off-gases and non-condensables (condenser vent stream) are routed to the reboiler for combustion. Excess flash tank off-gases are recycled/recompressed for an ultimate control efficiency of 100%. The heat content of the condenser vent stream has been calculated to determine total capacity required to combust the stream and demonstrate that each reboiler is adequately sized to burn these vapors from each respective

Reboiler Capacity (mmBtu/hr) = 1.00

From GRI-GLYCalc
Condenser Vent Stream

Name	MW	LHV	Mole %	Btu/scf
Water	18.015	0.00	1.39E+00	0
Carbon Dioxide	44.010	0.00	1.79E+00	0
Nitrogen	28.013	0.00	7.75E-02	0
Methane	16.042	919.00	1.43E+01	131
Ethane	30.069	1,619.00	2.89E+01	468
Propane	44.096	2,315.00	2.56E+01	593
Isobutane	58.122	3,000.00	4.38E+00	131
n-Butane	58.122	3,011.00	1.53E+01	461
Isopentane	72.149	3,699.00	2.32E+00	86
n-Pentane	72.149	3,707.00	3.29E+00	122
Cyclopentane	70.134	3,764.80	0.00E+00	0
n-Hexane	86.175	4,756.00	7.17E-01	34
Cyclohexane	84.161	4,481.50	3.04E-01	14
Other Hexanes (as n-Hexane)	86.175	4,756.00	8.91E-01	42
n-Heptane	100.204	5,502.50	8.51E-02	5
Methylcyclohexane	98.188	5,215.70	1.93E-01	10
Benzene	78.114	3,741.80	4.99E-01	19
Toluene	92.141	4,475.00	1.02E-02	0
Ethylbenzene	106.167	5,222.20	0.00E+00	0
Xylenes	106.500	5,208.87	4.12E-03	0
C8+ (as Nonane)	128.258	6,996.40	1.12E-02	1
		Total =	**1.00E+02**	**2,117**

GLYCalc Flow Rate = 2.50E+02 SCFH
Condenser Stream Heat Content = 0.53 mmBtu/hr
Adequate for Combustion of Non-Condensables? YES

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 4c: Condenser Vent Stream Heat Content - Gas Pumps - 55 mmscfd

Flash tank off-gases and non-condensables (condenser vent stream) are routed to the reboiler for combustion. Excess flash tank off-gases are recycled/recompressed for an ultimate control efficiency of 100%. The heat content of the condenser vent stream has been calculated to determine total capacity required to combust the stream and demonstrate that each reboiler is adequately sized to burn these vapors from each respective

Reboiler Capacity (mmBtu/hr) = 1.00

From GRI-GLYCalc
Condenser Vent Stream

Name	MW	LHV	Mole %	Btu/scf
Water	18.015	0.00	1.39E+00	0
Carbon Dioxide	44.010	0.00	9.34E-01	0
Nitrogen	28.013	0.00	1.30E-01	0
Methane	16.042	919.00	2.80E+01	257
Ethane	30.069	1,619.00	2.68E+01	434
Propane	44.096	2,315.00	2.16E+01	500
Isobutane	58.122	3,000.00	3.48E+00	104
n-Butane	58.122	3,011.00	1.12E+01	337
Isopentane	72.149	3,699.00	1.76E+00	65
n-Pentane	72.149	3,707.00	2.36E+00	87
Cyclopentane	70.134	3,764.80	0.00E+00	0
n-Hexane	86.175	4,756.00	5.32E-01	25
Cyclohexane	84.161	4,481.50	2.57E-01	12
Other Hexanes (as n-Hexane)	86.175	4,756.00	6.45E-01	31
n-Heptane	100.204	5,502.50	7.74E-02	4
Methylcyclohexane	98.188	5,215.70	1.77E-01	9
Benzene	78.114	3,741.80	5.69E-01	21
Toluene	92.141	4,475.00	1.13E-02	1
Ethylbenzene	106.167	5,222.20	0.00E+00	0
Xylenes	106.500	5,208.87	4.97E-03	0
C8+ (as Nonane)	128.258	6,996.40	1.38E-02	1
		Total =	**9.99E+01**	**1,889**

GLYCalc Flow Rate =	1.16E+02	SCFH
Condenser Stream Heat Content =	0.22	mmBtu/hr
Adequate for Combustion of Non-Condensables?	YES	

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 4d: Glycol Dehydration Unit Emissions - Greenhouse Gas Emissions

Input CH_4 mol% from gas analysis =	73.1340%
Input CO_2 mol% from gas analysis =	0.0960%

Potential Emissions

Greenhouse Gas (GHG) Emissions - Metric Tons (Tonnes)

Point ID: EPSTL-1 - EPSTL-3 (Each)

Pollutant	lb/hr	tonnes/yr
CO_2 =	<0.01	<0.01
CH_4 =	0.03	0.13
CH_4 as CO_2e =	0.83	3.29
Total CO_2 + CO_2e =	**0.83**	**3.29**

EPSTL-1 - EPSTL-3 (Total)

lb/hr	tonnes/yr
<0.01	<0.01
0.10	0.40
2.48	9.88
2.48	**9.88**

Greenhouse Gas (GHG) Emissions - Short Tons (Tons)

Point ID: EPSTL-1 - EPSTL-3 (Each)

Pollutant	lb/hr	tons/yr
CO_2 =	<0.01	<0.01
CH_4 =	0.03	0.15
CH_4 as CO_2e =	0.83	3.63
Total CO_2 + CO_2e =	**0.83**	**3.63**

EPSTL-1 - EPSTL-3 (Total)

lb/hr	tons/yr
<0.01	<0.01
0.10	0.44
2.48	10.89
2.48	**10.89**

Notes:

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

2) 40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298

3) GRI-GLYCalc Input Summary and Aggregate Calculations Reports attached. 10% safety factor added to GRI-GLYCalc results to account for potential fluctuations in gas composition. Potential emissions for the electric pumps serve as the basis for the potential emissions since they are greater than potential emissions using the gas pumps.

4) 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

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

GRI-GLYCalc Results (Electric Pump) - For Reference Only

Controlled Regenerator Emissions

Pollutant	lb/hr	tons/yr
CO_2 =	0.0001	0.0005
CH_4 =	0.0301	0.1320
CH_4 as CO_2e =	0.7525	3.3000
Total CO_2 + CO_2e =	0.7526	3.3005

Uncontrolled Regenerator Emissions

EPSTL-1 - EPSTL-3 (Each)

Pollutant	lb/hr	tons/yr
CO_2 =	0.0055	0.0239
CH_4 =	1.5110	6.6182
CH_4 as CO_2e =	37.7750	165.4550
Total CO_2 + CO_2e =	37.7805	165.4789

GRI-GLYCalc Results (Gas Pumps) - For Reference Only

Controlled Regenerator Emissions

Pollutant	lb/hr	tons/yr
CO_2 =	0.0001	0.0004
CH_4 =	0.0274	0.1202
CH_4 as CO_2e =	0.6850	3.0050
Total CO_2 + CO_2e =	0.6851	3.0054

Uncontrolled Regenerator Emissions

EPSTL-1 - EPSTL-3 (Each)

Pollutant	lb/hr	tons/yr
CO_2 =	0.0050	0.0218
CH_4 =	1.3771	6.0315
CH_4 as CO_2e =	34.4275	150.7875
Total CO_2 + CO_2e =	34.4325	150.8093

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 5a: Heater Emissions Calculations - Criteria Air Pollutants

Equipment Information

Point ID:	EPRBL-1	EPRBL-2	EPRBL-3	EPHT-1	EPHT-2
Description:	Glycol Reboiler	Glycol Reboiler	Glycol Reboiler	Heater Treater Burner	Heater Treater Burner
Burner Design (mmBtu/hr):	1.00	1.00	1.00	0.50	0.50
Fuel HHV (Btu/scf):	1,324	1,324	1,324	1,324	1,324
Annual Fuel Use (mmscf)	6.62	6.62	6.62	3.31	3.31
Annual Operating Hours:	8,760	8,760	8,760	8,760	8,760

Criteria Air Pollutant Emissions

Point ID:	EPRBL-1		EPRBL-2		EPRBL-3		EPHT-1		EPHT-2	
Pollutant	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
NOx	0.08	0.33	0.08	0.33	0.08	0.33	0.04	0.17	0.04	0.17
CO	0.06	0.28	0.06	0.28	0.06	0.28	0.03	0.14	0.03	0.14
VOC	<0.01	0.02	<0.01	0.02	<0.01	0.02	<0.01	0.01	<0.01	0.01
SO_2	<0.01	<0.01	<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	<0.01	0.01	<0.01	0.01
PM_{COND}	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
PM_{TOT}	0.01	0.03	0.01	0.03	0.01	0.03	<0.01	0.01	<0.01	0.01

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
SO_2	0.6
$PM_{10/2.5}$	5.7
PM_{COND}	1.9
PM_{TOT}	7.6

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 5b: Heater Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Point ID:	EPRBL-1	EPRBL-2	EPRBL-3	EPHT-1	EPHT-2
Description:	Glycol Reboiler	Glycol Reboiler	Glycol Reboiler	Heater Treater Burner	Heater Treater Burner
Burner Design (mmBtu/hr):	1.00	1.00	1.00	0.50	0.50
Fuel HHV (Btu/scf):	1,324	1,324	1,324	1,324	1,324
Annual Fuel Use (mmscf)	6.62	6.62	6.62	3.31	3.31
Annual Operating Hours:	8,760	8,760	8,760	8,760	8,760

Hazardous Air Pollutant Emissions

Point ID:	EPRBL-1		EPRBL-2		EPRBL-3		EPHT-1		EPHT-2	
Pollutant	**lb/hr**	**tons/yr**	**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	<0.01	<0.01	<0.01
Formaldehyde	<0.01	<0.01	<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	<0.01	<0.01
Toluene	<0.01	<0.01	<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**	**<0.01**	**<0.01**	**<0.01**

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.
Sand Hill Compressor Station
Table 5c: Heater Emissions Calculations - Greenhouse Gas Emissions

Equipment Information

Point ID:	EPRBL-1	EPRBL-2	EPRBL-3	EPHT-1	EPHT-2
Description:	Glycol Reboiler	Glycol Reboiler	Glycol Reboiler	Heater Treater Burner	Heater Treater Burner
Burner Design (mmBtu/hr):	1.00	1.00	1.00	0.50	0.50
Fuel HHV (Btu/scf):	1,324	1,324	1,324	1,324	1,324
Annual Fuel Use (mmscf)	6.62	6.62	6.62	3.31	3.31
Annual Operating Hours:	8,760	8,760	8,760	8,760	8,760

Greenhouse Gas (GHG) Emissions - Metric Tons (Tonnes)

Point ID:	EPRBL-1		EPRBL-2		EPRBL-3		EPHT-1		EPHT-2	
Pollutant	lb/hr	tonnes/yr	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	58.49	232.40	58.49	232.40
CH_4	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
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	0.06	0.22	0.06	0.22	0.06	0.22	0.03	0.11	0.03	0.11
N_2O as CO_2e	0.07	0.26	0.07	0.26	0.07	0.26	0.03	0.13	0.03	0.13
Total CO_2 + CO_2e	**117.10**	**465.28**	**117.10**	**465.28**	**117.10**	**465.28**	**58.55**	**232.64**	**58.55**	**232.64**

Greenhouse Gas (GHG) Emissions - Short Tons (Tons)

Point ID:	EPRBL-1		EPRBL-2		EPRBL-3		EPHT-1		EPHT-2	
Pollutant	lb/hr	tons/yr	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	58.49	256.18	58.49	256.18
CH_4	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
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	0.06	0.24	0.06	0.24	0.06	0.24	0.03	0.12	0.03	0.12
N_2O as CO_2e	0.07	0.29	0.07	0.29	0.07	0.29	0.03	0.14	0.03	0.14
Total CO_2 + CO_2e	**117.10**	**512.89**	**117.10**	**512.89**	**117.10**	**512.89**	**58.55**	**256.44**	**58.55**	**256.44**

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

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.
Sand Hill Compressor Station
Table 12: Fugitive Emissions Calculations

Equipment Information

Source Type/Service	Number of Sources	Em. Factor (lb/hr/source)	Control Efficiency	TOC lb/hr	TOC tons/yr	VOC Wt % *
Valves - Gas	931	9.92E-03	0.00%	9.2361	40.4542	23.1172%
Flanges - Gas	900	8.60E-04	0.00%	0.7738	3.3893	23.1172%
Compressor Seals - Gas	12	1.94E-02	0.00%	0.2328	1.0197	23.1172%
Relief Valves - Gas	26	1.94E-02	0.00%	0.5044	2.2093	23.1172%
Valves - Light Oil	30	5.51E-03	0.00%	0.1653	0.7242	79.0890%
Flanges - Light Oil	45	2.43E-04	0.00%	0.0109	0.0478	79.0890%
Pump Seals - Light Oil	4	2.87E-02	0.00%	0.1146	0.5021	79.0890%

* Total organic compound (TOC) emission rates multiplied by VOC content of the gas and liquid streams (weight percent) to obtain VOC emissions.

Emissions

Source Type/Service	VOC		CO_2		CH_4	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
Valves - Gas	2.14	9.35	0.02	0.08	4.98	21.83
Flanges - Gas	0.18	0.78	<0.01	0.01	0.42	1.83
Compressor Seals - Gas	0.05	0.24	<0.01	<0.01	0.13	0.55
Relief Valves - Gas	0.12	0.51	<0.01	<0.01	0.27	1.19
Valves - Light Oil	0.13	0.57	<0.01	<0.01	0.02	0.07
Flanges - Light Oil	0.01	0.04	<0.01	<0.01	<0.01	<0.01
Pump Seals - Light Oil	0.09	0.40	<0.01	<0.01	0.01	0.05
Total =	**2.71**	**11.89**	**0.02**	**0.09**	**5.83**	**25.52**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 12: Fugitive Emissions Calculations (Continued)

Hazardous Air Pollutant (HAP) Emissions (lb/hr)

Source Type/Service	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes	Total
Valves - Gas	0.04	<0.01	<0.01	<0.01	<0.01	0.04
Flanges - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Compressor Seals - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Relief Valves - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Valves - Light Oil	0.01	<0.01	<0.01	<0.01	<0.01	0.01
Flanges - Light Oil	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pump Seals - Light Oil	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Total =	**0.06**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.06**

Hazardous Air Pollutant (HAP) Emissions (tons/yr)

Source Type/Service	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes	Total
Valves - Gas	0.19	<0.01	<0.01	<0.01	<0.01	0.19
Flanges - Gas	0.02	<0.01	<0.01	<0.01	<0.01	0.02
Compressor Seals - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Relief Valves - Gas	0.01	<0.01	<0.01	<0.01	<0.01	0.01
Valves - Light Oil	0.03	<0.01	<0.01	<0.01	0.01	0.04
Flanges - Light Oil	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pump Seals - Light Oil	0.02	<0.01	<0.01	<0.01	<0.01	0.03
Total =	**0.26**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.28**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 12: Fugitive Emissions Calculations (Continued)

Sand Hill Compositional Analysis of Separator Gas - 2/26/15

Component	Molecular Weight	Mole %	Equiv. Wt. Basis	Weight %	HC Weight %	lb/hr	tons/yr
Hydrogen Sulfide	34.082	0.000%	0.000	0.0000%	-	0.00	0.00
Carbon Dioxide	44.010	0.096%	0.042	0.1931%	-	0.02	0.09
Nitrogen	28.013	0.345%	0.097	0.4416%	-	0.05	0.21
Methane	16.042	73.134%	11.732	53.6099%	53.952%	5.80	25.40
Ethane	30.069	16.583%	4.986	22.7850%	22.931%	2.46	10.79
Propane	44.096	6.204%	2.736	12.5008%	12.581%	1.35	5.92
i-Butane	58.122	0.696%	0.405	1.8485%	1.860%	0.20	0.88
n-Butane	58.122	1.750%	1.017	4.6478%	4.677%	0.50	2.20
i-Pentane	72.149	0.354%	0.255	1.1671%	1.175%	0.13	0.55
n-Pentane	72.149	0.442%	0.319	1.4572%	1.467%	0.16	0.69
n-Hexane	86.175	0.115%	0.099	0.4544%	0.457%	0.05	0.22
Other Hexanes	86.175	0.146%	0.126	0.5749%	0.579%	0.06	0.27
Heptanes (as n-Heptane)	100.202	0.025%	0.025	0.1145%	0.115%	0.01	0.05
Benzene	78.114	0.002%	0.001	0.0057%	0.006%	<0.01	<0.01
Toluene	92.141	0.000%	0.000	0.0004%	0.000%	<0.01	<0.01
Ethylbenzene	106.167	0.000%	0.000	0.0000%	0.000%	0.00	0.00
Xylenes	106.167	0.000%	0.000	0.0005%	0.000%	<0.01	<0.01
Octanes (as n-Octane)	114.229	0.035%	0.040	0.1811%	0.182%	0.02	0.09
Nonanes (as n-Nonane)	128.255	0.003%	0.004	0.0176%	0.018%	<0.01	0.01
Decanes (as n-Decane)	142.282	0.000%	0.000	0.0000%	0.000%	<0.01	<0.01
	TOTAL =	**100.00%**	**21.884**	**100.0000%**	**100.000%**	**10.82**	**47.37**
		TOTAL HC =	**21.745**	**TOTAL VOC =**	**23.117%**	**2.48**	**10.88**
				TOTAL HAP =	**0.464%**	**0.05**	**0.22**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 12: Fugitive Emissions Calculations (Continued)

Guy Avolio No. 8H Compositional Analysis of Separator Oil

Component	Molecular Weight	Mole %	Equiv. Wt. Basis	Weight %	HC Weight %	lb/hr	TPY
Hydrogen Sulfide	34.082	0.000%	0.000	0.0000%	-	0.00	0.00
Carbon Dioxide	44.010	0.052%	0.023	0.0448%	-	<0.01	<0.01
Nitrogen	28.013	0.105%	0.029	0.0575%	-	<0.01	<0.01
Methane	16.042	30.052%	4.821	9.4304%	9.440%	0.03	0.12
Ethane	30.069	19.482%	5.858	11.4592%	11.471%	0.03	0.15
Propane	44.096	14.361%	6.333	12.3875%	12.400%	0.04	0.16
i-Butane	58.122	2.120%	1.232	2.4103%	2.413%	0.01	0.03
n-Butane	58.122	7.241%	4.209	8.2326%	8.241%	0.02	0.11
i-Pentane	72.149	2.025%	1.461	2.8580%	2.861%	0.01	0.04
n-Pentane	72.149	3.336%	2.407	4.7082%	4.713%	0.01	0.06
n-Hexane	86.175	2.110%	1.818	3.5568%	3.560%	0.01	0.05
Other Hexanes	86.175	2.187%	1.885	3.6866%	3.690%	0.01	0.05
Heptanes (as n-Heptane)	100.202	3.905%	3.913	7.6542%	7.662%	0.02	0.10
Benzene	78.114	0.033%	0.026	0.0504%	0.050%	<0.01	<0.01
Toluene	92.141	0.148%	0.136	0.2668%	0.267%	<0.01	<0.01
Ethylbenzene	106.167	0.114%	0.121	0.2368%	0.237%	<0.01	<0.01
Xylenes	106.167	0.434%	0.461	0.9013%	0.902%	<0.01	0.01
Octanes (as n-Octane)	114.229	2.978%	3.402	6.6543%	6.661%	0.02	0.08
Nonanes (as n-Nonane)	128.255	1.911%	2.451	4.7944%	4.799%	0.01	0.06
Decanes (as n-Decane)	142.282	7.405%	10.536	20.6099%	20.631%	0.06	0.26
	TOTAL =	**100.00%**	**51.121**	**100.00%**	**100.000%**	**0.29**	**1.28**
		TOTAL HC =	**51.069**	**TOTAL VOC =**	**79.089%**	**0.23**	**1.01**
				TOTAL HAP =	**5.017%**	**0.01**	**0.06**

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 13a: Blowdown Emissions Calculations

Estimated annual volume = 1,793,500 standard cubic feet per year (scf/yr)

* Based on an estimated 10 blowdowns per engine during the first month of operation and 8 blowdowns per engine per month for the remainder of the year. See following table for estimated engine blowdown volume calculations.

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	tons/yr
Hydrogen Sulfide	34.082	0.000%	0.000	0.000%	-	0	0	0.00
Carbon Dioxide	44.010	0.096%	0.042	0.193%	-	1,722	5	0.10
Nitrogen	28.013	0.345%	0.097	0.442%	-	6,188	16	0.23
Methane	16.042	73.134%	11.732	53.610%	53.952%	1,311,659	3,457	27.73
Ethane	30.069	16.583%	4.986	22.785%	22.931%	297,416	784	11.79
Propane	44.096	6.204%	2.736	12.501%	12.581%	111,269	293	6.47
i-Butane	58.122	0.696%	0.405	1.848%	1.860%	12,483	33	0.96
n-Butane	58.122	1.750%	1.017	4.648%	4.677%	31,386	83	2.40
i-Pentane	72.149	0.354%	0.255	1.167%	1.175%	6,349	17	0.60
n-Pentane	72.149	0.442%	0.319	1.457%	1.467%	7,927	21	0.75
n-Hexane	86.175	0.115%	0.099	0.454%	0.457%	2,070	5	0.24
Other Hexanes	86.175	0.146%	0.126	0.575%	0.579%	2,619	7	0.30
Heptanes (as n-Heptane)	100.202	0.025%	0.025	0.114%	0.115%	448	1	0.06
Benzene	78.114	0.002%	0.001	0.006%	0.006%	29	0	<0.01
Toluene	92.141	0.000%	0.000	0.000%	0.000%	2	0	<0.01
Ethylbenzene	106.167	0.000%	0.000	0.000%	0.000%	0	0	0.00
Xylenes	106.167	0.000%	0.000	0.000%	0.000%	2	0	0.00
Octanes (as n-Octane)	114.229	0.035%	0.040	0.181%	0.182%	622	2	0.09
Nonanes (as n-Nonane)	128.255	0.003%	0.004	0.018%	0.018%	54	0	0.01
Decanes (as n-Decane)	142.282	0.000%	0.000	0.000%	0.000%	0	0	0.00
	TOTAL =	100.00%	**21.884**	100.000%	100.000%	1,792,243	4,724	51.73
		TOTAL HC	**21.745**	**99.365%**	100.000%	1,784,334	4,703	51.40
				TOTAL VOC =	**23.117%**	**175,259**	**462**	**11.88**
				TOTAL HAPs =	**0.464%**	**2,102**	**6**	**0.24**

Molar volume conversion @ 60° F and 1 atm: 1 lb/mole = 379.4 scf

Note: Hourly emissions have not been estimated due to variances in operating conditions.

Appalachia Midstream Services, L.L.C.
Sand Hill Compressor Station
Table 13b: Blowdown Volume Calculations

Description	Amount Each	Length ft	ID in	Pa psig	Va ft^3	Vs ft^3	Weight of Gas (lb)
1st Suction Line	1	50	10.02	125	27	260	14.81
1st Suction Scrubber	1	6.5	30	125	32	303	17.26
1st Suction Bottle	1	7	20	125	15	145	8.26
1st Cylinder	2	4	13.625	125	8	77	4.38
1st Discharge Bottle	1	12	16	125	17	159	9.06
1st Discharge Line to Cooler	1	18.5	7.981	125	6	61	3.48
1st-2nd Inter-Cooler	118	24	0.505	125	4	37	2.13
2nd Suction Line from Cooler	1	35	7.981	125	12	116	6.58
2nd Suction Scrubber	1	5.5	24	125	17	164	9.35
2nd Suction Bottle	1	3	16	125	4	40	2.27
2nd Cylinder	1	4	10.5	125	2	23	1.30
2nd Discharge Bottle	1	3.83	16	125	5	51	2.89
2nd Discharge Line to Cooler	1	42.67	6.065	125	9	81	4.63
2nd-3rd Inter-Cooler	86	24	0.505	125	3	27	1.55
3rd Suction Line from Cooler	1	30.5	6.065	125	6	58	3.31
3rd Suction Scrubber	1	5.5	18	125	10	92	5.26
3rd Suction Bottle	1	3	14	125	3	30	1.73
3rd Cylinder	1	4	6.25	125	1	8	0.46
3rd Discharge Bottle	1	3.67	14	125	4	37	2.12
3rd Discharge Line to Cooler	1	29	3.826	125	2	22	1.25
After-Cooler	74	24	0.63	125	4	37	2.08
					TOTAL =	**1,830**	104.16

$P_s * V_s/T_s = P_a * V_z/T_a$

If $T_s = T_a$:

$V_s = P_a * V_a/P_s$

Pounds of Gas = V_s * Density of Air * SG

Specific Gravity (SG) = 0.76

Density of Air = 0.074887 lb/ft^3

P_s = 14.7 psig

a = Actual

ATTACHMENT O: MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

Except as noted on Emissions Unit Data Sheets, AMS is not submitting any special 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 permit for the Sand Hill Compressor Station located in Marshall County, West Virginia. Driving directions to the facility are: From Dallas, three (3) miles west on Stone Church Road, 1.3 miles south on Golden Road, then east into location.

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

Nitrogen Oxides (NOx)	82.37 tons/yr
Carbon Monoxide (CO)	75.30 tons/yr
Volatile Organic Compounds (VOC)	98.04 tons/yr
Particulate Matter (PM)	6.84 tons/yr
Sulfur Dioxide (SO_2)	0.50 tons/yr
Acetaldehyde	5.45 tons/yr
Acrolein	3.35 tons/yr
Benzene	0.38 tons/yr
Ethylbenzene	0.08 tons/yr
Formaldehyde	3.22 tons/yr
Methanol	1.63 tons/yr
n-Hexane	2.15 tons/yr
Toluene	0.33 tons/yr
Xylenes	0.34 tons/yr
Methane	83.18 tons/yr
Carbon Dioxide	88,256.35 tons/yr
Nitrous Oxide	0.16 tons/yr
Carbon Dioxide Equivalent	90,381.98 tons/yr

Modifications are based on an updated gas analysis and no new construction is proposed. 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 2nd of September 2015

By: Appalachia Midstream Services, L.L.C.
Don Wicburg
VP Northeast
P.O. Box 54382
Oklahoma City, OK 73154-1382

ATTACHMENT R: AUTHORITY OF CORPORATION

Note: The Authority Form designating Mr. Don Wicburg, VP Northeast, signatory authority by Mr. John Michael Stice, President and Chief Operating Officer of Williams, has already been submitted to the agency.

APPENDIX A: SUPPORT DOCUMENTS

CATERPILLAR G3516B AND OXIDATION CATALYST SPECIFICATION SHEETS

GRI-GLYCALC REPORTS

REPRESENTATIVE FUEL GAS ANALYSIS

REPRESENTATIVE GAS ANALYSIS

G3516B

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

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:	Gas Analysis
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	7.0-40.0
COOLING SYSTEM:	JW+OC+1AC, 2AC	FUEL METHANE NUMBER:	53.6
CONTROL SYSTEM:	ADEM3	FUEL LHV (Btu/scf):	1203
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:	28		

				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	7420	7420	7947	8536
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	8167	8167	8747	9395
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(3)(4)	ft3/min	3148	3148	2469	1726
AIR FLOW	(WET)	(3)(4)	lb/hr	13958	13958	10949	7655
FUEL FLOW (60°F, 14.7 psia)			scfm	142	142	114	82
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	93.1	93.1	75.5	53.1
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	1012	1012	1005	1025
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	9240	9240	7226	5127
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	14449	14449	11343	7937
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	2.98	2.98	3.19	3.13
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	4.40	4.40	4.72	4.79
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	2.12	2.12	2.27	2.30
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	1.08	1.08	1.16	1.18
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.39	0.39	0.38	0.38
CO2		(8)(9)	g/bhp-hr	510	510	545	592
EXHAUST OXYGEN		(8)(11)	% DRY	9.1	9.1	8.8	8.4
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	22089	22089	20587	19228
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	9641	9641	7913	2550
HEAT REJ. TO A/C - STAGE 2 (2AC)		(12)(13)	Btu/min	5334	5334	5035	3317
COOLING SYSTEM SIZING CRITERIA							
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)		(13)(14)	Btu/min	39791			
TOTAL AFTERCOOLER CIRCUIT (2AC)		(13)(14)	Btu/min	5601			
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.							

CONDITIONS AND DEFINITIONS

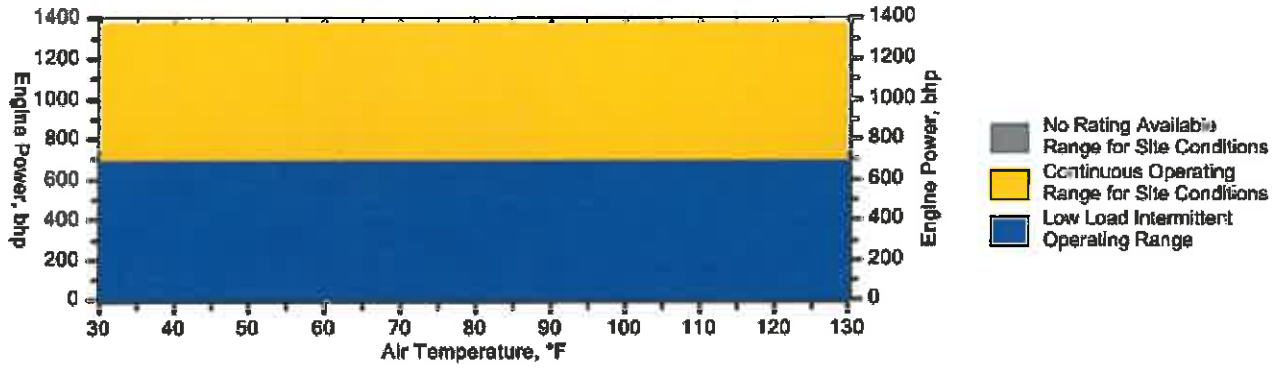
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating 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:
Data generated by Gas Engine Rating Pro Version 5.03.00
Ref. Data Set DM8800-07-001, Printed 26Jun2015

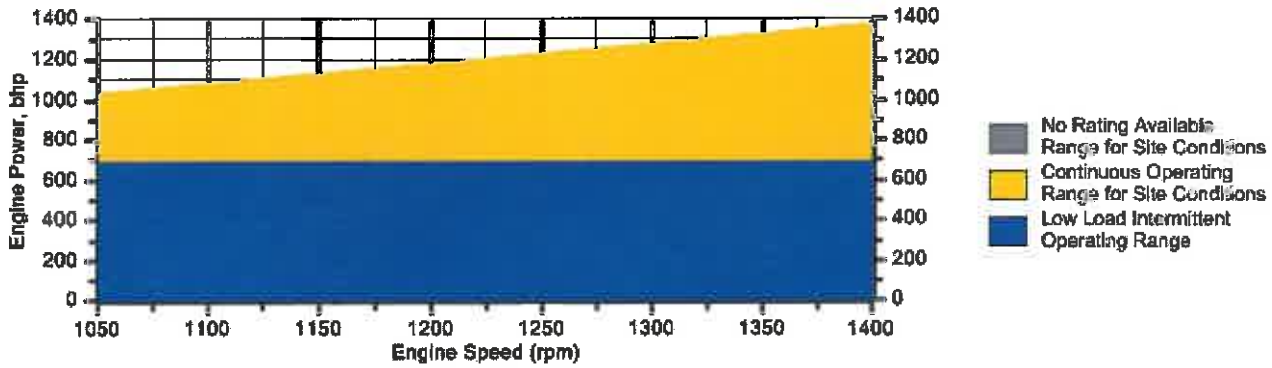
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 500 ft and 1400 rpm



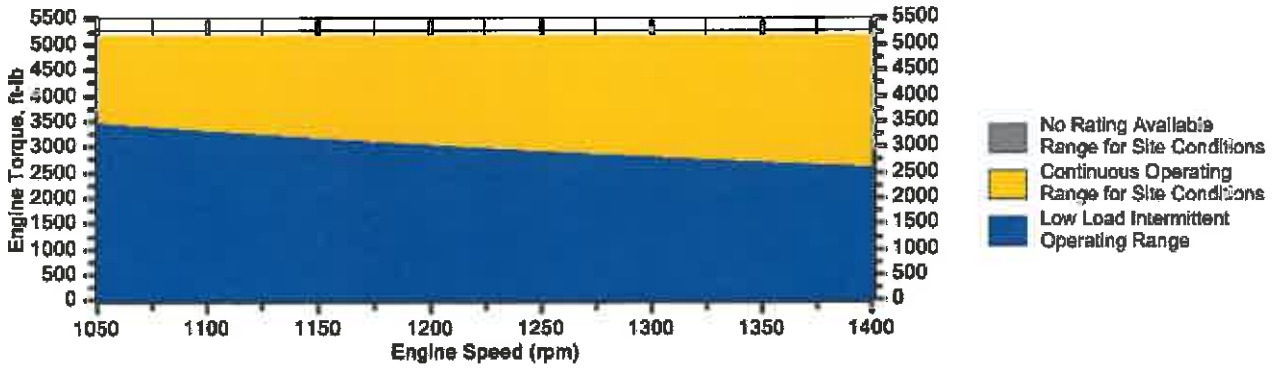
Engine Power vs. Engine Speed

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	73.1340	73.1340
Ethane	C2H6	16.5830	16.5830
Propane	C3H8	6.2040	6.2040
Isobutane	iso-C4H1O	0.6960	0.6960
Norbutane	nor-C4H1O	1.7500	1.7500
Isopentane	iso-C5H12	0.3540	0.3540
Norpentane	nor-C5H12	0.4420	0.4420
Hexane	C6H14	0.3960	0.3960
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.3450	0.3450
Carbon Dioxide	CO2	0.0960	0.0960
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:	Gas Analysis
Unit of Measure:	English
Calculated Fuel Properties	
Caterpillar Methane Number:	53.6
Lower Heating Value (Btu/scf):	1203
Higher Heating Value (Btu/scf):	1324
WOBBE Index (Btu/scf):	1382
THC: Free Inert Ratio:	225.76
Total % Inerts (% N2, CO2, He):	0.44%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.996
Stoich A/F Ratio (Vol/Vol):	12.45
Stoich A/F Ratio (Mass/Mass):	16.44
Specific Gravity (Relative to Air):	0.757
Specific Heat Constant (K):	1.273

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:
Data generated by Gas Engine Rating Pro Version 5.03.00
Ref. Data Set DM8800-07-001, Printed 26Jun2015

2585 Heartland Drive
Sheridan, WY 82801
Office: | Direct: +1 (307) 675.5310
kdunham@emittechnologies.com

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3516B
Horsepower:	1380
RPM:	1400
Compression Ratio:	8.0
Exhaust Flow Rate:	9240 CFM
Exhaust Temperature:	1012 °F
Reference:	DM8800-07-001
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

	g/bhp-hr
NOx:	0.50
CO:	2.98
THC:	4.40
NMHC	2.12
NMNEHC:	1.08
HCHO:	0.39
O2:	9.00 %

POST CATALYST EMISSIONS

	g/bhp-hr
NOx:	Unaffected by Oxidation Catalyst
CO:	<0.45
VOC:	<0.27
HCHO:	<0.02

CONTROL EQUIPMENT

Catalyst Housing

Model:	ELH-3550-1416F-4CE0-241
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:	14" Flat Face Flange
Outlet Connections:	16" Flat Face Flange
Configuration:	End In / Side 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:	4
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

2585 Heartland Drive
Sheridan, WY 82801
Office: | Direct: +1 (307) 675.5310
kdunham@emittechnologies.com

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: Sand Hill Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Electric - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 06, 2015

DESCRIPTION:

Description: Three identical dehydration units
Sand Hill Gas Analysis 2/26/15
55 MMSCFD/22 gpm
Still vent condenser/combustion; flash tank
combustion - excess recycled/recompressed

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 103.00 deg. F
Pressure: 950.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.0960
Nitrogen	0.3450
Methane	73.1340
Ethane	16.5830
Propane	6.2040
Isobutane	0.6960
n-Butane	1.7500
Isopentane	0.3540
n-Pentane	0.4420
n-Hexane	0.1154
Cyclohexane	0.0110
Other Hexanes	0.1460
Heptanes	0.0250
Methylcyclohexane	0.0134
2,2,4-Trimethylpentane	0.0015
Benzene	0.0016
Toluene	0.0001
Xylenes	0.0001
C8+ Heavies	0.0819

DRY GAS:

Flow Rate: 55.0 MMSCF/day
Water Content: 7.0 lbs. H2O/MMSCF

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 22.0 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Recycle/recompression
Temperature: 120.0 deg. F
Pressure: 50.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 52.0 deg. F
Pressure: 14.1 psia

Control Device: Combustion Device
Destruction Efficiency: 98.0 %
Excess Oxygen: 0.0 %
Ambient Air Temperature: 52.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Sand Hill Compressor Station - Electric Pump
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Electric - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 06, 2015

DESCRIPTION:

Description: Three identical dehydration units
Sand Hill Gas Analysis 2/26/15
55 MMSCFD/22 gpm
Still vent condenser/combustion; flash tank
combustion - excess recycled/recompressed

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0301	0.723	0.1320
Ethane	0.1143	2.742	0.5005
Propane	0.1484	3.561	0.6499
Isobutane	0.0335	0.804	0.1466
n-Butane	0.1170	2.808	0.5125
Isopentane	0.0220	0.529	0.0965
n-Pentane	0.0313	0.750	0.1369
n-Hexane	0.0081	0.195	0.0356
Cyclohexane	0.0034	0.081	0.0147
Other Hexanes	0.0101	0.242	0.0442
Heptanes	0.0011	0.027	0.0049
Methylcyclohexane	0.0025	0.060	0.0109
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.0051	0.123	0.0225
Toluene	0.0001	0.003	0.0005
Xylenes	0.0001	0.001	0.0003
C8+ Heavies	0.0002	0.005	0.0009
Total Emissions	0.5273	12.656	2.3096
Total Hydrocarbon Emissions	0.5273	12.656	2.3096
Total VOC Emissions	0.3829	9.190	1.6772
Total HAP Emissions	0.0135	0.324	0.0591
Total BTEX Emissions	0.0053	0.128	0.0233

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.5110	36.264	6.6182
Ethane	5.7972	139.132	25.3915
Propane	8.0525	193.260	35.2700
Isobutane	2.0105	48.252	8.8060
n-Butane	7.6641	183.939	33.5688
Isopentane	1.9252	46.206	8.4326
n-Pentane	3.4050	81.721	14.9140

n-Hexane	1.9408	46.580	8.5008
Cyclohexane	1.0995	26.389	4.8160
Other Hexanes	1.7502	42.006	7.6660
Heptanes	0.9696	23.270	4.2468
Methylcyclohexane	1.5913	38.191	6.9698
2,2,4-Trimethylpentane	0.0239	0.573	0.1045
Benzene	1.2883	30.919	5.6426
Toluene	0.1191	2.859	0.5217
Xylenes	0.2098	5.035	0.9189
C8+ Heavies	15.3120	367.488	67.0665
Total Emissions	54.6701	1312.082	239.4549
Total Hydrocarbon Emissions	54.6701	1312.082	239.4549
Total VOC Emissions	47.3619	1136.686	207.4452
Total HAP Emissions	3.5819	85.965	15.6886
Total BTEX Emissions	1.6172	38.813	7.0833

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	29.8975	717.540	130.9511
Ethane	31.2304	749.530	136.7892
Propane	20.3758	489.019	89.2459
Isobutane	3.2852	78.845	14.3893
n-Butane	9.4743	227.384	41.4975
Isopentane	2.0414	48.993	8.9413
n-Pentane	2.8565	68.556	12.5115
n-Hexane	0.8789	21.093	3.8494
Cyclohexane	0.1214	2.914	0.5318
Other Hexanes	1.0538	25.291	4.6157
Heptanes	0.2072	4.973	0.9076
Methylcyclohexane	0.1346	3.229	0.5894
2,2,4-Trimethylpentane	0.0103	0.247	0.0450
Benzene	0.0197	0.472	0.0862
Toluene	0.0011	0.027	0.0050
Xylenes	0.0008	0.019	0.0034
C8+ Heavies	0.2797	6.713	1.2252
Total Emissions	101.8686	2444.846	446.1844
Total Hydrocarbon Emissions	101.8686	2444.846	446.1844
Total VOC Emissions	40.7407	977.776	178.4441
Total HAP Emissions	0.9107	21.858	3.9890
Total BTEX Emissions	0.0216	0.518	0.0945

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	52.00	deg. F
Condenser Pressure:	14.08	psia
Condenser Duty:	1.12e-001	MM BTU/hr
Hydrocarbon Recovery:	2.28	bbls/day
Produced Water:	9.95	bbls/day
Ambient Temperature:	52.00	deg. F
Excess Oxygen:	0.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	1.12e-001	MM BTU/hr

Component	Emitted	Destroyed
Methane	1.99%	98.01%
Ethane	1.97%	98.03%
Propane	1.84%	98.16%
Isobutane	1.67%	98.33%
n-Butane	1.53%	98.47%
Isopentane	1.14%	98.86%
n-Pentane	0.92%	99.08%
n-Hexane	0.42%	99.58%
Cyclohexane	0.31%	99.69%
Other Hexanes	0.58%	99.42%
Heptanes	0.12%	99.88%
Methylcyclohexane	0.16%	99.84%
2,2,4-Trimethylpentane	0.16%	99.84%
Benzene	0.40%	99.60%
Toluene	0.10%	99.90%
Xylenes	0.03%	99.97%
C8+ Heavies	0.00%	100.00%

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:	2.87	lbs. H2O/MMSCF
Temperature:	103.0	deg. F
Pressure:	950.0	psig
Dry Gas Flow Rate:	55.0000	MMSCF/day
Glycol Losses with Dry Gas:	1.7070	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	66.20	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	9.09	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.33%	95.67%
Carbon Dioxide	99.47%	0.53%
Nitrogen	99.95%	0.05%
Methane	99.96%	0.04%
Ethane	99.88%	0.12%
Propane	99.83%	0.17%
Isobutane	99.78%	0.22%
n-Butane	99.72%	0.28%
Isopentane	99.74%	0.26%

n-Pentane	99.68%	0.32%
n-Hexane	99.53%	0.47%
Cyclohexane	97.82%	2.18%
Other Hexanes	99.63%	0.37%
Heptanes	99.22%	0.78%
Methylcyclohexane	97.83%	2.17%
2,2,4-Trimethylpentane	99.67%	0.33%
Benzene	82.69%	17.31%
Toluene	78.41%	21.59%
Xylenes	67.18%	32.82%
C8+ Heavies	98.15%	1.85%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 120.0 deg. F
Flash Pressure: 50.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.97%	0.03%
Carbon Dioxide	38.61%	61.39%
Nitrogen	4.67%	95.33%
Methane	4.81%	95.19%
Ethane	15.66%	84.34%
Propane	28.32%	71.68%
Isobutane	37.96%	62.04%
n-Butane	44.72%	55.28%
Isopentane	48.79%	51.21%
n-Pentane	54.61%	45.39%
n-Hexane	68.99%	31.01%
Cyclohexane	90.37%	9.63%
Other Hexanes	62.79%	37.21%
Heptanes	82.48%	17.52%
Methylcyclohexane	92.51%	7.49%
2,2,4-Trimethylpentane	70.33%	29.67%
Benzene	98.57%	1.43%
Toluene	99.13%	0.87%
Xylenes	99.68%	0.32%
C8+ Heavies	98.42%	1.58%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	56.11%	43.89%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	1.02%	98.98%

n-Pentane	0.92%	99.08%
n-Hexane	0.72%	99.28%
Cyclohexane	3.54%	96.46%
Other Hexanes	1.59%	98.41%
Heptanes	0.61%	99.39%
Methylcyclohexane	4.32%	95.68%
2,2,4-Trimethylpentane	2.13%	97.87%
Benzene	5.07%	94.93%
Toluene	7.97%	92.03%
Xylenes	12.96%	87.04%
C8+ Heavies	12.21%	87.79%

STREAM REPORTS:

WET GAS STREAM

Temperature: 103.00 deg. F
Pressure: 964.70 psia
Flow Rate: 2.30e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.39e-001	1.52e+002
Carbon Dioxide	9.59e-002	2.55e+002
Nitrogen	3.45e-001	5.84e+002
Methane	7.30e+001	7.09e+004
Ethane	1.66e+001	3.01e+004
Propane	6.20e+000	1.65e+004
Isobutane	6.95e-001	2.44e+003
n-Butane	1.75e+000	6.15e+003
Isopentane	3.54e-001	1.54e+003
n-Pentane	4.41e-001	1.93e+003
n-Hexane	1.15e-001	6.01e+002
Cyclohexane	1.10e-002	5.60e+001
Other Hexanes	1.46e-001	7.61e+002
Heptanes	2.50e-002	1.51e+002
Methylcyclohexane	1.34e-002	7.95e+001
2,2,4-Trimethylpentane	1.50e-003	1.04e+001
Benzene	1.60e-003	7.55e+000
Toluene	9.99e-005	5.57e-001
Xylenes	9.99e-005	6.42e-001
C8+ Heavies	8.18e-002	8.43e+002
Total Components	100.00	1.33e+005

DRY GAS STREAM

Temperature: 103.00 deg. F
Pressure: 964.70 psia
Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.05e-003	6.59e+000
Carbon Dioxide	9.56e-002	2.54e+002

Nitrogen	3.45e-001	5.84e+002
Methane	7.32e+001	7.09e+004
Ethane	1.66e+001	3.01e+004
Propane	6.20e+000	1.65e+004
Isobutane	6.95e-001	2.44e+003
n-Butane	1.75e+000	6.13e+003
Isopentane	3.53e-001	1.54e+003
n-Pentane	4.41e-001	1.92e+003
n-Hexane	1.15e-001	5.98e+002
Cyclohexane	1.08e-002	5.47e+001
Other Hexanes	1.46e-001	7.58e+002
Heptanes	2.48e-002	1.50e+002
Methylcyclohexane	1.31e-002	7.78e+001
2,2,4-Trimethylpentane	1.50e-003	1.03e+001
Benzene	1.32e-003	6.25e+000
Toluene	7.85e-005	4.37e-001
Xylenes	6.72e-005	4.31e-001
C8+ Heavies	8.04e-002	8.28e+002
Total Components	100.00	1.33e+005

LEAN GLYCOL STREAM

Temperature: 103.00 deg. F
Flow Rate: 2.20e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.22e+004
Water	1.50e+000	1.86e+002
Carbon Dioxide	1.10e-012	1.36e-010
Nitrogen	2.46e-013	3.05e-011
Methane	8.52e-018	1.06e-015
Ethane	1.41e-007	1.75e-005
Propane	9.34e-009	1.16e-006
Isobutane	1.28e-009	1.59e-007
n-Butane	3.43e-009	4.25e-007
Isopentane	1.61e-004	1.99e-002
n-Pentane	2.54e-004	3.15e-002
n-Hexane	1.14e-004	1.42e-002
Cyclohexane	3.26e-004	4.04e-002
Other Hexanes	2.29e-004	2.83e-002
Heptanes	4.77e-005	5.91e-003
Methylcyclohexane	5.80e-004	7.19e-002
2,2,4-Trimethylpentane	4.20e-006	5.20e-004
Benzene	5.56e-004	6.88e-002
Toluene	8.33e-005	1.03e-002
Xylenes	2.52e-004	3.12e-002
C8+ Heavies	1.72e-002	2.13e+000
Total Components	100.00	1.24e+004

RICH GLYCOL STREAM

Temperature: 103.00 deg. F
Pressure: 964.70 psia
Flow Rate: 2.26e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.61e+001	1.22e+004
Water	2.61e+000	3.31e+002
Carbon Dioxide	1.07e-002	1.36e+000
Nitrogen	2.41e-003	3.06e-001
Methane	2.48e-001	3.14e+001
Ethane	2.92e-001	3.70e+001
Propane	2.24e-001	2.84e+001
Isobutane	4.17e-002	5.30e+000
n-Butane	1.35e-001	1.71e+001
Isopentane	3.14e-002	3.99e+000
n-Pentane	4.96e-002	6.29e+000
n-Hexane	2.23e-002	2.83e+000
Cyclohexane	9.94e-003	1.26e+000
Other Hexanes	2.23e-002	2.83e+000
Heptanes	9.32e-003	1.18e+000
Methylcyclohexane	1.42e-002	1.80e+000
2,2,4-Trimethylpentane	2.73e-004	3.47e-002
Benzene	1.09e-002	1.38e+000
Toluene	1.03e-003	1.31e-001
Xylenes	1.91e-003	2.42e-001
C8+ Heavies	1.40e-001	1.77e+001
Total Components	100.00	1.27e+004

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 64.70 psia
Flow Rate: 1.41e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.62e-001	1.08e-001
Carbon Dioxide	5.12e-001	8.37e-001
Nitrogen	2.80e-001	2.92e-001
Methane	5.01e+001	2.99e+001
Ethane	2.79e+001	3.12e+001
Propane	1.24e+001	2.04e+001
Isobutane	1.52e+000	3.29e+000
n-Butane	4.39e+000	9.47e+000
Isopentane	7.61e-001	2.04e+000
n-Pentane	1.07e+000	2.86e+000
n-Hexane	2.74e-001	8.79e-001
Cyclohexane	3.88e-002	1.21e-001
Other Hexanes	3.29e-001	1.05e+000
Heptanes	5.56e-002	2.07e-001
Methylcyclohexane	3.69e-002	1.35e-001
2,2,4-Trimethylpentane	2.42e-003	1.03e-002
Benzene	6.78e-003	1.97e-002
Toluene	3.32e-004	1.14e-003
Xylenes	1.97e-004	7.78e-004
C8+ Heavies	4.42e-002	2.80e-001
Total Components	100.00	1.03e+002

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 2.24e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.69e+001	1.22e+004
Water	2.63e+000	3.31e+002
Carbon Dioxide	4.18e-003	5.27e-001
Nitrogen	1.14e-004	1.43e-002
Methane	1.20e-002	1.51e+000
Ethane	4.61e-002	5.80e+000
Propane	6.40e-002	8.05e+000
Isobutane	1.60e-002	2.01e+000
n-Butane	6.09e-002	7.66e+000
Isopentane	1.55e-002	1.95e+000
n-Pentane	2.73e-002	3.44e+000
n-Hexane	1.55e-002	1.95e+000
Cyclohexane	9.06e-003	1.14e+000
Other Hexanes	1.41e-002	1.78e+000
Heptanes	7.75e-003	9.75e-001
Methylcyclohexane	1.32e-002	1.66e+000
2,2,4-Trimethylpentane	1.94e-004	2.44e-002
Benzene	1.08e-002	1.36e+000
Toluene	1.03e-003	1.29e-001
Xylenes	1.92e-003	2.41e-001
C8+ Heavies	1.39e-001	1.74e+001
Total Components	100.00	1.26e+004

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: 3.41e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.98e+001	1.45e+002
Carbon Dioxide	1.33e-001	5.27e-001
Nitrogen	5.68e-003	1.43e-002
Methane	1.05e+000	1.51e+000
Ethane	2.15e+000	5.80e+000
Propane	2.03e+000	8.05e+000
Isobutane	3.85e-001	2.01e+000
n-Butane	1.47e+000	7.66e+000
Isopentane	2.97e-001	1.93e+000
n-Pentane	5.25e-001	3.41e+000

n-Hexane	2.51e-001	1.94e+000
Cyclohexane	1.45e-001	1.10e+000
Other Hexanes	2.26e-001	1.75e+000
Heptanes	1.08e-001	9.70e-001
Methylcyclohexane	1.80e-001	1.59e+000
2,2,4-Trimethylpentane	2.33e-003	2.39e-002
Benzene	1.84e-001	1.29e+000
Toluene	1.44e-002	1.19e-001
Xylenes	2.20e-002	2.10e-001
C8+ Heavies	1.00e+000	1.53e+001
Total Components	100.00	2.01e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 52.00 deg. F
Flow Rate: 2.90e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	1.45e+002	999785.
Carbon Dioxide	3.86e-003	5.61e-003	39.
Nitrogen	1.73e-006	2.52e-006	0.
Methane	4.17e-004	6.06e-004	4.
Ethane	2.36e-003	3.43e-003	24.
Propane	1.41e-003	2.05e-003	14.
Isobutane	1.90e-004	2.76e-004	2.
n-Butane	9.62e-004	1.40e-003	10.
Isopentane	1.42e-004	2.07e-004	1.
n-Pentane	2.30e-004	3.34e-004	2.
n-Hexane	5.78e-005	8.39e-005	1.
Cyclohexane	1.74e-004	2.52e-004	2.
Other Hexanes	5.42e-005	7.87e-005	1.
Heptanes	4.89e-006	7.10e-006	0.
Methylcyclohexane	6.57e-005	9.55e-005	1.
2,2,4-Trimethylpentane	1.05e-007	1.52e-007	0.
Benzene	1.11e-002	1.62e-002	111.
Toluene	2.52e-004	3.66e-004	3.
Xylenes	1.52e-004	2.20e-004	2.
C8+ Heavies	1.46e-007	2.13e-007	0.
Total Components	100.00	1.45e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 52.00 deg. F
Flow Rate: 6.65e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	1.45e-002	4.11e-003
Carbon Dioxide	9.99e-003	2.83e-003
Nitrogen	2.83e-005	8.01e-006
Methane	1.19e-002	3.36e-003
Ethane	2.85e-001	8.07e-002
Propane	2.23e+000	6.32e-001
Isobutane	1.19e+000	3.36e-001
n-Butane	6.41e+000	1.81e+000
Isopentane	2.91e+000	8.23e-001

n-Pentane	6.51e+000	1.84e+000
n-Hexane	5.42e+000	1.53e+000
Cyclohexane	3.29e+000	9.31e-001
Other Hexanes	4.40e+000	1.25e+000
Heptanes	3.23e+000	9.13e-001
Methylcyclohexane	5.19e+000	1.47e+000
2,2,4-Trimethylpentane	7.76e-002	2.19e-002
Benzene	3.59e+000	1.02e+000
Toluene	3.98e-001	1.13e-001
Xylenes	7.31e-001	2.07e-001
C8+ Heavies	5.41e+001	1.53e+001
Total Components	100.00	2.83e+001

CONDENSER VENT STREAM

Temperature: 52.00 deg. F
Pressure: 14.08 psia
Flow Rate: 2.50e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.39e+000	1.64e-001
Carbon Dioxide	1.79e+000	5.18e-001
Nitrogen	7.75e-002	1.43e-002
Methane	1.43e+001	1.51e+000
Ethane	2.89e+001	5.71e+000
Propane	2.56e+001	7.42e+000
Isobutane	4.38e+000	1.67e+000
n-Butane	1.53e+001	5.85e+000
Isopentane	2.32e+000	1.10e+000
n-Pentane	3.29e+000	1.56e+000
n-Hexane	7.17e-001	4.07e-001
Cyclohexane	3.04e-001	1.68e-001
Other Hexanes	8.91e-001	5.05e-001
Heptanes	8.51e-002	5.61e-002
Methylcyclohexane	1.93e-001	1.24e-001
2,2,4-Trimethylpentane	2.55e-003	1.92e-003
Benzene	4.99e-001	2.57e-001
Toluene	1.02e-002	6.19e-003
Xylenes	4.12e-003	2.87e-003
C8+ Heavies	8.66e-003	9.71e-003
Total Components	100.00	2.71e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 4.83e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	1.48e+001	3.01e-002
Ethane	2.99e+001	1.14e-001
Propane	2.64e+001	1.48e-001
Isobutane	4.53e+000	3.35e-002
n-Butane	1.58e+001	1.17e-001

Isopentane	2.40e+000	2.20e-002
n-Pentane	3.40e+000	3.13e-002
n-Hexane	7.41e-001	8.13e-003
Cyclohexane	3.14e-001	3.36e-003
Other Hexanes	9.21e-001	1.01e-002
Heptanes	8.80e-002	1.12e-003
Methylcyclohexane	1.99e-001	2.49e-003
2,2,4-Trimethylpentane	2.64e-003	3.83e-005
Benzene	5.16e-001	5.13e-003
Toluene	1.06e-002	1.24e-004
Xylenes	4.25e-003	5.75e-005
C8+ Heavies	8.95e-003	1.94e-004
Total Components	100.00	5.27e-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	89.16	87.59	63.78
45.0	87.03	85.16	62.02
50.0	84.64	82.40	60.29
55.0	81.97	79.33	58.58
60.0	79.03	75.97	56.89
65.0	75.86	72.33	55.24
70.0	72.47	68.46	53.63
75.0	68.91	64.41	52.05
80.0	65.22	60.24	50.53
85.0	61.44	56.01	49.06
90.0	57.64	51.80	47.64
95.0	53.84	47.65	46.29
100.0	50.10	43.64	45.01
105.0	46.46	39.79	43.81
110.0	42.92	36.14	42.67
115.0	39.52	32.72	41.61
120.0	36.27	29.52	40.62
125.0	33.16	26.55	39.70
130.0	30.20	23.80	38.83
135.0	27.38	21.25	38.01
140.0	24.70	18.90	37.23
145.0	22.14	16.71	36.45
150.0	19.71	14.69	35.65
155.0	17.19	12.66	34.72
160.0	14.90	10.85	33.66
165.0	12.63	9.10	32.25
170.0	10.36	7.39	30.21

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	5.643	2.273	59.72
BTEX	7.083	2.398	66.15
Total HAP	15.689	6.060	61.37
VOC	207.445	101.473	51.08

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: Sand Hill Compressor Station - Gas Pumps
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Gas - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 06, 2015

DESCRIPTION:

Description: Three identical dehydration units
Sand Hill Gas Analysis 2/26/15
55 MMSCFD/15 gpm total (Two 7.5 gpm pumps)
Still vent condenser/combustion; flash tank
combustion - excess recycled/recompressed

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 103.00 deg. F
Pressure: 900.00 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	0.0960
Nitrogen	0.3450
Methane	73.1340
Ethane	16.5830
Propane	6.2040
Isobutane	0.6960
n-Butane	1.7500
Isopentane	0.3540
n-Pentane	0.4420
n-Hexane	0.1154
Cyclohexane	0.0110
Other Hexanes	0.1460
Heptanes	0.0250
Methylcyclohexane	0.0134
2,2,4-Trimethylpentane	0.0015
Benzene	0.0016
Toluene	0.0001
Xylenes	0.0001
C8+ Heavies	0.0819

DRY GAS:

Flow Rate: 55.0 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: 120.0 deg. F
Pressure: 50.0 psig

REGENERATOR OVERHEADS CONTROL DEVICE:

Control Device: Condenser
Temperature: 52.0 deg. F
Pressure: 14.1 psia

Control Device: Combustion Device
Destruction Efficiency: 98.0 %
Excess Oxygen: 0.0 %
Ambient Air Temperature: 52.0 deg. F

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Sand Hill Compressor Station - Gas Pumps
File Name: C:\Users\hmoseley\Dropbox\Flatrock OKC - Hillary\Access\Sand Hill\2015 June R13 Mod App\2015-07-06 Sand Hill_Gas - 55 mm - 2-26-15 analysis and 900 psi.ddf
Date: July 06, 2015

DESCRIPTION:

Description: Three identical dehydration units
Sand Hill Gas Analysis 2/26/15
55 MMSCFD/15 gpm total (Two 7.5 gpm pumps)
Still vent condenser/combustion; flash tank
combustion - excess recycled/recompressed

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0274	0.658	0.1202
Ethane	0.0491	1.179	0.2151
Propane	0.0582	1.397	0.2549
Isobutane	0.0123	0.296	0.0540
n-Butane	0.0398	0.956	0.1745
Isopentane	0.0077	0.186	0.0339
n-Pentane	0.0104	0.250	0.0456
n-Hexane	0.0028	0.067	0.0123
Cyclohexane	0.0013	0.032	0.0058
Other Hexanes	0.0034	0.081	0.0149
Heptanes	0.0005	0.011	0.0021
Methylcyclohexane	0.0011	0.026	0.0047
2,2,4-Trimethylpentane	<0.0001	<0.001	0.0001
Benzene	0.0027	0.065	0.0119
Toluene	0.0001	0.002	0.0003
Xylenes	<0.0001	0.001	0.0001
C8+ Heavies	0.0001	0.003	0.0005
Total Emissions	0.2171	5.209	0.9507
Total Hydrocarbon Emissions	0.2171	5.209	0.9507
Total VOC Emissions	0.1405	3.372	0.6154
Total HAP Emissions	0.0056	0.135	0.0246
Total BTEX Emissions	0.0028	0.067	0.0123

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.3771	33.049	6.0315
Ethane	2.5082	60.196	10.9858
Propane	3.2597	78.233	14.2776
Isobutane	0.7898	18.956	3.4594
n-Butane	2.8499	68.399	12.4828
Isopentane	0.7879	18.909	3.4509
n-Pentane	1.3454	32.289	5.8927

n-Hexane	0.8475	20.339	3.7119
Cyclohexane	0.5639	13.534	2.4699
Other Hexanes	0.7454	17.889	3.2648
Heptanes	0.4940	11.855	2.1635
Methylcyclohexane	0.9000	21.599	3.9419
2,2,4-Trimethylpentane	0.0125	0.300	0.0547
Benzene	0.8825	21.180	3.8654
Toluene	0.0856	2.053	0.3748
Xylenes	0.1635	3.923	0.7160
C8+ Heavies	12.5494	301.186	54.9665
Total Emissions	30.1621	723.890	132.1099
Total Hydrocarbon Emissions	30.1621	723.890	132.1099
Total VOC Emissions	26.2769	630.645	115.0927
Total HAP Emissions	1.9915	47.795	8.7226
Total BTEX Emissions	1.1315	27.157	4.9561

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	178.1754	4276.209	780.4081
Ethane	89.4030	2145.671	391.5850
Propane	53.1418	1275.404	232.7612
Isobutane	8.3320	199.968	36.4942
n-Butane	22.7415	545.795	99.6076
Isopentane	5.4448	130.675	23.8481
n-Pentane	7.3523	176.454	32.2029
n-Hexane	2.4982	59.958	10.9423
Cyclohexane	0.4168	10.003	1.8255
Other Hexanes	2.9403	70.568	12.8787
Heptanes	0.6901	16.562	3.0226
Methylcyclohexane	0.5077	12.185	2.2238
2,2,4-Trimethylpentane	0.0354	0.850	0.1552
Benzene	0.0871	2.089	0.3813
Toluene	0.0053	0.127	0.0232
Xylenes	0.0039	0.094	0.0171
C8+ Heavies	1.4961	35.905	6.5527
Total Emissions	373.2715	8958.517	1634.9293
Total Hydrocarbon Emissions	373.2715	8958.517	1634.9293
Total VOC Emissions	105.6932	2536.637	462.9363
Total HAP Emissions	2.6299	63.118	11.5190
Total BTEX Emissions	0.0962	2.310	0.4216

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	52.00	deg. F
Condenser Pressure:	14.08	psia
Condenser Duty:	4.66e-002	MM BTU/hr
Hydrocarbon Recovery:	1.55	bbls/day
Produced Water:	10.26	bbls/day
Ambient Temperature:	52.00	deg. F
Excess Oxygen:	0.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	4.66e-002	MM BTU/hr

Component	Emitted	Destroyed
Methane	1.99%	98.01%
Ethane	1.96%	98.04%
Propane	1.79%	98.21%
Isobutane	1.56%	98.44%
n-Butane	1.40%	98.60%
Isopentane	0.98%	99.02%
n-Pentane	0.77%	99.23%
n-Hexane	0.33%	99.67%
Cyclohexane	0.23%	99.77%
Other Hexanes	0.46%	99.54%
Heptanes	0.10%	99.90%
Methylcyclohexane	0.12%	99.88%
2,2,4-Trimethylpentane	0.12%	99.88%
Benzene	0.31%	99.69%
Toluene	0.07%	99.93%
Xylenes	0.02%	99.98%
C8+ Heavies	0.00%	100.00%

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:	3.47	lbs. H2O/MMSCF
Temperature:	103.0	deg. F
Pressure:	900.0	psig
Dry Gas Flow Rate:	55.0000	MMSCF/day
Glycol Losses with Dry Gas:	1.4697	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	68.82	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	6.01	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.03%	94.97%
Carbon Dioxide	99.65%	0.35%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.92%	0.08%
Propane	99.88%	0.12%
Isobutane	99.85%	0.15%
n-Butane	99.81%	0.19%
Isopentane	99.82%	0.18%

n-Pentane	99.77%	0.23%
n-Hexane	99.67%	0.33%
Cyclohexane	98.47%	1.53%
Other Hexanes	99.74%	0.26%
Heptanes	99.44%	0.56%
Methylcyclohexane	98.45%	1.55%
2,2,4-Trimethylpentane	99.76%	0.24%
Benzene	87.39%	12.61%
Toluene	83.91%	16.09%
Xylenes	74.13%	25.87%
C8+ Heavies	98.56%	1.44%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 120.0 deg. F
Flash Pressure: 50.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.79%	0.21%
Carbon Dioxide	8.84%	91.16%
Nitrogen	0.74%	99.26%
Methane	0.77%	99.23%
Ethane	2.73%	97.27%
Propane	5.78%	94.22%
Isobutane	8.66%	91.34%
n-Butane	11.14%	88.86%
Isopentane	12.84%	87.16%
n-Pentane	15.68%	84.32%
n-Hexane	25.55%	74.45%
Cyclohexane	58.69%	41.31%
Other Hexanes	20.65%	79.35%
Heptanes	41.93%	58.07%
Methylcyclohexane	65.20%	34.80%
2,2,4-Trimethylpentane	26.63%	73.37%
Benzene	91.46%	8.54%
Toluene	94.63%	5.37%
Xylenes	97.97%	2.03%
C8+ Heavies	90.47%	9.53%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	45.81%	54.19%
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	1.73%	98.27%

n-Pentane	1.60%	98.40%
n-Hexane	1.17%	98.83%
Cyclohexane	4.77%	95.23%
Other Hexanes	2.61%	97.39%
Heptanes	0.85%	99.15%
Methylcyclohexane	5.38%	94.62%
2,2,4-Trimethylpentane	2.92%	97.08%
Benzene	5.38%	94.62%
Toluene	8.25%	91.75%
Xylenes	13.09%	86.91%
C8+ Heavies	11.69%	88.31%

STREAM REPORTS:

WET GAS STREAM

Temperature: 103.00 deg. F
Pressure: 914.70 psia
Flow Rate: 2.30e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.45e-001	1.58e+002
Carbon Dioxide	9.59e-002	2.55e+002
Nitrogen	3.45e-001	5.84e+002
Methane	7.30e+001	7.09e+004
Ethane	1.66e+001	3.01e+004
Propane	6.20e+000	1.65e+004
Isobutane	6.95e-001	2.44e+003
n-Butane	1.75e+000	6.15e+003
Isopentane	3.53e-001	1.54e+003
n-Pentane	4.41e-001	1.93e+003
n-Hexane	1.15e-001	6.01e+002
Cyclohexane	1.10e-002	5.59e+001
Other Hexanes	1.46e-001	7.60e+002
Heptanes	2.50e-002	1.51e+002
Methylcyclohexane	1.34e-002	7.95e+001
2,2,4-Trimethylpentane	1.50e-003	1.04e+001
Benzene	1.60e-003	7.55e+000
Toluene	9.99e-005	5.57e-001
Xylenes	9.99e-005	6.42e-001
C8+ Heavies	8.18e-002	8.43e+002
Total Components	100.00	1.33e+005

DRY GAS STREAM

Temperature: 103.00 deg. F
Pressure: 914.70 psia
Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.31e-003	7.96e+000
Carbon Dioxide	9.57e-002	2.54e+002

Nitrogen	3.45e-001	5.84e+002
Methane	7.31e+001	7.09e+004
Ethane	1.66e+001	3.01e+004
Propane	6.20e+000	1.65e+004
Isobutane	6.95e-001	2.44e+003
n-Butane	1.75e+000	6.13e+003
Isopentane	3.54e-001	1.54e+003
n-Pentane	4.41e-001	1.92e+003
n-Hexane	1.15e-001	5.99e+002
Cyclohexane	1.08e-002	5.51e+001
Other Hexanes	1.46e-001	7.58e+002
Heptanes	2.49e-002	1.51e+002
Methylcyclohexane	1.32e-002	7.83e+001
2,2,4-Trimethylpentane	1.50e-003	1.03e+001
Benzene	1.40e-003	6.60e+000
Toluene	8.39e-005	4.67e-001
Xylenes	7.42e-005	4.76e-001
C8+ Heavies	8.08e-002	8.31e+002
Total Components	100.00	1.33e+005

LEAN GLYCOL STREAM

Temperature: 103.00 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	1.05e-012	8.89e-011
Nitrogen	2.28e-013	1.93e-011
Methane	8.01e-018	6.76e-016
Ethane	1.35e-007	1.14e-005
Propane	9.26e-009	7.82e-007
Isobutane	1.29e-009	1.09e-007
n-Butane	3.46e-009	2.92e-007
Isopentane	1.64e-004	1.39e-002
n-Pentane	2.60e-004	2.19e-002
n-Hexane	1.19e-004	1.00e-002
Cyclohexane	3.35e-004	2.83e-002
Other Hexanes	2.36e-004	2.00e-002
Heptanes	5.02e-005	4.24e-003
Methylcyclohexane	6.06e-004	5.12e-002
2,2,4-Trimethylpentane	4.44e-006	3.75e-004
Benzene	5.94e-004	5.01e-002
Toluene	9.10e-005	7.69e-003
Xylenes	2.92e-004	2.46e-002
C8+ Heavies	1.97e-002	1.66e+000
Total Components	100.00	8.44e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 103.00 deg. F
Pressure: 914.70 psia
Flow Rate: 1.62e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.24e+001	8.31e+003
Water	3.08e+000	2.77e+002
Carbon Dioxide	1.63e-002	1.46e+000
Nitrogen	1.67e-002	1.51e+000
Methane	2.00e+000	1.80e+002
Ethane	1.02e+000	9.19e+001
Propane	6.27e-001	5.64e+001
Isobutane	1.01e-001	9.12e+000
n-Butane	2.84e-001	2.56e+001
Isopentane	6.94e-002	6.25e+000
n-Pentane	9.69e-002	8.72e+000
n-Hexane	3.73e-002	3.36e+000
Cyclohexane	1.12e-002	1.01e+000
Other Hexanes	4.12e-002	3.71e+000
Heptanes	1.32e-002	1.19e+000
Methylcyclohexane	1.62e-002	1.46e+000
2,2,4-Trimethylpentane	5.37e-004	4.83e-002
Benzene	1.13e-002	1.02e+000
Toluene	1.09e-003	9.85e-002
Xylenes	2.13e-003	1.92e-001
C8+ Heavies	1.75e-001	1.57e+001
Total Components	100.00	9.00e+003

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 64.70 psia
Flow Rate: 6.15e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.99e-001	5.81e-001
Carbon Dioxide	1.87e-001	1.33e+000
Nitrogen	3.29e-001	1.50e+000
Methane	6.85e+001	1.78e+002
Ethane	1.83e+001	8.94e+001
Propane	7.44e+000	5.31e+001
Isobutane	8.85e-001	8.33e+000
n-Butane	2.41e+000	2.27e+001
Isopentane	4.66e-001	5.44e+000
n-Pentane	6.29e-001	7.35e+000
n-Hexane	1.79e-001	2.50e+000
Cyclohexane	3.06e-002	4.17e-001
Other Hexanes	2.11e-001	2.94e+000
Heptanes	4.25e-002	6.90e-001
Methylcyclohexane	3.19e-002	5.08e-001
2,2,4-Trimethylpentane	1.91e-003	3.54e-002
Benzene	6.88e-003	8.71e-002
Toluene	3.54e-004	5.29e-003
Xylenes	2.27e-004	3.90e-003
C8+ Heavies	5.42e-002	1.50e+000
Total Components	100.00	3.77e+002

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 1.54e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.64e+001	8.31e+003
Water	3.21e+000	2.77e+002
Carbon Dioxide	1.50e-003	1.29e-001
Nitrogen	1.29e-004	1.11e-002
Methane	1.60e-002	1.38e+000
Ethane	2.91e-002	2.51e+000
Propane	3.78e-002	3.26e+000
Isobutane	9.16e-003	7.90e-001
n-Butane	3.31e-002	2.85e+000
Isopentane	9.30e-003	8.02e-001
n-Pentane	1.59e-002	1.37e+000
n-Hexane	9.94e-003	8.57e-001
Cyclohexane	6.87e-003	5.92e-001
Other Hexanes	8.88e-003	7.65e-001
Heptanes	5.78e-003	4.98e-001
Methylcyclohexane	1.10e-002	9.51e-001
2,2,4-Trimethylpentane	1.49e-004	1.29e-002
Benzene	1.08e-002	9.33e-001
Toluene	1.08e-003	9.32e-002
Xylenes	2.18e-003	1.88e-001
C8+ Heavies	1.65e-001	1.42e+001
Total Components	100.00	8.62e+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: 3.33e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.47e+001	1.50e+002
Carbon Dioxide	3.35e-002	1.29e-001
Nitrogen	4.52e-003	1.11e-002
Methane	9.77e-001	1.38e+000
Ethane	9.49e-001	2.51e+000
Propane	8.41e-001	3.26e+000
Isobutane	1.55e-001	7.90e-001
n-Butane	5.58e-001	2.85e+000
Isopentane	1.24e-001	7.88e-001
n-Pentane	2.12e-001	1.35e+000

n-Hexane	1.12e-001	8.47e-001
Cyclohexane	7.63e-002	5.64e-001
Other Hexanes	9.85e-002	7.45e-001
Heptanes	5.61e-002	4.94e-001
Methylcyclohexane	1.04e-001	9.00e-001
2,2,4-Trimethylpentane	1.24e-003	1.25e-002
Benzene	1.29e-001	8.83e-001
Toluene	1.06e-002	8.56e-002
Xylenes	1.75e-002	1.63e-001
C8+ Heavies	8.39e-001	1.25e+001
Total Components	100.00	1.80e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 52.00 deg. F
Flow Rate: 2.99e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	1.50e+002	999792.
Carbon Dioxide	2.01e-003	3.02e-003	20.
Nitrogen	2.90e-006	4.34e-006	0.
Methane	8.17e-004	1.22e-003	8.
Ethane	2.19e-003	3.28e-003	22.
Propane	1.20e-003	1.79e-003	12.
Isobutane	1.51e-004	2.26e-004	2.
n-Butane	7.08e-004	1.06e-003	7.
Isopentane	1.08e-004	1.62e-004	1.
n-Pentane	1.65e-004	2.48e-004	2.
n-Hexane	4.30e-005	6.45e-005	0.
Cyclohexane	1.48e-004	2.21e-004	1.
Other Hexanes	3.94e-005	5.90e-005	0.
Heptanes	4.47e-006	6.69e-006	0.
Methylcyclohexane	6.08e-005	9.11e-005	1.
2,2,4-Trimethylpentane	8.98e-008	1.35e-007	0.
Benzene	1.27e-002	1.90e-002	127.
Toluene	2.80e-004	4.20e-004	3.
Xylenes	1.84e-004	2.76e-004	2.
C8+ Heavies	1.98e-007	2.97e-007	0.
Total Components	100.00	1.50e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 52.00 deg. F
Flow Rate: 4.53e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	1.41e-002	2.72e-003
Carbon Dioxide	4.75e-003	9.17e-004
Nitrogen	4.68e-005	9.03e-006
Methane	2.10e-002	4.06e-003
Ethane	2.54e-001	4.91e-002
Propane	1.81e+000	3.48e-001
Isobutane	8.98e-001	1.73e-001
n-Butane	4.44e+000	8.57e-001
Isopentane	2.08e+000	4.01e-001

n-Pentane	4.28e+000	8.25e-001
n-Hexane	3.67e+000	7.07e-001
Cyclohexane	2.58e+000	4.98e-001
Other Hexanes	2.98e+000	5.76e-001
Heptanes	2.44e+000	4.70e-001
Methylcyclohexane	4.39e+000	8.47e-001
2,2,4-Trimethylpentane	6.08e-002	1.17e-002
Benzene	3.77e+000	7.28e-001
Toluene	4.25e-001	8.20e-002
Xylenes	8.38e-001	1.62e-001
C8+ Heavies	6.50e+001	1.25e+001
Total Components	100.00	1.93e+001

CONDENSER VENT STREAM

Temperature: 52.00 deg. F
Pressure: 14.08 psia
Flow Rate: 1.16e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.39e+000	7.64e-002
Carbon Dioxide	9.34e-001	1.25e-001
Nitrogen	1.30e-001	1.11e-002
Methane	2.80e+001	1.37e+000
Ethane	2.68e+001	2.46e+000
Propane	2.16e+001	2.91e+000
Isobutane	3.48e+000	6.16e-001
n-Butane	1.12e+001	1.99e+000
Isopentane	1.76e+000	3.87e-001
n-Pentane	2.36e+000	5.20e-001
n-Hexane	5.32e-001	1.40e-001
Cyclohexane	2.57e-001	6.60e-002
Other Hexanes	6.45e-001	1.70e-001
Heptanes	7.74e-002	2.37e-002
Methylcyclohexane	1.77e-001	5.31e-002
2,2,4-Trimethylpentane	2.17e-003	7.57e-004
Benzene	5.69e-001	1.35e-001
Toluene	1.13e-002	3.18e-003
Xylenes	4.97e-003	1.61e-003
C8+ Heavies	1.16e-002	6.03e-003
Total Components	100.00	1.11e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.26e+000 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	2.87e+001	2.74e-002
Ethane	2.74e+001	4.91e-002
Propane	2.22e+001	5.82e-002
Isobutane	3.56e+000	1.23e-002
n-Butane	1.15e+001	3.98e-002

Isopentane	1.80e+000	7.74e-003
n-Pentane	2.42e+000	1.04e-002
n-Hexane	5.45e-001	2.80e-003
Cyclohexane	2.64e-001	1.32e-003
Other Hexanes	6.62e-001	3.39e-003
Heptanes	7.94e-002	4.73e-004
Methylcyclohexane	1.82e-001	1.06e-003
2,2,4-Trimethylpentane	2.23e-003	1.51e-005
Benzene	5.83e-001	2.71e-003
Toluene	1.16e-002	6.36e-005
Xylenes	5.09e-003	3.22e-005
C8+ Heavies	1.19e-002	1.21e-004
Total Components	100.00	2.17e-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	91.43	90.29	75.96
45.0	89.91	88.55	74.79
50.0	88.21	86.59	73.63
55.0	86.42	84.54	72.55
60.0	84.35	82.14	71.38
65.0	82.08	79.53	70.23
70.0	79.62	76.71	69.07
75.0	76.99	73.70	67.93
80.0	74.19	70.51	66.79
85.0	71.26	67.18	65.67
90.0	68.20	63.74	64.56
95.0	65.04	60.22	63.46
100.0	61.80	56.66	62.39
105.0	58.52	53.09	61.34
110.0	55.22	49.54	60.32
115.0	51.91	46.04	59.32
120.0	48.61	42.61	58.35
125.0	45.35	39.28	57.42
130.0	42.12	36.06	56.51
135.0	38.95	32.95	55.62
140.0	35.83	29.96	54.74
145.0	32.76	27.09	53.87
150.0	29.74	24.32	52.97
155.0	26.76	21.65	52.00
160.0	23.82	19.07	50.89
165.0	20.65	16.36	49.43
170.0	17.62	13.81	47.47

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	3.865	1.191	69.19
BTEX	4.956	1.253	74.71
Total HAP	8.723	2.516	71.15
VOC	115.093	37.812	67.15

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GAS ANALYSIS REPORT NO.: 21-030515-42 (372061) **DATE:** 03/05/15

FOR: ACCESS MIDSTREAM
ATTN: DEE BAILEY
190 MIDSTREAM WAY
JANE LEW WV 26378

SAMPLE IDENTIFICATION:
COMPANY: ACCESS MIDSTREAM
FIELD: N/P
LEASE: SANDHILL UPSTREAM OF DEH
STA #:

SAMPLE DATA: DATE: 02/26/15 10:00 **BY:** F. RODAK
PSIG: 950 **TEMP:** 103 **DEG.F.** **DP:** N/P **LBS H20**

REMARKS: WET GAS

CYL #1239

SAMPLE TYPE: SPOT **EFFECTIVE DATE:** 03/01/15

HYDROCARBON ANALYSIS - METHOD GPA 2261-13 **LAB ANALYST:** MP

COMPONENT NAME		MOL PERCENT	GPM @ 14.730 PSIA
HYDROGEN SULFIDE	(H2S)	0.000	
CARBON DIOXIDE	(CO2)	0.096	
NITROGEN	(N2)	0.345	
METHANE	(C1)	73.134	
ETHANE	(C2)	16.583	4.434
PROPANE	(C3)	6.204	1.709
ISO-BUTANE	(IC4)	0.696	0.228
N-BUTANE	(NC4)	1.750	0.552
ISO-PENTANE	(IC5)	0.354	0.129
N-PENTANE	(NC5)	0.442	0.160
HEXANES PLUS	(C6+)	0.396	0.164
TOTAL		100.000	

MOL WEIGHT: 21.95
BTU/LB: 22816.0

ETHANE + GPM: 7.376
PROPANE + GPM: 2.942
ISO-PENTANE + GPM: 0.453

COMPRESSIBILITY FACTOR: 0.9959
SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1): 0.761

BTU/CUFT. (REAL) 60 DEG.F. - PSIA:	14.650	14.696	14.730	15.025
DRY:	1320.8	1324.9	1328.0	1354.6
SAT:	1297.6	1301.8	1304.9	1331.4

REVIEWED BY: Lisa Venable

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2129 WEST WILLOW SCOTT LA 70583 337-232-3568

DATE: 03/05/15

SAMPLE IDENTIFICATION

COMPANY: ACCESS MIDSTREAM
FIELD: N/P
LEASE: SANDHILL UPSTREAM OF DEH
STA #:

SAMPLE DATE: 02/26/15
(372061)

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)	0.0079	0.0312
2,3-DIMETHYLBUTANE CYCLOPENTANE	0.0146	0.0519
2-METHYLPENTANE	0.0778	0.3060
3-METHYLPENTANE	0.0457	0.1794
N-HEXANE	0.1154	0.4514
2,2-DIMETHYLPENTANE	0.0019	0.0085
METHYLCYCLOPENTANE	0.0120	0.0460
2,4-DIMETHYLPENTANE	0.0002	0.0011
2,2,3-TRIMETHYLBUTANE	0.0005	0.0021
BENZENE	0.0016	0.0057
3,3-DIMETHYLPENTANE	0.0010	0.0047
CYCLOHEXANE	0.0110	0.0424
2-METHYLHEXANE	0.0168	0.0766
2,3-DIMETHYLPENTANE	0.0041	0.0186
1,1-DIMETHYLCYCLOPENTANE 3-METHYLHEXANE	0.0178	0.0809
1,t3-DIMETHYLCYCLOPENTANE	0.0011	0.0052
1,c3-DIMETHYLCYCLOPENTANE 3-ETHYLPENTANE	0.0024	0.0108

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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	0.0015	0.0070
N-HEPTANE	0.0250	0.1142
METHYLCYCLOHEXANE 1,1,3-TRIMETHYLCYCLOPENTANE 2,2-DIMETHYLHEXANE	0.0134	0.0608
1,C2-DIMETHYLCYCLOPENTANE	0.0002	0.0008
2,5-DIMETHYLHEXANE	0.0000	0.0000
2,4-DIMETHYLHEXANE 2,2,3-TRIMETHYLPENTANE ETHYLCYCLOPENTANE	0.0008	0.0037
1,t2,c4-TRIMETHYLCYCLOPENTANE 3,3-DIMETHYLHEXANE	0.0017	0.0085
1,t2,c3-TRIMETHYLCYCLOPENTANE	0.0006	0.0030
2,3,4-TRIMETHYLPENTANE	0.0002	0.0009
TOLUENE	0.0001	0.0005
2,3-DIMETHYLHEXANE	0.0020	0.0103
1,1,2-TRIMETHYLCYCLOPENTANE	0.0006	0.0032
2-METHYLHEPTANE	0.0031	0.0160
4-METHYLHEPTANE	0.0013	0.0069
3,4-DIMETHYLHEXANE	0.0003	0.0017
3-METHYLHEPTANE 3-ETHYLHEXANE	0.0036	0.0187
1,c3-DIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOPENTANE 1,c2,t4-TRIMETHYLCYCLOPENTANE	0.0015	0.0078
1,t4-DIMETHYLCYCLOHEXANE	0.0007	0.0036
2,2,5-TRIMETHYLHEXANE	0.0000	0.0003
1,1-DIMETHYLCYCLOHEXANE 1,methyl-t3-ETHYLCYCLOPENTANE	0.0004	0.0019
1-methyl-c3-ETHYLCYCLOPENTANE	0.0002	0.0010
1-methyl-t2-ETHYLCYCLOPENTANE 2,2,4-TRIMETHYLHEXANE	0.0000	0.0000
1-methyl-1-ETHYLCYCLOPENTANE CYCLOHEPTANE N-OCTANE	0.0038	0.0196
1,T2-DIMETHYLCYCLOCHEXANE	0.0002	0.0011

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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
1,t3-DIMETHYLCYCLOHEXANE 1,c4-DIMETHYLCYCLOHEXANE 1,c2,c3-TRIMETHYLCYCLOPENTANE	0.0004	0.0020
2,4,4-TRIMETHYLHEXANE	0.0000	0.0001
ISOPROPYLCYCLOPENTANE	0.0000	0.0002
UNKNOWN	0.0000	0.0002
2,2-DIMETHYLHEPTANE	0.0000	0.0003
2,4-DIMETHYLHEPTANE 1-methyl-c2-ETHYLCYCLOPENTANE	0.0001	0.0008
2,2,3-TRIMETHYLHEXANE	0.0000	0.0002
1,c2-DIMETHYLCYCLOHEXANE 2,6-DIMETHYLHEPTANE	0.0001	0.0008
N-PROPYLCYCLOPENTANE 1,c3,c5-TRIMETHYLCYCLOHEXANE	0.0001	0.0006
2,5-DIMETHYLHEPTANE 3,5-DIMETHYLHEPTANE ETHYLCYCLOHEXANE	0.0006	0.0032
1,1,3-TRIMETHYLCYCLOHEXANE 2,3,3-TRIMETHYLHEXANE 3,3-DIMETHYLHEPTANE	0.0001	0.0006
1,1,4-TRIMETHYLCYCLOHEXANE	0.0000	0.0002
UNKNOWN	0.0000	0.0000
2,3,4-TRIMETHYLHEXANE	0.0000	0.0002
ETHYLBENZENE	0.0000	0.0000
1,t2,t4-TRIMETHYLCYCLOHEXANE 1,c3,t5-TRIMETHYLCYCLOHEXANE 2,3-DIMETHYLHEPTANE	0.0001	0.0004
M-XYLENE P-XYLENE 3,4-DIMETHYLHEPTANE	0.0001	0.0006
2-METHYLOCTANE 4-METHYLOCTANE	0.0006	0.0034
UNKNOWN	0.0003	0.0020
3-METHYLOCTANE	0.0002	0.0013
UNKNOWN	0.0000	0.0000
1,t2,c3-TRIMETHYLCYCLOHEXANE 1,t2,c4-TRIMETHYLCYCLOHEXANE	0.0000	0.0001

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
O-XYLENE	0.0001	0.0004
1,1,2-TRIMETHYLCYCLOHEXANE	0.0000	0.0002
UNKNOWN	0.0000	0.0003
ISOBUTYLCYCLOPENTANE	0.0000	0.0001
N-NONANE	0.0002	0.0014
UNKNOWN	0.0000	0.0000
1,c2,c3-TRIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOHEXANE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
ISOPROPYLBENZENE	0.0000	0.0002
2,2-DIMETHYLOCTANE	0.0000	0.0001
ISOPROPYLCYCLOHEXANE CYCLOOCTANE	0.0000	0.0001
UNKNOWN	0.0000	0.0000
N-BUTYLCYCLOPENTANE N-PROPYLCYCLOHEXANE	0.0000	0.0001
3,3-DIMETHYLOCTANE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
N-PROPYLBENZENE	0.0000	0.0002
UNKNOWN	0.0000	0.0000
m-ETHYLTOLUENE	0.0000	0.0000
p-ETHYLTOLUENE 2,3-DIMETHYLOCTANE	0.0000	0.0001
4-METHYLNONANE 5-METHYLNONANE 1,3,5-TRIMETHYLBENZENE	0.0000	0.0001
2-METHYLNONANE	0.0000	0.0000
3-ETHYLOCTANE	0.0000	0.0003
O-ETHYLTOLUENE 3-METHYLNONANE	0.0000	0.0001
UNKNOWN	0.0000	0.0000
1,2,4-TRIMETHYLBENZENE t-BUTYLBENZENE METHYLCYCLOOCTANE	0.0000	0.0000
tert-BUTYLCYCLOHEXANE	0.0000	0.0001

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
COMPONENTS AS % OF TOTAL SAMPLE

COMPONENT	MOL PERCENT	WT. PERCENT
ISO-BUTYLCYCLOHEXANE	0.0000	0.0000
N-DECANE	0.0000	0.0001
ISOBUTYLBENZENE	0.0000	0.0000
sec-BUTYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
1-METHYL-3-ISOPROPYLBENZENE	0.0000	0.0000
1,2,3-TRIMETHYLBENZENE 1-METHYL-4-ISOPROPYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
1-METHYL-2-ISOPROPYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
N-BUTYLCYCLOHEXANE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
1,3-DIETHYLBENZENE 1-METHYL-3-PROPYLBENZENE	0.0000	0.0000
1,2-DIETHYLBENZENE N-BUTYLBENZENE 1-METHYL-4-PROPYLBENZENE	0.0000	0.0000
1,4-DIETHYLBENZENE	0.0000	0.0000
1-METHYL-2-PROPYLBENZENE	0.0000	0.0001
1,4-DIMETHYL-2-ETHYLBENZENE	0.0000	0.0001
UNKNOWN	0.0000	0.0001
1,2-DIMETHYL-4-ETHYLBENZENE	0.0000	0.0000
1,3-DIMETHYL-2-ETHYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
1,2-DIMETHYL-3-ETHYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
N-UNDECANE	0.0000	0.0001
UNKNOWN	0.0000	0.0000
1,2,4,5-TETRAMETHYLBENZENE	0.0000	0.0000
1,2,3,5-TETRAMETHYLBENZENE	0.0000	0.0000
UNKNOWN	0.0000	0.0000
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	0.0001
NAPHTHALENE	0.0000	0.0000
N-DODECANE	0.0000	0.0002
ISOTRIDECANES PLUS	0.0000	0.0000
TOTALS	0.3960	1.6360

TOTAL HEXANES	=	0.2614	1.0199
TOTAL HEPTANES	=	0.0969	0.4238
TOTAL OCTANES	=	0.0347	0.1703
TOTAL NONANES	=	0.0030	0.0198
TOTAL DECANES PLUS	=	0.0000	0.0022

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DATE: 03/05/15

SAMPLE IDENTIFICATION

COMPANY: ACCESS MIDSTREAM
FIELD: N/P
LEASE: SANDHILL UPSTREAM OF DEH
STA #:

SAMPLE DATE: 02/26/15
(372061)

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)	2.002	1.906
2,3-DIMETHYLBUTANE CYCLOPENTANE	3.678	3.173
2-METHYLPENTANE	19.658	18.704
3-METHYLPENTANE	11.532	10.967
N-HEXANE	28.971	27.558
2,2-DIMETHYLPENTANE	0.471	0.521
METHYLCYCLOPENTANE	3.026	2.812
2,4-DIMETHYLPENTANE	0.063	0.067
2,2,3-TRIMETHYLBUTANE	0.118	0.131
BENZENE	0.408	0.350
3,3-DIMETHYLPENTANE	0.263	0.288
CYCLOHEXANE	2.790	2.591
2-METHYLHEXANE	4.230	4.683
2,3-DIMETHYLPENTANE	1.024	1.137
1,1-DIMETHYLCYCLOPENTANE 3-METHYLHEXANE	4.484	4.946
1,t3-DIMETHYLCYCLOPENTANE	0.290	0.317

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,c3-DIMETHYLCYCLOPENTANE 3-ETHYLPENTANE	0.607	0.659
1,t2-DIMETHYLCYCLOPENTANE 2,2,4-TRIMETHYLPENTANE	0.390	0.426
N-HEPTANE	6.305	6.978
METHYLCYCLOHEXANE 1,1,3-TRIMETHYLCYCLOPENTANE 2,2-DIMETHYLHEXANE	3.379	3.717
1,C2-DIMETHYLCYCLOPENTANE	0.045	0.050
2,5-DIMETHYLHEXANE	0.000	0.000
2,4-DIMETHYLHEXANE 2,2,3-TRIMETHYLPENTANE ETHYLCYCLOPENTANE	0.199	0.228
1,t2,c4-TRIMETHYLCYCLOPENTANE 3,3-DIMETHYLHEXANE	0.417	0.518
1,t2,c3-TRIMETHYLCYCLOPENTANE	0.145	0.185
2,3,4-TRIMETHYLPENTANE	0.045	0.056
TOLUENE	0.027	0.029
2,3-DIMETHYLHEXANE	0.498	0.629
1,1,2-TRIMETHYLCYCLOPENTANE	0.163	0.197
2-METHYLHEPTANE	0.779	0.980
4-METHYLHEPTANE	0.335	0.422
3,4-DIMETHYLHEXANE	0.082	0.105
3-METHYLHEPTANE 3-ETHYLHEXANE	0.906	1.142
1,c3-DIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOPENTANE 1,c2,t4-TRIMETHYLCYCLOPENTANE	0.390	0.478
1,t4-DIMETHYLCYCLOHEXANE	0.172	0.217
2,2,5-TRIMETHYLHEXANE	0.009	0.018
1,1-DIMETHYLCYCLOHEXANE 1,methyl-t3-ETHYLCYCLOPENTANE	0.091	0.116
1-methyl-c3-ETHYLCYCLOPENTANE	0.045	0.061
1-methyl-t2-ETHYLCYCLOPENTANE 2,2,4-TRIMETHYLHEXANE	0.000	0.000
1-methyl-1-ETHYLCYCLOPENTANE CYCLOHEPTANE N-OCTANE	0.951	1.197

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,T2-DIMETHYLCYCLOCHEXANE	0.054	0.069
UNKNOWN	0.009	0.010
1,t3-DIMETHYLCYCLOHEXANE 1,c4-DIMETHYLCYCLOHEXANE 1,c2,c3-TRIMETHYLCYCLOPENTANE	0.100	0.123
2,4,4-TRIMETHYLHEXANE	0.000	0.006
ISOPROPYLCYCLOPENTANE	0.009	0.011
UNKNOWN	0.009	0.014
2,2-DIMETHYLHEPTANE	0.009	0.019
2,4-DIMETHYLHEPTANE 1-methyl-c2-ETHYLCYCLOPENTANE	0.036	0.049
2,2,3-TRIMETHYLHEXANE	0.009	0.010
1,c2-DIMETHYLCYCLOHEXANE 2,6-DIMETHYLHEPTANE	0.036	0.046
N-PROPYLCYCLOPENTANE 1,c3,c5-TRIMETHYLCYCLOHEXANE	0.027	0.039
2,5-DIMETHYLHEPTANE 3,5-DIMETHYLHEPTANE ETHYLCYCLOHEXANE	0.154	0.196
1,1,3-TRIMETHYLCYCLOHEXANE 2,3,3-TRIMETHYLHEXANE 3,3-DIMETHYLHEPTANE	0.027	0.036
1,1,4-TRIMETHYLCYCLOHEXANE	0.009	0.014
UNKNOWN	0.000	0.003
2,3,4-TRIMETHYLHEXANE	0.009	0.011
ETHYLBENZENE	0.000	0.000
1,t2,t4-TRIMETHYLCYCLOHEXANE 1,c3,t5-TRIMETHYLCYCLOHEXANE 2,3-DIMETHYLHEPTANE	0.018	0.027
M-XYLENE P-XYLENE 3,4-DIMETHYLHEPTANE	0.036	0.039
2-METHYLOCTANE 4-METHYLOCTANE	0.145	0.206
UNKNOWN	0.082	0.125
3-METHYLOCTANE	0.054	0.081
UNKNOWN	0.000	0.000

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,t2,c3-TRIMETHYLCYCLOHEXANE 1,t2,c4-TRIMETHYLCYCLOHEXANE	0.009	0.008
O-XYLENE	0.018	0.026
1,1,2-TRIMETHYLCYCLOHEXANE	0.009	0.012
UNKNOWN	0.009	0.018
ISOBUTYLCYCLOPENTANE	0.009	0.008
N-NONANE	0.063	0.084
UNKNOWN	0.000	0.000
1,c2,c3-TRIMETHYLCYCLOHEXANE 1,c2,t3-TRIMETHYLCYCLOHEXANE	0.000	0.000
UNKNOWN	0.000	0.000
ISOPROPYLBENZENE	0.009	0.010
2,2-DIMETHYLOCTANE	0.000	0.004
ISOPROPYLCYCLOHEXANE CYCLOOCTANE	0.009	0.009
UNKNOWN	0.000	0.001
N-BUTYLCYCLOPENTANE N-PROPYLCYCLOHEXANE	0.009	0.009
3,3-DIMETHYLOCTANE	0.000	0.000
UNKNOWN	0.000	0.002
N-PROPYLBENZENE	0.009	0.014
UNKNOWN	0.000	0.002
m-ETHYLTOLUENE	0.000	0.002
p-ETHYLTOLUENE 2,3-DIMETHYLOCTANE	0.000	0.004
4-METHYLNONANE 5-METHYLNONANE 1,3,5-TRIMETHYLBENZENE	0.000	0.005
2-METHYLNONANE	0.000	0.000
3-ETHYLOCTANE	0.009	0.019
O-ETHYLTOLUENE 3-METHYLNONANE	0.000	0.004
UNKNOWN	0.000	0.001
1,2,4-TRIMETHYLBENZENE t-BUTYLBENZENE METHYLCYCLOOCTANE	0.000	0.002

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
tert-BUTYLCYCLOHEXANE	0.000	0.006
ISO-BUTYLCYCLOHEXANE	0.000	0.001
N-DECANE	0.009	0.008
ISOBUTYLBENZENE	0.000	0.001
sec-BUTYLBENZENE	0.000	0.002
UNKNOWN	0.000	0.000
1-METHYL-3-ISOPROPYLBENZENE	0.000	0.000
1,2,3-TRIMETHYLBENZENE 1-METHYL-4-ISOPROPYLBENZENE	0.000	0.000
UNKNOWN	0.000	0.000
1-METHYL-2-ISOPROPYLBENZENE	0.000	0.003
UNKNOWN	0.000	0.001
N-BUTYLCYCLOHEXANE	0.000	0.000
UNKNOWN	0.000	0.002
1,3-DIETHYLBENZENE 1-METHYL-3-PROPYLBENZENE	0.000	0.000
1,2-DIETHYLBENZENE N-BUTYLBENZENE 1-METHYL-4-PROPYLBENZENE	0.000	0.000
1,4-DIETHYLBENZENE	0.000	0.000
1-METHYL-2-PROPYLBENZENE	0.000	0.004
1,4-DIMETHYL-2-ETHYLBENZENE	0.000	0.004
UNKNOWN	0.000	0.004
1,2-DIMETHYL-4-ETHYLBENZENE	0.000	0.000
1,3-DIMETHYL-2-ETHYLBENZENE	0.000	0.000
UNKNOWN	0.000	0.000
1,2-DIMETHYL-3-ETHYLBENZENE	0.000	0.000
UNKNOWN	0.000	0.000
N-UNDECANE	0.000	0.007
UNKNOWN	0.000	0.000
1,2,4,5-TETRAMETHYLBENZENE	0.000	0.000
1,2,3,5-TETRAMETHYLBENZENE	0.000	0.000
UNKNOWN	0.000	0.000

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CAPILLARY ANALYSIS - METHOD GPA 2286-95
HEAVY END FRACTION

COMPONENT	MOL PERCENT	WT. PERCENT
1,2,3,4-TETRAMETHYLBENZENE CYCLODECANE	0.000	0.003
UNKNOWN	0.000	0.004
NAPHTHALENE	0.000	0.003
N-DODECANE	0.009	0.010
ISOTRIDECANES PLUS	0.000	0.000
TOTALS	100.000	100.000

SPECIFIC GRAVITY @ 60 DEG. F. (AIR = 1)	3.1282
MOLECULAR WEIGHT	90.59
COMPRESSIBILITY FACTOR	0.8894
SUMMATION FACTOR	0.0867
CU. FT. VAPOR/GAL @ 14.696 PSIA & 60 DEG. F.	24.138
CU. FT. VAPOR/GAL @ 14.730 PSIA & 60 DEG. F.	24.082
BTU/CU.FT. @ 14.696 PSIA, DRY	4956.20
BTU/CU.FT. @ 14.730 PSIA, DRY	4967.70
BTU/LB	20778

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