E. Marcellus Asset Company, LLC
Tichenal Compressor Station

R13 Modification Application

E. MARCELLUS ASSET COMPANY, LLC
CRESTWOOD MIDSTREAM PARTNERS LP
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October 2015

Trinity Consultants

Environmental solutions delivered uncommonly well

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E. Marcellus Asset Company, LLC (E. Marcellus), a subsidiary of Crestwood Midstream Partners LP (Crestwood), is submitting this permit modification application to the West Virginia Department of Environmental Protection (WVDEP) for the Tichenal Compressor Station (Tichenal), a natural gas compression facility located near Tichenal, WV. Tichenal is currently permitted under Title 45 of the West Virginia Code of State Rules (CSR) Part 13 Permit No. R13-3076, issued on December 10, 2013, and General Permit No. G35-A062A, issued on August 27, 2012.

1.1. FACILITY DESCRIPTION

The Tichenal Station is an existing natural gas compression and processing facility that consists of dehydration units and compressor engines. Gas flows into the station from nearby wells and undergoes liquid removal and three stages of compression. Attachment G provides a detailed process description for the facility. A process flow diagram is included as Attachment F.

On August 27, 2012, the Tichenal Station was authorized via General Permit No. G35-A062A to construct and operate nine (9) natural gas compressor engines, two (2) dehydrators, two (2) produced water tanks, and five (5) miscellaneous atmospheric storage tanks.

The Tichenal Station was then issued Permit No. R13-3076 on December 10, 2013, to upsize five of the nine natural gas compressors, add two additional produced water tanks, and add truck loading operations. Emission Unit IDs CE-1 through CE-5 (Waukesha L5794GSI, 1380 hp) were to be removed and replaced with Emission Unit IDs CE-10 through CE-14 (Waukesha L7044GSI, 1680 hp). However, this replacement project did not occur.

The emission units currently operated at the facility include the following:

- Five (5) Waukesha L5794GSI compressor engines (CE-1 through CE-5), each rated at 1380 bhp and equipped with non-selective catalytic reduction (NSCR) control devices (3-way catalysts), which were originally authorized under General Permit No. G35-A062A;
- Four (4) Waukesha L7044GSI compressor engines (CE-6 through CE-9), each rated at 1680 bhp and equipped with 3-way catalysts;
- One (1) triethylene glycol (TEG) dehydration unit (RBV/RSV-1), rated at 64 million standard cubic feet per day (MMscfd), equipped with a condenser and an associated reboiler (rated at 1.5 MMBtu/hr);
- One (1) TEG dehydration unit (RBV/RSV-2), rated at 60 MMscfd, equipped with a condenser and an associated reboiler (rated at 1.5 MMBtu/hr);
- Two (2) produced water storage tanks (T01 and T02; 300 bbl each);
- Two (2) produced water storage tanks (T08 and T09; 210 bbl each);
- Five (5) miscellaneous storage tanks (T03 through T07; each 1,000 gallons or less);
- Facility-wide fugitive components, pneumatic controllers, and pneumatic pumps;
- Miscellaneous sources of emissions such as pipeline pigging, compressor rod packing, and compressor engine blowdowns; and
- Tank truck loading.

As part of this modification, E. Marcellus seeks to:

- Remove CE-10 through CE-14. These engines were permitted but never installed.
- Incorporate CE-1 through CE-5 into the R13 permit. These engines were planned to be removed with the installation of CE-10 through CE-14, but now E. Marcellus wishes to retain these assets.
- Provide revised NSCR catalyst spec sheets for the engine catalysts.
- Propose revisions to monitoring and recordkeeping provisions of the facility's R13 permit.
- Update potential emissions for all sources to better reflect actual operating conditions.

A detailed account of all proposed updates to the existing permit can be found in Appendix A (redline markup of the existing R13 permit), Appendix B (general revisions), and Appendix C (applicable provisions of 40 Code of Federal Regulations [CFR] 60 Subpart JJJJ).

1.2. SOURCE STATUS

WVDEP must make stationary source determinations on a case-by-case basis using the guidance under the Clean Air Act (CAA) and EPA's and WVDEP's implementing regulations. The definition of stationary source in 40 CFR 51.166(b) includes the following:

> *"(6) Building, structure, facility, or installation means all of the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under control of the same person (or persons under common control)."*

Other additional pollutant emitting facilities should be aggregated with Tichenal for air permitting purposes if and only if all three elements of the "stationary source" definition above are fulfilled. WVDEP previously determined that the Tichenal station is a separate, stationary source when the current permit was issued. The closest Crestwood-owned facility is the Morgan Station, which is located approximately 3.2 miles from the Tichenal Station. There are two inlet facilities near the Tichenal station that are owned and operated by a third party. There are no new contiguous or adjacent facilities under control of E. Marcellus or Crestwood. As such, the Tichenal Station should continue to be considered a separate stationary source with respect to permitting programs, including Title V and Prevention of Significant Deterioration (PSD). As discussed in this application, the facility is a minor source of air emissions with respect to New Source Review (NSR) and Title V permitting.

1.3. R-13 APPLICATION ORGANIZATION

This R-13 permit application is organized as follows:

- Section 2: Sample Emission Source Calculations;
- Section 3: R-13 Application Forms;
- Attachment A: Business Certificate;
- Attachment B: Area Map;
- Attachment C: Installation and Start Up Schedule;
- Attachment D: Regulatory Discussion;
- Attachment E: Plot Plan;
- Attachment F: Detailed Process Flow Diagram;
- Attachment G: Process Description;
- Attachment I: Emission Units Table;
- Attachment J: Emission Points Data Summary Sheet;
- Attachment K: Fugitive Emissions Data Summary Sheet;
- Attachment L: Emissions Unit Data Sheets;
- Attachment M: Air Pollution Control Device Sheets;
- Attachment N: Supporting Emission Calculations;
- Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans;
- Attachment P: Public Notice;
- Appendix A: Redline Mark-up of R13 Permit;
- Appendix B: Proposed R13 Permit Changes;
- Appendix C: Applicable Provisions of 40 CFR 60 Subpart JJJJ;
- Application Fee.

The characteristics of air emissions from the natural gas compression facility operations, along with the methodology for calculating emissions, are briefly described in this section of the application. Detailed emission calculations are presented in Attachment N of this application.

Emissions from the facility will result from natural gas combustion in the compressor engines and reboilers, processing of natural gas in the TEG dehydrators, storage of organic liquids, and loading of organic liquids into tank trucks. The calculation methodologies used to estimate emissions from each of these source types are summarized below.

- **Compressor Engines and Reboilers:** Potential emissions from the reboilers of all criteria pollutants and Hazardous Air Pollutants (HAPs) are calculated using U.S. EPA's AP-42 factors for natural gas combustion equipment.[1] These calculations assume a site-specific heat content of natural gas. Greenhouse gas (GHG) emissions are calculated according to 40 CFR 98 Subpart C.[2] Potential emissions from the compressor engines use emission factors provided by the manufacturer where possible, and are supplemented with published emission factors from AP-42.[3]

- **Fugitive Equipment Leaks:** Emissions of volatile organic compounds (VOC) and HAP from leaking equipment components have been estimated using facility estimated component counts and types along with *Table 2-4: Oil & Gas Production Operations Average Emission Factors, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.* Emission factors used are based on average measured total organic compounds (TOC) from component types indicated in gas service at Oil & Gas Production Operations. GHG emissions from component leaks are calculated according to the procedures in 40 CFR 98 Subpart W.[4]

- **Pneumatic Controllers and Pumps:** Emissions of VOC, HAP, and GHG were estimated according to the procedures in 40 CFR 98 Subpart W and the measured component fractions from the site-specific gas analysis.

- **Blowdowns and Venting:** Emissions of VOC, HAP, and GHG from miscellaneous venting sources (e.g., station shutdowns, pigging operations, engine starts, compressor blowdowns, etc.) have been estimated based on the site-specific gas analysis using the maximum number of events and corresponding gas volumes per event.

- **Storage Tanks:** Flashing emissions of VOC and HAPs from the produced water stored in the tanks at the facility are calculated using a site-specific flash gas analysis and assuming produced water contains 1% condensate. This is assumed to represent all potential emissions (flashing, working, and breathing losses) from the produced water tanks. Emissions from the other miscellaneous storage tanks are assumed to be negligible.

[1] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 1.4, Natural Gas Combustion, Supplement D, July 1998.

[2] 40 CFR 98 Subpart C, *General Stationary Fuel Combustion Sources*, Tables C-1 and C-2.

[3] U.S. EPA, AP-42, Fifth Edition, Volume I, Chapter 3.2, Natural Gas-Fired Reciprocating Engines, Supplement F, August 2000.

[4] 40 CFR 98 Subpart W, *Petroleum and Natural Gas Systems*, Section 98.233(r), *Population Count and Emission Factors*.

- **TEG Dehydration Units:** Potential emissions of HAPs, volatile organic compounds (VOC), methane and carbon dioxide from the dehydration units are calculated using GRI-GLYCalc v4.0.

- **Tank Truck Loading:** Emissions of VOC and HAPs from the loading of produced water from storage tanks to tank trucks are calculated using U.S. EPA's AP-42 Chapter 5.2 factors.[5]

[5] U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 5.2, Transportation And Marketing Of Petroleum Liquids, June 2008.

3. R-13 APPLICATION FORMS

The WVDEP permit application forms contained in this application include all applicable R-13 application forms including the required attachments.

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):*
E. Marcellus Asset Company, LLC

2. Federal Employer ID No. ***(FEIN):***
46-2362188

3. Name of facility *(if different from above):*
Tichenal Compressor Station

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

5A. Applicant's mailing address:
801 Cherry Street
Suite 3800, Unit 20
Fort Worth, TX 76102

5B. Facility's present physical address:
386 Hurst Hollow Road
Lost Creek, WV 26385

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: Crestwood Midstream Partners LP

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: Lease agreement with owner for unrestricted access to the site
- 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 compression and dehydration facility

10. North American Industry Classification System **(NAICS)** code for the facility:
486210

11A. DAQ Plant ID No. (for existing facilities only):
0 3 3 – 0 0 2 0 0

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-3076, G35A-062A

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 the Jane Lew exit of I-79, proceed west on County Route 7 to US Route 19 in Jane Lew. Turn right onto US Route 19 N. Proceed north on Route 19 to the New Bethel United Methodist Church and Cemetery. Proceed approximately 1,000 feet to a fork in the road. Bear left onto Isaac's Creek Road (County Route 38). Proceed on Isaac's Creek Road approximately 2.8 miles to County Route 38/3 (Hurst Hollow Road). Turn left onto CR 38/3. The station is approximately 0.35 miles on the right side of the road.

12.B. New site address (if applicable):	12C. Nearest city or town: Tichenal	12D. County: Harrison
12.E. UTM Northing (KM): 4,337.325	12F. UTM Easting (KM): 543.491	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
This application seeks to revise the current permit to update equipment representations and associated emissions from the permitted equipment at the facility. There will be no physical modifications to the equipment at the station as a result of this project.

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

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

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

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

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

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

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

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: Natural Gas Compressor Engine Data Sheets; Natural Gas Glycol Dehydration Unit Data Sheets

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: Catalysts

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

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

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

35A. **Certification of Information.** To certify this permit application, a Responsible Official (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 _____ *(Please use blue ink)* DATE: 10-26-2015 *(Please use blue ink)*

35B. Printed name of signee: Chris Humes		35C. Title: VP, Pipeline Operations
35D. E-mail: Chris.Humes@crestwoodlp.com	36E. Phone: 832-519-2200	36F. FAX: 817-339-5430
36A. Printed name of contact person (if different from above): Jeff Stovall		36B. Title: Air Quality Manager
36C. E-mail: Jeff.Stovall@crestwoodlp.com	36D. Phone: 817-339-5474	36E. FAX: 817-339-5430

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) NA**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☒ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☐ **Attachment Q: Business Confidential Claims NA**
- ☐ **Attachment R: Authority Forms NA**
- ☐ **Attachment S: Title V Permit Revision Information NA**
- ☒ **Application Fee**

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

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

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

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

ATTACHMENT A

Business Certificate

State of West Virginia

Certificate

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

E. MARCELLUS ASSET COMPANY, LLC

Control Number: 99XWW

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

has filed its "Application for Certificate of Authority" in my office according to the provisions of West Virginia Code §31B-10-1002. I hereby declare the organization to be registered as a foreign limited liability company from its effective date of November 30, 2012, until a certificate of cancellation is filed with our office.

Therefore, I hereby issue this

CERTIFICATE OF AUTHORITY OF A FOREIGN LIMITED LIABILITY COMPANY

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

Given under my hand and the Great Seal of the State of West Virginia on this day of November 30, 2012

Natalie E Tennant

Secretary of State

West Virginia Secretary of State — Online Data Services

Business and Licensing

Online Data Services Help

Business Organization Detail

NOTICE: The West Virginia Secretary of State's Office makes every reasonable effort to ensure the accuracy of information. However, we make no representation or warranty as to the correctness or completeness of the information. If information is missing from this page, it is not in the The West Virginia Secretary of State's database.

E. MARCELLUS ASSET COMPANY, LLC

Organization Information

Org Type	Effective Date	Established Date	Filing Date	Charter	Class	Sec Type	Termination Date	Termination Reason
LLC | Limited Liability Company	11/30/2012		11/30/2012	Foreign	Profit			

Organization Information

Business Purpose	2131 - Mining, Quarrying, Oil & Gas Extraction - Support Activities for Mining - Support Activities for Mining (drilling oil & gas wells, coal & metal mining support)	**Capital Stock**	
Charter County		**Control Number**	99XWW
Charter State	DE	**Excess Acres**	
At Will Term	A	**Member Managed**	MBR
At Will Term Years		**Par Value**	
Authorized Shares			

Addresses

Type	Address
Mailing Address	700 LOUISIANA STREET SUITE 2550 HOUSTON, TX, 77002 USA
Notice of Process Address	CT CORPORATION SYSTEM 5400 D BIG TYLER ROAD CHARLESTON, WV, 25313
Principal Office Address	700 LOUISIANA STREET SUITE 2550 HOUSTON, TX, 77002 USA
Type	**Address**

Officers

Type	Name/Address
Member	CRESTWOOD MARCELLUS MIDSTREAM LLC 700 LOUISIANA STREET SUITE 2550 HOUSTON, TX, 77002
Type	**Name/Address**

Annual Reports

Date	Filed For
6/29/2015	2015
6/27/2014	2014
6/7/2013	2013
Date	**Filed For**

For more information, please contact the Secretary of State's Office at 304-558-8000.

Wednesday, August 12, 2015 — 3:06 PM

ATTACHMENT B

Area Map

ATTACHMENT B

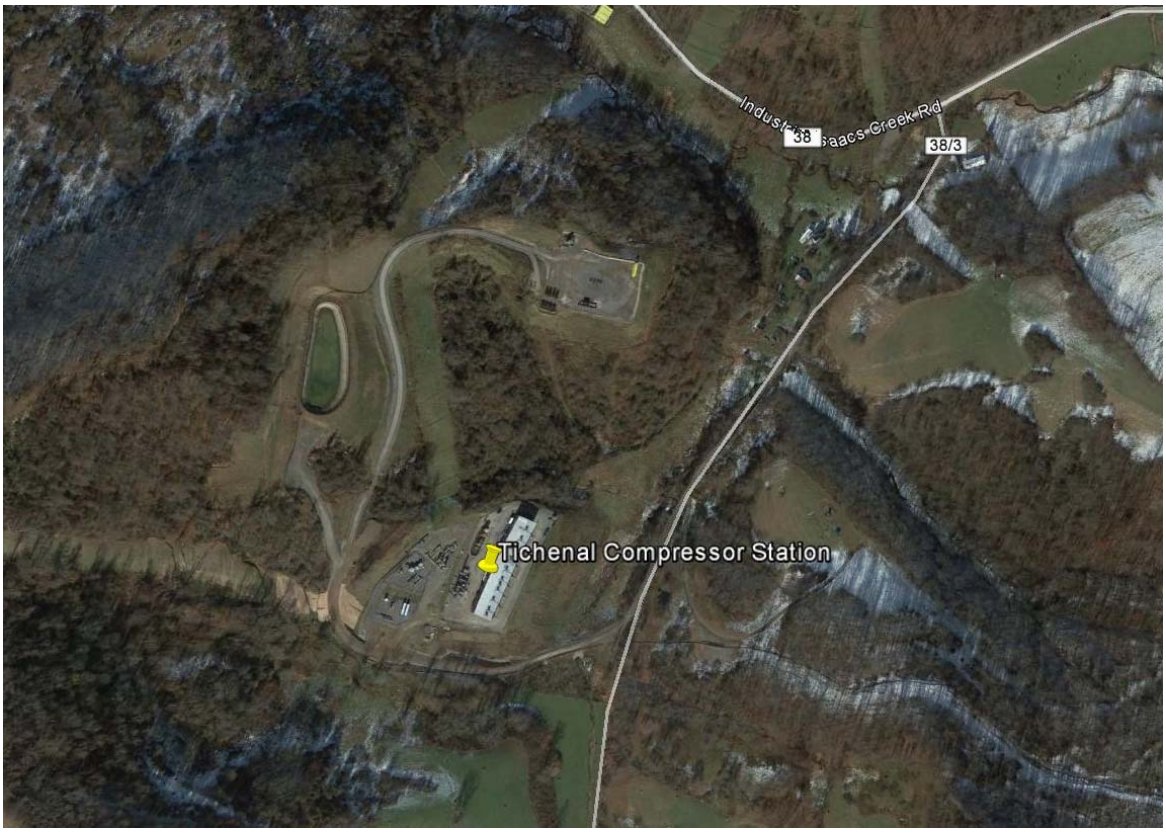


Figure 1 - Map of Tichenal Compressor Station

UTM Northing (KM):	4,337.325
UTM Easting (KM):	543.491
Elevation:	~1,130 ft

ATTACHMENT C

Installation and Start Up Schedule

ATTACHMENT C

Schedule of Planned Installation and Start-Up

No new sources are being installed as part of this application. All equipment is permitted and is currently in operation.

ATTACHMENT D

Regulatory Discussion

ATTACHMENT D – REGULATORY APPLICABILITY

This section documents the applicability determinations made for Federal and State air quality regulations. The monitoring, recordkeeping, reporting, and testing plan is presented in Attachment O. In this section, applicability or non-applicability of the following regulatory programs is addressed:

- Prevention of Significant Deterioration (PSD) permitting;
- Non-Attainment New Source Review (NNSR) permitting;
- Title V of the 1990 Clean Air Act Amendments;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP); and
- West Virginia State Implementation Plan (SIP) regulations.

This review is presented to supplement and/or add clarification to the information provided in the WVDEP R13 permit application forms, which fulfill the requirement to include citations and descriptions of applicable statutory and administrative code requirements.

In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the station. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the station. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

PSD and NNSR Source Classification

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review. PSD regulations apply when a new source is constructed in which emissions exceed PSD major source thresholds, an existing minor source undergoes a modification in which emission increases exceed PSD major source thresholds, or an existing major source undergoes a modification in which emission increases exceed PSD significant emission rates. The Tichenal Station is considered an existing minor source with respect to PSD and will remain a minor source, as shown in Attachment N. No new sources are being installed as part of this application and as such, PSD permitting is not triggered.

NNSR regulations apply only in areas designated as non-attainment. The Tichenal Station is located in Harrison County, which is designated as attainment/unclassifiable for all criteria pollutants.[1] Therefore, NNSR regulations do not apply to the Tichenal Station.

Title V Operating Permit Program

40 CFR 70 establishes the Federal Title V operating permit program. West Virginia has incorporated the provisions of this Federal program in its Title V operating permit program in West Virginia 45 CSR 30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, 100,000 tpy of greenhouse gas pollutants (on a carbon dioxide equivalent [CO_2e] basis), and 100 tpy of all other

[1] U.S. EPA Greenbook, http://www.epa.gov/airquality/greenbook/anayo_wv.html, as of January 30, 2015.

regulated pollutants.[2] The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility, as shown in Attachment N. Therefore, the station is not a major source for Title V purposes.

New Source Performance Standards

NSPS, located in 40 CFR Part 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the facility.

NSPS Subparts K, Ka, and Kb – Storage Vessels

These subparts apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified between 1973 and 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to July 23, 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 m^3 (~19,813 gallons). The produced water tanks and other miscellaneous tanks at the facility each have a capacity of less than 19,813 gallons. As such, Subparts K, Ka, and Kb do not apply to the storage tanks at the facility.

NSPS Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines

Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, applies to manufacturers, owners and operators of stationary spark (SI) engines for which construction commenced after June 12, 2006. The requirements for SI engines with a maximum power rating equal to or greater than 500 hp apply to owner/operators of such engines manufactured on or after July 1, 2007.

All of the compressor engines at the Tichenal Station are 4-stroke rich burn (4SRB) engines greater than 500 hp. The engines are non-emergency with the potential to operate 8,760 hours per year. Of these engines, CE-2, CE-4 through CE-9 were manufactured after the applicable date, and are subject to the emissions standards applicable to non-emergency SI engines $\geq$ 500 hp. Engines CE-1 and CE-3 were manufactured before the applicable date and as such are not subject to the standard.

Table D-1. NSPS Subpart JJJJ Emission Standards for Non-Emergency Engines > 500 HP

Manufacture Date	Pollutant	Emission Standards (g/hp-hr)	Emission Standards (ppmvd at 15% O_2)
Between 7/1/2007 and 7/1/2010	NO_X	2.0	160
	CO	4.0	540
	VOC*	1.0	86
7/1/2010 and later	NO_X	1.0	82
	CO	2.0	270
	VOC*	0.7	60

* VOC limits do not include formaldehyde.

[2] On June 23, 2014, the U.S Supreme Court decision in the case of *Utility Air Regulatory Group v. EPA* effectively changed the permitting procedures for GHGs under the PSD and Title V programs.

The proposed emission limits in this application are below the most stringent emission standards in NSPS Subpart JJJJ. Engines at the Tichenal Station that are subject to Subpart JJJJ are operated in accordance with these emission limits and with the applicable testing, monitoring, recordkeeping, reporting, and work practice requirements. Appendix C to this application provides a detailed regulatory analysis of the applicable provisions of Subpart JJJJ.

Subpart OOOO—Crude Oil and Natural Gas Production, Transmission, and Distribution

Subpart OOOO – *Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution*, applies to affected facilities that commenced construction, reconstruction, or modification after August 23, 2011. The list of potentially affected facilities includes:

- Gas wellheads,
- Centrifugal compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment,
- Reciprocating compressors located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment,
- Continuous bleed natural gas-driven pneumatic controllers with a bleed rate of > 6 scfh located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment (excluding natural gas processing plants),
- Continuous bleed natural gas-driven pneumatic controllers located at natural gas processing plants,
- Storage vessels in the production, processing, or transmission and storage segments,
- Equipment leaks at onshore natural gas processing plants, and
- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells.

The four (4) produced water storage tanks have potential VOC emissions below 6 tpy. The five (5) miscellaneous storage tanks do not meet the definition of "storage vessel" under NSPS Subpart OOOO because they do not contain crude oil, condensate, intermediate hydrocarbon liquids, or produced water. As such, these tanks are not considered storage vessel affected facilities under this rule.

The nine (9) reciprocating compressors were installed after August 23, 2011, and are subject to NSPS Subpart OOOO. The compressors are operated and maintained in accordance with §60.5385, and compliance is demonstrated per the applicable requirements of §60.5385; §60.5410(c), regarding initial compliance demonstration; §60.5415(c), regarding continuous compliance demonstration; and §60.5420, regarding notification, reporting, and recordkeeping requirements.

The continuous-bleed pneumatic controllers were installed after August 23, 2011, and are therefore potentially subject to NSPS Subpart OOOO. Per §60.5365(d)(2), a pneumatic controller affected facility is a single continuous bleed natural gas driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh. The Tichenal Station operates both intermittent bleed and continuous bleed pneumatic controllers. The intermittent bleed pneumatic controllers do not meet the definition of a pneumatic controller affected facility according to the rule. The continuous bleed pneumatic controllers are pneumatic controller affected facilities. Crestwood will continue to comply with the requirements of Subpart OOOO, including maintaining a bleed rate below 6 scf/hr, and complying with reporting and recordkeeping requirements.

Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas industry (Subpart OOOO) and associated equipment (Subparts K-Kb, JJJJ), the applicability of a

particular NSPS to the station can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to the Tichenal compressor station.

National Emission Standards for Hazardous Air Pollutants

40 CFR Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular source category. A HAP major source is defined as having potential emissions in excess of 25 tpy for total HAP and/or potential emissions in excess of 10 tpy for any individual HAP. The station is an area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. NESHAP apply to sources in specifically regulated industrial source categories (Clean Air Act Section 112(d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as a specific industrial source type. Besides 40 CFR 63 Subpart A (NESHAP Subpart A), which is similar to 40 CFR 60 Subpart A (NSPS Subpart A), the potentially applicable NESHAP Subparts are discussed in the following sections.

40 CFR 63 Subpart HH – Oil and Natural Gas Production Facilities

This standard contains requirements for both major and area sources of HAP. At area sources, the only affected source is a triethylene glycol (TEG) dehydration unit (§63.760(b)(2)). Dehydrators RSV-1 and RSV-2 are subject to certain area source requirements under MACT Subpart HH. Per 63.764(e)(1), the owner or operator of an area source is exempt from the control requirements of 63.764(d) if the criteria listed in paragraph (e)(1)(i) or (ii) are met, except that the records of the determination of these criteria must be maintained as required in §63.774(d)(1).

Per §63.764(e)(1)(ii), Dehydrators RSV-1 and RSV-2 are exempt from most of Subpart HH requirements because the actual annual emissions of benzene from each dehydrator are less than 0.90 megagrams per year (1 ton per year), as determined by the procedures specified in §63.772(b)(2) of this Subpart (i.e., GRI GLYCalc). Crestwood will continue to comply with this requirement for determining actual average emissions of benzene. Additionally, Crestwood will continue to maintain records as required in §63.774(d)(1)(ii) of actual average benzene emissions (in terms of benzene emissions per year).

40 CFR 63 Subpart ZZZZ – Reciprocating Internal Combustion Engines (RICE)

This subpart applies to new and existing stationary reciprocating combustion engines at area sources of HAP. The compressor engines (CE-1 to CE-9) are classified as new stationary RICE units with respect to MACT Subpart ZZZZ. All of the engines maintain compliance with Subpart ZZZZ by complying with the requirements of 40 CFR 60 Subpart JJJJ, as stated in §63.6590(c). Note that engines CE-1 and CE-3 have no requirements under either NSPS Subpart JJJJ or MACT Subpart ZZZZ.[3]

West Virginia SIP Regulations

The station is potentially subject to regulations contained in the West Virginia Code of State Regulations, Title 45. The Code of State Regulations fall under two main categories: those regulations that are generally applicable (e.g., permitting requirements), and those that have specific applicability (e.g., PM standards for manufacturing equipment).

[3] U.S. EPA Implementation Q&A for MACT Subpart ZZZZ and NSPS Subpart JJJJ, http://www.epa.gov/airtoxics/icengines/docs/20120717riceqaupdate.pdf, April, 2, 2013.

45 CSR 2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

45 CSR 2 applies to fuel burning units, defined as equipment burning fuel "for the primary purpose of producing heat or power by indirect heat transfer". The reboilers are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from units shall not exceed 10 percent, based on a six-minute block average. Per 45 CSR 2-4, PM emissions from the units will not exceed a level measured in lb/hr of 0.09 multiplied by the heat design inputs in MMBtu/hr.

45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

According to 45 CSR 4-3:

No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

The station is generally subject to this requirement. Crestwood will operate all equipment and control devices in a manner as to avoid causing or contributing to an objectionable odor at any location occupied by the public.

45 CSR 6: Control of Air Pollution from the Combustion of Refuse

45 CSR 6 applies to activities involving incineration of refuse, defined as:

"the destruction of combustible refuse by burning in a furnace designed for that purpose. For the purposes of this rule, the destruction of any combustible liquid or gaseous material by burning in a flare or flare stack, thermal oxidizer or thermal catalytic oxidizer stack shall be considered incineration."

The facility does not operate any incinerators under this definition and, as such, has no requirements under this rule.

45 CSR 10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

This rule potentially applies to fuel burning units, including glycol dehydration unit reboilers. Per 45 CSR 10-10.1, units rated less than 10 MMBtu/hr are exempt from the SO_2 emission limitations. Additionally, these units are exempt from Section 8 (Monitoring, Recording and Reporting) as well as interpretive rule 10A. The reboilers at Tichenal are each rated 1.5 MMBtu/hr and therefore have no requirements under this Rule.

45 CSR 13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, Permission to Commence Construction, and Procedures for Evaluation

This rule establishes procedures for permitting and reporting of stationary sources. Crestwood will continue to comply with the requirements of this rule by complying with the applicable general provisions in the facility's existing operating permits.

45 CSR 16: Standards of Performance for New Stationary Sources

45 CSR 16-1 incorporates the federal Clean Air Act (CAA) standards of performance for new stationary sources set forth in 40 CPR Part 60 by reference. As noted above, the affected facilities at the station will maintain compliance with NSPS Subparts JJJJ and OOOO, as applicable.

45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

According to 45 CSR 17-3.1:

No person shall cause, suffer, allow or permit fugitive particulate matter to be discharged beyond the boundary lines of the property lines of the property on which the discharge originates or at any public or residential location, which causes or contributes to statutory air pollution.

Due to the nature of the activities at the station, it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, Crestwood will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any such emissions occur.

45 CSR 21: To Prevent and Control Air Pollution From the Emission of Volatile Organic Compounds

45 CSR 21 applies only to sources located in Putnam County, Kanawha County, Cabell County, Wayne County, and Wood County, West Virginia. The Tichenal Station is located in Harris County. Therefore, the requirements of this section to not apply to the station.

45 CSR 22: Air Quality Management Fee Program

This regulation establishes a program to collect fees for certificates to operate and for permits to construct, modify or relocate sources of air pollution. Crestwood will continue to comply with this rule by paying all required permitting fees.

45 CSR 34: Emissions Standards for Hazardous Air Pollutants

45 CSR 34-1 incorporates the federal Clean Air Act (CAA) national emissions standards for hazardous air pollutants (NESHAPs) as set forth in 40 CPR Parts 61 and 63 by reference. Applicability of these rules is discussed above.

Non-Applicability of Other SIP Rules

A thorough examination of the West Virginia SIP rules with respect to applicability at the station reveals many SIP regulations that do not apply or impose additional requirements on operations. Such SIP rules include those specific to a particular type of industrial operation that is categorically not applicable to the station.

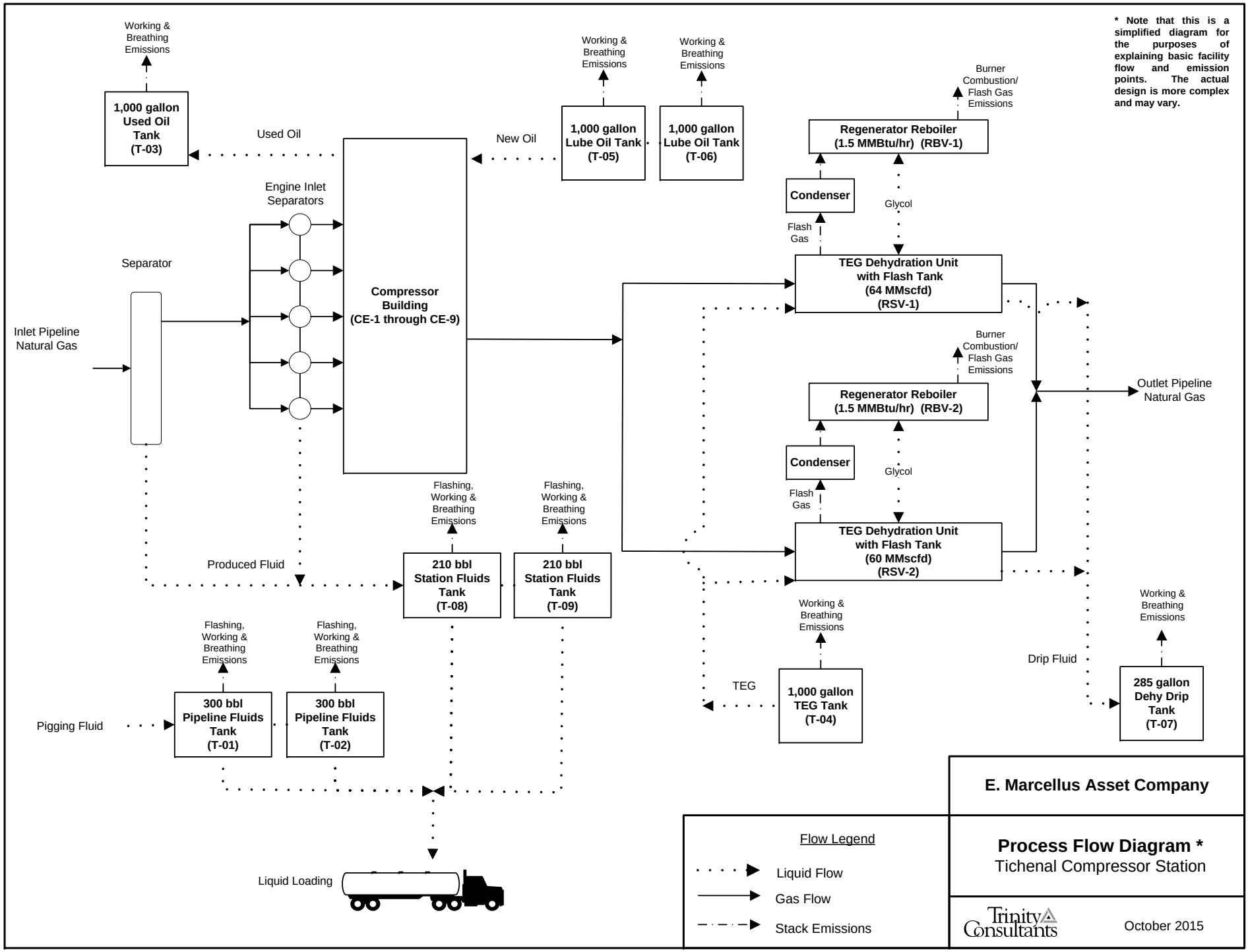
ATTACHMENT E

Plot Plan


Produced Water Tanks (T-01 & T-02, T-08 & T-09)
Station Inlet
Third Party Owned and Operated Facilities
Compressor Building
CE-1
CE-2
CE-3
CE-4
CE-5
CE-6
CE-7
CE-8
CE-9
TEG Dehydrators (RSV-1 & RSV-2) and Reboilers (RBV-1 & RBV-2)
Tichenal fence line

ATTACHMENT F

Detailed Process Flow Diagram


* Note that this is a simplified diagram for the purposes of explaining basic facility flow and emission points. The actual design is more complex and may vary.
Working & Breathing Emissions
1,000 gallon Used Oil Tank (T-03)
Used Oil
New Oil
1,000 gallon Lube Oil Tank (T-05)
1,000 gallon Lube Oil Tank (T-06)
Engine Inlet Separators
Separator
Inlet Pipeline Natural Gas
Compressor Building (CE-1 through CE-9)
Burner Combustion/ Flash Gas Emissions
Regenerator Reboiler (1.5 MMBtu/hr) (RBV-1)
Condenser
Glycol
Flash Gas
TEG Dehydration Unit with Flash Tank (64 MMscfd) (RSV-1)
Regenerator Reboiler (1.5 MMBtu/hr) (RBV-2)
Condenser
TEG Dehydration Unit with Flash Tank (60 MMscfd) (RSV-2)
Outlet Pipeline Natural Gas
Flashing, Working & Breathing Emissions
Produced Fluid
210 bbl Station Fluids Tank (T-08)
210 bbl Station Fluids Tank (T-09)
Pigging Fluid
300 bbl Pipeline Fluids Tank (T-01)
300 bbl Pipeline Fluids Tank (T-02)
TEG
1,000 gallon TEG Tank (T-04)
Drip Fluid
285 gallon Dehy Drip Tank (T-07)
Liquid Loading
Flow Legend
Liquid Flow
Gas Flow
Stack Emissions
E. Marcellus Asset Company
Process Flow Diagram *
Tichenal Compressor Station
Trinity Consultants
October 2015

ATTACHMENT G

Process Description

ATTACHMENT G – PROCESS DESCRIPTION

This modification application involves administrative changes to the existing permit for the Tichenal Compressor Station. No new equipment is being installed as part of this application, and the current operational processes at the facility will not change.

The Tichenal Compressor Station consists of nine (9) engines that drive compressors for natural gas compression, two (2) TEG dehydrators, and several storage tanks. Gas flows into the station from off-site production wells and passes through an inlet scrubber, where liquids are removed and sent to produced water storage tanks. The gas then passes through three stages of compression and undergoes cooling, where additional produced liquids are collected. The gas is routed to the TEG dehydrators for additional dehydration. Fluids from the dehydration process are collected in a drip tank. Water absorbed by the TEG is boiled out of the glycol in the reboiler and recirculated through a closed looped system. Flash gas from the dehy is routed to the reboiler heater to be used as fuel. The dry gas is then piped to the sales line.

A process flow diagram is included as Attachment F.

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]
CE-1	1E	Compressor Engine Waukesha L5794GSI	2013[9]	1,380 hp	Existing; No change[5]	1C
CE-2	2E	Compressor Engine Waukesha L5794GSI	2011	1,380 hp	Existing; No change[5]	2C
CE-3	3E	Compressor Engine Waukesha L5794GSI	2015[9]	1,380 hp	Existing; No change[5]	3C
CE-4	4E	Compressor Engine Waukesha L5794GSI	2015[9]	1,380 hp	Existing; No change[5]	4C
CE-5	5E	Compressor Engine Waukesha L5794GSI	2011	1,380 hp	Existing; No change[5]	5C
CE-6	6E	Compressor Engine Waukesha L7044GSI	2012	1,680 hp	Existing; No change	6C
CE-7	7E	Compressor Engine Waukesha L7044GSI	2012	1,680 hp	Existing; No change	7C
CE-8	8E	Compressor Engine Waukesha L7044GSI	2012	1,680 hp	Existing; No change	8C
CE-9	9E	Compressor Engine Waukesha L7044GSI	2012	1,680 hp	Existing; No change	9C
CE-10	10E	Compressor Engine Waukesha L7044GSI	NA	1,680 hp	Removal[6]	10C
CE-11	11E	Compressor Engine Waukesha L7044GSI	NA	1,680 hp	Removal[6]	11C
CE-12	12E	Compressor Engine Waukesha L7044GSI	NA	1,680 hp	Removal[6]	12C
CE-13	13E	Compressor Engine Waukesha L7044GSI	NA	1,680 hp	Removal[6]	13C
CE-14	14E	Compressor Engine Waukesha L7044GSI	NA	1,680 hp	Removal[6]	14C
RBV-1	15E	TEG Dehydrator Reboiler	2011	1.5 MMBtu/hr[7]	Existing, No change	None
RSV-1	16E	TEG Dehydrator Still Vent	2011	64 MMSCFD	Existing, No change	16C
RBV-2	17E	TEG Dehydrator Reboiler	2012	1.5 MMBtu/hr[7]	Existing, No change	None
RSV-2	18E	TEG Dehydrator Still Vent	2012	60 MMSCFD	Existing, No change	18C
T-01	19E	Produced Water Tank	2011	300 bbl	Existing, No change	None

T-02	20E	Produced Water Tank	2011	300 bbl	Existing, No change	None
T-03	21E	Used Oil Tank	2011	1,000 gallon	Existing, No change	None
T-04	22E	TEG Tank	2011	1,000 gallon	Existing, No change	None
T-05	23E	Lube Oil Tank	2011	1,000 gallon	Existing, No change	None
T-06	24E	Lube Oil Tank	2011	1,000 gallon	Existing, No change	None
T-07	25E	Dehy Drip Fluid Tank	2011	285 gallon	Existing, No change	None
T-08	26E	Produced Water Tank	2011	210 bbl [8]	Existing, No change	None
T-09	27E	Produced Water Tank	2011	210 bbl [8]	Existing, No change	None
LR-1	28E	Tank Truck Loading	2011	NA	Existing, No change	None

[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.

[5] Note that these engines were planned to be removed with the installation of CE-10 through CE-14, but now E. Marcellus wishes to retain these assets.

[6] Note that these sources were permitted with the intent of replacing CE-1 through CE-5, but were never installed.

[7] The current R13 permit incorrectly lists the heat input of these units as 0.20 MMBtu/hr.

[8] The current R13 permit incorrectly lists the capacity of these tanks as 300 bbl.

[9] CE-1, CE-3, and CE-4 were replaced with like-in-kind engines in the installation years noted.

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			
1E through 5E (each engine)	Upward Vertical Stack	CE-1 through CE-5 (each engine)	Compressor Engine	1C through 5C	NSCR	NA	NA	NO_X VOC CO SO_X PM HAP CO_2e	41.68 1.15 28.29 0.01 0.23 0.26 1,551	182.56 5.06 123.93 0.03 1.00 1.15 6,793	1.52 0.30 1.83 0.01 0.23 0.26 1,511	6.66 1.33 8.00 0.03 1.00 1.15 6,618	Gas/Vapor Gas/Vapor Gas/Vapor Gas/Vapor Solid Gas/Vapor Gas/Vapor	O: Mfg. Guarantee; AP-42	NA
6E through 9E (each engine)	Upward Vertical Stack	CE-6 through CE-9 (each engine)	Compressor Engine	6C through 9C	NSCR	NA	NA	NO_X VOC CO SO_X PM HAP CO_2e	48.89 1.85 44.45 0.01 0.29 0.33 2,020	214.14 8.11 194.67 0.04 1.28 1.43 8,846	1.85 0.37 2.22 0.01 0.29 0.33 1,954	8.11 1.62 9.73 0.04 1.28 1.43 8,558	Gas/Vapor Gas/Vapor Gas/Vapor Gas/Vapor Solid Gas/Vapor Gas/Vapor	O: Mfg. Guarantee; AP-42	NA
15E and 17E (each reboiler)	Upward Vertical Stack	RBV-1 and RBV-2 (each reboiler)	TEG Dehy Reboilers	None	NA	NA	NA	NO_X VOC CO SO_X PM HAP CO_2e	0.14 0.01 0.11 0.00 0.01 0.00 176	0.59 0.03 0.50 0.00 0.05 0.01 769	0.14 0.01 0.11 0.00 0.01 0.00 176	0.59 0.03 0.50 0.00 0.05 0.01 769	Gas/Vapor Gas/Vapor Gas/Vapor Gas/Vapor Solid Gas/Vapor Gas/Vapor	O: AP-42	NA
16E	Upward Vertical Stack	RSV-1	TEG Dehy Still Vent	16C	Condenser/ Combustion	NA	NA	VOC HAP CO_2e Benzene	32.98 3.23 8,477 0.34	144.45 14.14 37,128 1.48	1.45 0.08 1,571 0.01	6.33 0.37 6,879 0.04	Gas/Vapor Gas/Vapor Gas/Vapor Gas/Vapor	O: GRI GLYCalc	NA
18E	Upward Vertical Stack	RSV-2	TEG Dehy Still Vent	18C	Condenser/ Combustion	NA	NA	VOC HAP CO_2e Benzene	32.96 3.21 8,468 0.34	144.36 14.07 37,091 1.49	1.44 0.08 1,570 0.01	6.33 0.37 6,875 0.04	Gas/Vapor Gas/Vapor Gas/Vapor Gas/Vapor	O: GRI GLYCalc	NA
19E-20E (combined)	Vent	T-01 & T-02 (combined)	Produced Water Tanks	None	NA	NA	NA	VOC HAP CO_2e	0.03 0.00 4.60	0.13 0.02 20.16	0.03 0.00 4.60	0.13 0.02 20.16	Gas/Vapor Gas/Vapor Gas/Vapor	EE	NA

21E	Vent	T-03	Used Oil Tank	None	NA	NA	NA	VOC	Neg.	Neg.	Neg.	Neg.	Gas/Vapor	EE	NA
22E	Vent	T-04	TEG Tank	None	NA	NA	NA	VOC	Neg.	Neg.	Neg.	Neg.	Gas/Vapor	EE	NA
23E-24E (each tank)	Vent	T-05 & T-06 (each tank)	Lube Oil Tanks	None	NA	NA	NA	VOC	Neg.	Neg.	Neg.	Neg.	Gas/Vapor	EE	NA
25E	Vent	T-07	Dehy Drip Tank	None	NA	NA	NA	VOC	Neg.	Neg.	Neg.	Neg.	Gas/Vapor	EE	NA
26E-27E (combined)	Vent	T-08 & T-09 (combined)	Produced Water Tanks	None	NA	NA	NA	VOC HAP CO_2e	0.02 0.00 3.20	0.09 0.01 14.01	0.02 0.00 3.20	0.09 0.01 14.01	Gas/Vapor Gas/Vapor Gas/Vapor	EE	NA

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. (^{0}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
1E	1.167	1149	6179	96.3		24		
2E	1.167	1149	6179	96.3		24		
3E	1.167	1149	6179	96.3		24		
4E	1.167	1149	6179	96.3		24		
5E	1.167	1149	6179	96.3		24		
6E	1.167	1181	7808	121.7		24		
7E	1.167	1181	7808	121.7		24		
8E	1.167	1181	7808	121.7		24		
9E	1.167	1181	7808	121.7		24		
15E	8 in.	1050	~53	~152		16		
17E	8 in.	1050	~53	~152		16		

[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 (No change to existing) ☐ 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 ☒ 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? Compressor rod packing, Venting Episodes ☒ 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	NA	NA	NA	NA	NA	NA
Unpaved Haul Roads	NA	NA	NA	NA	NA	NA
Storage Pile Emissions	NA	NA	NA	NA	NA	NA
Loading/Unloading Operations	VOC HAP	0.02 0.00	0.08 0.00	0.02 0.00	0.08 0.00	O [A]
Wastewater Treatment Evaporation & Operations	NA	NA	NA	NA	NA	NA
Equipment Leaks	VOC HAP CO_2e	Does not apply	0.41 0.00 21.13	Does not apply	2.14 0.02 92.53	O [B]
General Clean-up VOC Emissions	NA	NA	NA	NA	NA	NA
Other: Pneumatic Devices	VOC HAP CO_2e	3.35 0.03 1,352	14.69 0.12 5,924	3.35 0.03 1,352	14.69 0.12 5,924	O [C]
Other: Station Shutdowns Pigging Compressor Rod Packing Engine Startups and Shutdowns Compressor Blowdowns	VOC HAP CO_2e	1.88 0.02 756	8.22 0.07 3,313	1.88 0.02 756	8.22 0.07 3,313	O [C]

[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).
[A] AP-42; Site-specific analysis
[B] 40 CFR 98; Site-specific analysis
[C] Engineering Estimate; 40 CFR 98

ATTACHMENT L

Emission Units Data Sheets

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		CE-1		CE-2		CE-3	
Engine Manufacturer and Model		Waukesha L5794GSI		Waukesha L5794GSI		Waukesha L5794GSI	
Manufacturer's Rated bhp/rpm		1,380/1,200		1,380/1,200		1,380/1,200	
Source Status[2]		ES		ES		ES	
Date Installed/Modified/Removed[3]		10/16/2013		9/01/2011		2/27/2015	
Engine Manufactured/Reconstruction Date[4]		3/20/2007		11/02/2007		3/29/2007	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		No		No		No	
Engine, Fuel and Combustion Data	Engine Type[6]	RB4S		RB4S		RB4S	
	APCD Type[7]	NSCR		NSCR		NSCR	
	Fuel Type[8]	PQ		PQ		PQ	
	H_2S (gr/100 scf)	<0.2		<0.2		<0.2	
	Operating bhp/rpm	1,380/1,200		1,380/1,200		1,380/1,200	
	BSFC (Btu/bhp-hr)	8,508		8,508		8,508	
	Fuel throughput (ft^3/hr)	~10,680		~10,680		~10,680	
	Fuel throughput ($MMft^3$/yr)	~93.6		~93.6		~93.6	
	Operation (hrs/yr)	8,760		8,760		8,760	
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO_X	1.52	6.66	1.52	6.66	1.52	6.66
MD	CO	1.83	8.00	1.83	8.00	1.83	8.00
MD	VOC	0.30	1.33	0.30	1.33	0.30	1.33
AP	SO_2	0.01	0.03	0.01	0.03	0.01	0.03
AP	PM_{10}	0.23	1.00	0.23	1.00	0.23	1.00
MD	Formaldehyde	0.12	0.53	0.12	0.53	0.12	0.53

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		CE-4		CE-5		CE-6	
Engine Manufacturer and Model		Waukesha L5794GSI		Waukesha L5794GSI		Waukesha L7044GSI	
Manufacturer's Rated bhp/rpm		1,380/1,200		1,380/1,200		1,680/1,200	
Source Status[2]		ES		ES		ES	
Date Installed/Modified/Removed[3]		5/29/2015		9/01/2011		9/01/2012	
Engine Manufactured/Reconstruction Date[4]		4/7/2008		11/2/2007		Jan 2008	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		No		No		No	
Engine, Fuel and Combustion Data	Engine Type[6]	RB4S		RB4S		RB4S	
	APCD Type[7]	NSCR		NSCR		NSCR	
	Fuel Type[8]	PQ		PQ		PQ	
	H_2S (gr/100 scf)	<0.2		<0.2		<0.2	
	Operating bhp/rpm	1,380/1,200		1,380/1,200		1,680/1,200	
	BSFC (Btu/bhp-hr)	8,508		8,508		8,927	
	Fuel throughput (ft^3/hr)	~10,680		~10,680		~13,620	
	Fuel throughput ($MMft^3$/yr)	~93.6		~93.6		~119.31	
	Operation (hrs/yr)	8,760		8,760		8,760	
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO_X	1.52	6.66	1.52	6.66	1.85	8.11
MD	CO	1.83	8.00	1.83	8.00	2.22	9.73
MD	VOC	0.30	1.33	0.30	1.33	0.37	1.62
AP	SO_2	0.01	0.03	0.01	0.03	0.01	0.04
AP	PM_{10}	0.23	1.00	0.23	1.00	0.29	1.28
MD	Formaldehyde	0.12	0.53	0.12	0.53	0.15	0.65

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number[1]		CE-7		CE-8		CE-9	
Engine Manufacturer and Model		Waukesha L7044GSI		Waukesha L7044GSI		Waukesha L7044GSI	
Manufacturer's Rated bhp/rpm		1,680/1,200		1,680/1,200		1,680/1,200	
Source Status[2]		ES		ES		ES	
Date Installed/Modified/Removed[3]		9/01/2012		9/01/2012		9/01/2012	
Engine Manufactured/Reconstruction Date[4]		March 2008		May 2007		April 2006	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No)[5]		No		No		No	
Engine, Fuel and Combustion Data	Engine Type[6]	RB4S		RB4S		RB4S	
	APCD Type[7]	NSCR		NSCR		NSCR	
	Fuel Type[8]	PQ		PQ		PQ	
	H_2S (gr/100 scf)	<0.2		<0.2		<0.2	
	Operating bhp/rpm	1,680/1,200		1,680/1,200		1,680/1,200	
	BSFC (Btu/bhp-hr)	8,927		8,927		8,927	
	Fuel throughput (ft^3/hr)	~13,620		~13,620		~13,620	
	Fuel throughput ($MMft^3$/yr)	~119.3		~119.3		~119.3	
	Operation (hrs/yr)	8,760		8,760		8,760	
Reference[9]	Potential Emissions[10]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
MD	NO_X	1.85	8.11	1.85	8.11	1.85	8.11
MD	CO	2.22	9.73	2.22	9.73	2.22	9.73
MD	VOC	0.37	1.62	0.37	1.62	0.37	1.62
AP	SO_2	0.01	0.04	0.01	0.04	0.01	0.04
AP	PM_{10}	0.29	1.28	0.29	1.28	0.29	1.28
MD	Formaldehyde	0.15	0.65	0.15	0.65	0.15	0.65

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

2. Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Removal of Source

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

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

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

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

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

LB2S	Lean Burn Two Stroke	RB4S	Rich Burn Four Stroke
LB4S	Lean Burn Four Stroke		

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

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	SCR	Lean Burn & Selective Catalytic Reduction

8. Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas

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

MD	Manufacturer's Data	AP	AP-42
GR	GRI-HAPCalc™	OT	Other _ (please list)

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

NATURAL GAS FIRED BOILER/LINE HEATER DATA SHEET

Source ID #[1]	Status[2]	Design Heat Input (mmBtu/hr)[3]	Hours of Operation (hrs/yr)[4]	Fuel Heating Value (Btu/scf)[5]	
NA					

1. Enter the appropriate Source Identification Numbers (Source ID #) for each boiler or line heater located at the compressor station. Boilers should be designated BLR-1, BLR-2, BLR-3, etc. Heaters or Line Heaters should be designated HTR-1, HTR-2, HTR-3, etc. Enter glycol dehydration unit Reboiler Vent data on the *Glycol Dehydration Unit Data Sheet*.
2. Enter the Status for each boiler or line heater using the following:

   EXIST Existing Equipment NEW Installation of New Equipment
   REM Equipment Removed
3. Enter boiler or line heater design heat input in mmBtu/hr.
4. Enter the annual hours of operation in hours/year for each boiler or line heater.
5. Enter the fuel heating value in Btu/standard cubic foot.

STORAGE TANK DATA SHEET

Source ID #[1]	Status[2]	Content[3]	Volume[4]	Dia[5]	Throughput[6]	Orientation[7]	Liquid Height[8]
T-01	EXIST	Produced Water	12,600 gal	12	~904,470 (combined)	VERT	7 ft
T-02	EXIST	Produced Water	12,600 gal	12		VERT	7 ft
T-03	EXIST	Used Oil	1,000 gal	5	~12,000	VERT	3 ft
T-04	EXIST	TEG	1,000 gal	4	~12,000	HORZ	3 ft
T-05	EXIST	Lube Oil	1,000 gal	4	~12,000	HORZ	3 ft
T-06	EXIST	Lube Oil	1,000 gal	4	~12,000	HORZ	3 ft
T-07	EXIST	Dehy Drip	285 gal	3.17	~3,420	HORZ	2 ft
T-08	EXIST	Produced Water	8,820 gal	10	~628,530 (combined)	VERT	7 ft
T-09	EXIST	Produced Water	8,820 gal	10		VERT	7 ft

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the compressor station. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:

   EXIST Existing Equipment NEW Installation of New Equipment
   REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, etc.
4. Enter storage tank volume in gallons.
5. Enter storage tank diameter in feet.
6. Enter storage tank throughput in gallons per year.
7. Enter storage tank orientation using the following:

VERT Vertical Tank HORZ Horizontal Tank

8. Enter storage tank average liquid height in feet.

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		Exterran	
		Max Dry Gas Flow Rate (mmscf/day)		64	
		Design Heat Input (mmBtu/hr)		1.50 (RBV-1)	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		ES	
		Date Installed/Modified/Removed[3]		9/01/2011	
		Regenerator Still Vent APCD[4]		CC	
		Fuel HV (Btu/scf)		~1,108	
		H_2S Content (gr/100 scf)		<0.01	
		Operation (hrs/yr)		8,760	
Source ID #[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
RBV-1	Reboiler Vent	AP	NO_X	0.14	0.59
		AP	CO	0.11	0.50
		AP	VOC	0.01	0.03
		AP	SO_2	0.00	0.00
		AP	PM_{10}	0.01	0.05
RSV-1	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	1.45	6.33
		GRI-GLYCalc™	Benzene	0.01	0.04
		GRI-GLYCalc™	Ethylbenzene	0.02	0.07
		GRI-GLYCalc™	Toluene	0.03	0.12
		GRI-GLYCalc™	Xylenes	0.02	0.09
		GRI-GLYCalc™	n-Hexane	0.01	0.05

NATURAL GAS GLYCOL DEHYDRATION UNIT DATA SHEET

General Glycol Dehydration Unit Data		Manufacturer and Model		Valerus	
		Max Dry Gas Flow Rate (mmscf/day)		60	
		Design Heat Input (mmBtu/hr)		1.50 (RBV-2)	
		Design Type (DEG or TEG)		TEG	
		Source Status[2]		ES	
		Date Installed/Modified/Removed[3]		9/01/2012	
		Regenerator Still Vent APCD[4]		CC	
		Fuel HV (Btu/scf)		~1,108	
		H_2S Content (gr/100 scf)		<0.01	
		Operation (hrs/yr)		8,760	
Source ID #[1]	Vent	Reference[5]	Potential Emissions[6]	lbs/hr	tons/yr
RBV-2	Reboiler Vent	AP	NO_X	0.14	0.59
		AP	CO	0.11	0.50
		AP	VOC	0.01	0.03
		AP	SO_2	0.00	0.00
		AP	PM_{10}	0.01	0.05
RSV-2	Glycol Regenerator Still Vent	GRI-GLYCalc™	VOC	1.44	6.33
		GRI-GLYCalc™	Benzene	0.01	0.04
		GRI-GLYCalc™	Ethylbenzene	0.02	0.07
		GRI-GLYCalc™	Toluene	0.03	0.12
		GRI-GLYCalc™	Xylenes	0.02	0.09
		GRI-GLYCalc™	n-Hexane	0.01	0.05

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

2. Enter the Source Status using the following codes:

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

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

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

   NA None
   CD Condenser

FL	Flare	CC	Condenser/Combustion Combination
TO	Thermal Oxidizer		

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

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-GLYCalc™	OT	Other _____	(please list)

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

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

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

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

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

Identification Number (as assigned on *Equipment List Form*): LR-1

1. Loading Area Name: Truck Loading Rack

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	None (uses truck pumps)
Number of liquids loaded	1 (produced water)
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1; there are 2 loadout locations but it is not feasible to have a truck at both locations at the same time

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

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

6. Are cargo vessels pressure tested for leaks at this or any other location?
☐ Yes ☒ No
If YES, describe:

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

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

8. Bulk Liquid Data *(add pages as necessary):*							
Pump ID No.			N/A				
Liquid Name			Produced Water				
Max. daily throughput (1000 gal/day)			75.6				
Max. annual throughput (1000 gal/yr)			1,533				
Loading Method [1]			SUB				
Max. Fill Rate (gal/min)			126				
Average Fill Time (min/loading)			TBD				
Max. Bulk Liquid Temperature (°F)			100				
True Vapor Pressure [2]			0.34 psia				
Cargo Vessel Condition [3]			U				
Control Equipment or Method [4]			N/A				
Minimum control efficiency (%)			N/A				
Maximum Emission Rate [Controlled]	Loading (lb VOC/hr)						
	Annual (tons VOC/yr)						
Estimation Method [5]			EPA				

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

[2] At maximum bulk liquid temperature

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

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

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

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

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

MONITORING Permittee will maintain loading throughput records.	RECORDKEEPING Permittee will maintain loading throughput records.
REPORTING None.	TESTING None.

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

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

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

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

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

NA

ATTACHMENT M

Air Pollution Control Device Sheets

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): 1C – 5C

Equipment Information

1. Manufacturer: IAC Acoustics Model No.QAC4-67-14 or equivalent	2. Control Device Name: Catalyst Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: Collection Efficiency (all pollutants): 100% See Item 23 for guaranteed control efficiency.	
8. Attached efficiency curve and/or other efficiency information. See attached spec sheet	
9. Design inlet volume: SCFM	10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Particulate (type):	☐ Odor ☒ Other NO_x, CO, NMHC, HCHO, CH_4
17. Inlet gas velocity: 99.7 ft/sec	18. Pollutant specific gravity: Varies
19. Gas flow into the collector: 6179 ACF @ 1149 °F and 14.7 PSIA	20. Gas stream temperature: Inlet: 1149 °F Outlet: 1112-1239 °F
21. Gas flow rate: Design Maximum: 6179 ACFM Average Expected: 6179 ACFM	22. Particulate Grain Loading in grains/scf: NA Inlet: Outlet:

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

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A NO_x	41.68	NA	100	1.52	NA	96 claimed
B CO	28.29	NA	100	1.83	NA	94 claimed
C NMHC/VOC	1.00	NA	100	0.18	NA	82 claimed
D HCHO	0.15	NA	100	0.12	NA	20 claimed

24. Dimensions of stack: Height 24 ft. Diameter 1.17 ft.

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

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

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

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

MONITORING: See Appendix C for detailed MRRT in accordance with the requirements of NSPS Subpart JJJJ	RECORDKEEPING: See Appendix C for detailed MRRT in accordance with the requirements of NSPS Subpart JJJJ
REPORTING: See Appendix C for detailed MRRT in accordance with the requirements of NSPS Subpart JJJJ	TESTING: See Appendix C for detailed MRRT in accordance with the requirements of 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
Claimed control efficiencies:
NO_X: 96%
CO: 94%
NMHC/VOC: 82%
HCHO: 20%

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
See Item 31 above.

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

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): 6C – 9C

Equipment Information

1. Manufacturer: IAC Acoustics Model No.QAC4-67-14 or equivalent	2. Control Device Name: Catalyst Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: Collection Efficiency (all pollutants): 100% See Item 23 for guaranteed control efficiency.	
8. Attached efficiency curve and/or other efficiency information. See attached spec sheet	
9. Design inlet volume: SCFM	10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Particulate (type):	☐ Odor ☒ Other NO_x, CO, NMHC, HCHO, CH_4
17. Inlet gas velocity: 126 ft/sec	18. Pollutant specific gravity: Varies
19. Gas flow into the collector: 7808 ACF @ 1181 °F and 14.7 PSIA	20. Gas stream temperature: Inlet: 1181 °F Outlet: 1112-1271 °F
21. Gas flow rate: Design Maximum: 7808 ACFM Average Expected: 7808 ACFM	22. Particulate Grain Loading in grains/scf: NA Inlet: Outlet:

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

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A NO_x	48.89	NA	100	1.85	NA	96 claimed
B CO	44.45	NA	100	2.22	NA	95 claimed
C NMHC/VOC	1.67	NA	100	0.22	NA	87 claimed
D HCHO	0.19	NA	100	0.15	NA	20 claimed

24. Dimensions of stack: Height 24 ft. Diameter 1.17 ft.

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

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

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

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

MONITORING: See Appendix C for detailed MRRT in accordance with the requirements of NSPS Subpart JJJJ	RECORDKEEPING: See Appendix C for detailed MRRT in accordance with the requirements of NSPS Subpart JJJJ
REPORTING: See Appendix C for detailed MRRT in accordance with the requirements of NSPS Subpart JJJJ	TESTING: See Appendix C for detailed MRRT in accordance with the requirements of 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 or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
Claimed control efficiencies:
NO_X: 96%
CO: 95%
NMHC/VOC: 87%
HCHO: 20%

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
See Item 31 above.

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

ATTACHMENT N

Supporting Emission Calculations

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 1a. Total Emissions from All Sources at the Facility *(Includes fugitive emissions)*

Pollutants	Estimated Site-Wide Emissions	
	lb/hr	tpy
VOC	11.62	51.27
NO_X	15.28	66.95
CO	18.24	79.91
Formaldehyde (HCHO)	1.20	5.26
Total HAPs	2.85	12.47
SO_2	0.07	0.31
PM_{10}	2.32	10.18
$PM_{2.5}$	2.32	10.18
GHG (CO_2e)	21,000	91,981
Others	---	---

Notes:
1. PM_{10} and $PM_{2.5}$ emissions are filterable + condensable.
2. VOC as shown above is NMNEHC + HCHO.
3. Emissions from all sources at the facility (including venting and fugitives) are included above

TABLE 1b. Total Emissions from All Sources at the Facility *(Not including fugitive emissions)*

Pollutants	Estimated Site-Wide Emissions		Title V Major Source Thresholds	PSD Major Source Thresholds
	lb/hr	tpy	tpy	tpy
VOC	5.99	26.22	100	250
NO_X	15.28	66.95	100	250
CO	18.24	79.91	100	250
Formaldehyde (HCHO)	1.20	5.26	10	---
Total HAPs	2.80	12.25	25	---
SO_2	0.07	0.31	100	250
PM_{10}	2.32	10.18	100	250
$PM_{2.5}$	2.32	10.18	100	250
GHG (CO_2e)	18,870	82,652	100,000	---
Others	---	---	---	---

Notes:
1. PM_{10} and $PM_{2.5}$ emissions are filterable + condensable.
2. VOC as shown above is NMNEHC + HCHO.
3. Emissions from all sources at the facility are included above
4. The Title V major source threshold for CO_{2e} is only applicable if the site is major for another pollutant.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 2. Atmospheric Emissions from Each Source at the Facility

Source Name	Source ID	Pollutants																	
		VOC		NO_x		CO		HCHO		Total HAPs		PM_{10}		$PM_{2.5}$		SO_2		GHG (CO_2e)	
		(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
1,380 HP Compressor Engine	CE-1	0.30	1.33	1.52	6.66	1.83	8.00	0.12	0.53	0.26	1.15	0.23	1.00	0.23	1.00	0.01	0.03	1,511	6,618
1,380 HP Compressor Engine	CE-2	0.30	1.33	1.52	6.66	1.83	8.00	0.12	0.53	0.26	1.15	0.23	1.00	0.23	1.00	0.01	0.03	1,511	6,618
1,380 HP Compressor Engine	CE-3	0.30	1.33	1.52	6.66	1.83	8.00	0.12	0.53	0.26	1.15	0.23	1.00	0.23	1.00	0.01	0.03	1,511	6,618
1,380 HP Compressor Engine	CE-4	0.30	1.33	1.52	6.66	1.83	8.00	0.12	0.53	0.26	1.15	0.23	1.00	0.23	1.00	0.01	0.03	1,511	6,618
1,380 HP Compressor Engine	CE-5	0.30	1.33	1.52	6.66	1.83	8.00	0.12	0.53	0.26	1.15	0.23	1.00	0.23	1.00	0.01	0.03	1,511	6,618
1,680 HP Compressor Engine	CE-6	0.37	1.62	1.85	8.11	2.22	9.73	0.15	0.65	0.33	1.43	0.29	1.28	0.29	1.28	0.01	0.04	1,954	8,558
1,680 HP Compressor Engine	CE-7	0.37	1.62	1.85	8.11	2.22	9.73	0.15	0.65	0.33	1.43	0.29	1.28	0.29	1.28	0.01	0.04	1,954	8,558
1,680 HP Compressor Engine	CE-8	0.37	1.62	1.85	8.11	2.22	9.73	0.15	0.65	0.33	1.43	0.29	1.28	0.29	1.28	0.01	0.04	1,954	8,558
1,680 HP Compressor Engine	CE-9	0.37	1.62	1.85	8.11	2.22	9.73	0.15	0.65	0.33	1.43	0.29	1.28	0.29	1.28	0.01	0.04	1,954	8,558
Natural Gas-Fired TEG Dehy Reboiler	RBV-1	0.01	0.03	0.14	0.59	0.11	0.50	0.00	0.00	0.00	0.01	0.01	0.05	0.01	0.05	0.00	0.00	176	769
TEG Dehy Still	RSV-1	1.45	6.33	---	---	---	---	---	---	0.08	0.37	---	---	---	---	---	---	1,571	6,879
Natural Gas-Fired TEG Dehy Reboiler	RBV-2	0.01	0.03	0.14	0.59	0.11	0.50	0.00	0.00	0.00	0.01	0.01	0.05	0.01	0.05	0.00	0.00	176	769
TEG Dehy Still	RSV-2	1.44	6.33	---	---	---	---	---	---	0.08	0.37	---	---	---	---	---	---	1,570	6,875
Produced Water Tank	T01	0.02	0.07	---	---	---	---	---	---	0.00	0.01	---	---	---	---	---	---	2.3	10.1
Produced Water Tank	T02	0.02	0.07	---	---	---	---	---	---	0.00	0.01	---	---	---	---	---	---	2.3	10.1
Used Oil Tank	T03	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TEG Tank	T04	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
New Oil Tank	T05	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
New Oil Tank	T06	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Dehy Drip Tank	T07	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Produced Water Tank	T08	0.02	0.07	---	---	---	---	---	---	0.00	0.01	---	---	---	---	---	---	2.3	10.1
Produced Water Tank	T09	0.02	0.07	---	---	---	---	---	---	0.00	0.01	---	---	---	---	---	---	2.3	10.1
Produced Water Loading	---	0.02	0.08	---	---	---	---	---	---	0.00	0.00	---	---	---	---	---	---	---	---
Fugitives and Blowdowns	---	5.64	25.05	---	---	---	---	---	---	0.05	0.22	---	---	---	---	---	---	2,130	9,329
Total Facility		11.62	51.27	15.28	66.95	18.24	79.91	1.20	5.26	2.85	12.47	2.32	10.18	2.32	10.18	0.07	0.31	21,000	91,981

Notes:
1. PM_{10} and $PM_{2.5}$ emissions are filterable + condensable.
2. VOC as shown above (for compressor engines) is NMNEHC + HCHO.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 3. 1,380 HP Compressor Engine Emissions Calculations *(each engine)*

Engine Information:

Source ID:	**CE-1 through CE-5**
Manufacturer:	Waukesha
Model No.:	L5794GSI
Installation Date:	2011-2015
Manufacture Date:	2007-2008
Projected Startup Date:	Existing
Stroke Cycle:	4 stroke
Type of Burn:	Rich
Rated Horsepower (bhp):	1,380
Control Device:	NSCR
Stack Designation:	CE-1 through CE-5

Engine Fuel Information:

Fuel Type:	Natural Gas	
Higher Heating Value (HHV) (Btu/scf):	1,108	From site-specific gas analysis (see Table 16).
Specific Fuel Consumption (Btu/bhp-hr):	8,508	From manufacturer's spec sheet.
Maximum Fuel Consumption at 100% Load (scf/hr):	10,680	= 178 scfm * 60 min/hr
Heat Input (MMBtu/hr):	11.74	= 8,508 Btu/bhp-hr * 1,380 hp /1,000,000
Potential Fuel Consumption (MMBtu/yr):	102,852	= 11.83 MMBtu/hr * 8,760 hrs/yr
Max. Fuel Consumption at 100%(MMscf/hr):	0.0107	= 10,680 scf/hr ÷ 1,000,000
Max. Fuel Consumption (MMscf/yr):	93.6	= 0.0107 MMscf/hr * 8,760 hrs/yr
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Uncontrolled Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	13.7	g/bhp-hr	41.68	182.56	Mfg. Specs
VOC (NMHC excl. HCHO)	0.33	g/bhp-hr	1.00	4.40	Mfg. Specs
CO	9.3	g/bhp-hr	28.29	123.93	Mfg. Specs
CH_4	1.42	g/bhp-hr	4.32	18.92	Mfg. Specs
Formaldehyde (HCHO)	0.05	g/bhp-hr	0.15	0.67	Mfg. Specs
GHG (CO_2e)	---	---	1550.87	6792.82	Mfg. Specs, 40 CFR 98, Table C-2

Controlled Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	0.50	g/bhp-hr	1.52	6.66	Mfg. Specs
VOC (NMHC excl. HCHO)	0.06	g/bhp-hr	0.18	0.80	Mfg. Specs
CO	0.60	g/bhp-hr	1.83	8.00	Mfg. Specs
SO_2	0.001	lb/MMBtu	0.01	0.03	AP-42, Table 3.2-3 (Aug-2000)
PM_{10}	0.02	lb/MMBtu	0.23	1.00	AP-42, Table 3.2-3 (Aug-2000)
$PM_{2.5}$	0.02	lb/MMBtu	0.23	1.00	AP-42, Table 3.2-3 (Aug-2000)
Formaldehyde (HCHO)	0.04	g/bhp-hr	0.12	0.53	Mfg. Specs
GHG (CO_2e)	See Next Table		1,511	6,618	Mfg. Specs, 40 CFR 98, Table C-2
Other (Total HAP)	See Next Table		0.26	1.15	AP-42, Table 3.2-3 (Aug-2000)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type.
4. Emissions of VOC HAPs and aldehydes are expected to be reduced as a result of the NSCR catalyst. However, emissions represented here conservatively do not account for any reduction.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 3. 1,380 HP Compressor Engine Emissions Calculations *(each engine)*

Greenhouse Gas (GHG) & Hazardous Air Pollutant (HAP) Emissions Calculations:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	474	g/bhp-hr	1442.10	6,316	Mfg. Specs
CH_4	0.89	g/bhp-hr	2.72	11.92	Mfg. Specs w/ 37% Catalyst Control
N_2O	0.0001	kg/MMBtu	0.00	0.01	40 CFR 98, Table C-2
GHG (CO_2e)			**1,511**	**6,618**	
Organic HAPs:					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
1,3-Butadiene	6.63E-04	lb/MMBtu	0.008	0.034	AP-42, Table 3.2-3 (Aug-2000)
1,3-Dichloropropene	1.27E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Acetaldehyde	2.79E-03	lb/MMBtu	0.033	0.143	AP-42, Table 3.2-3 (Aug-2000)
Acrolein	2.63E-03	lb/MMBtu	0.031	0.135	AP-42, Table 3.2-3 (Aug-2000)
Benzene	1.58E-03	lb/MMBtu	0.019	0.081	AP-42, Table 3.2-3 (Aug-2000)
Carbon Tetrachloride	1.77E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Chlorobenzene	1.29E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Chloroform	1.37E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Ethylbenzene	2.48E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Ethylene Dibromide	2.13E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Methanol	3.06E-03	lb/MMBtu	0.036	0.157	AP-42, Table 3.2-3 (Aug-2000)
Methylene Chloride	4.12E-05	lb/MMBtu	0.000	0.002	AP-42, Table 3.2-3 (Aug-2000)
Naphthalene	9.71E-05	lb/MMBtu	0.001	0.005	AP-42, Table 3.2-3 (Aug-2000)
PAH	1.41E-04	lb/MMBtu	0.002	0.007	AP-42, Table 3.2-3 (Aug-2000)
Styrene	1.19E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Toluene	5.58E-04	lb/MMBtu	0.007	0.029	AP-42, Table 3.2-3 (Aug-2000)
Vinyl Chloride	7.18E-06	lb/MMBtu	0.000	0.000	AP-42, Table 3.2-3 (Aug-2000)
Xylene	1.95E-04	lb/MMBtu	0.002	0.010	AP-42, Table 3.2-3 (Aug-2000)
Total HAP (includes HCHO)			**0.26**	**1.15**	

Example Calculations:

Emission Rate (lbs/hr) = EF (g/bhp-hr) * Engine Rating (bhp) ÷ 453.59 (g/lb)

Emission Rate (lbs/hr) = EF (lb/MMBtu) * Engine Heat Input (MMBtu/hr)

Emission Rate (lbs/hr) = EF (kg/MMBtu) * Engine Heat Input (MMBtu/hr) * 2.205 (lb/kg)

Emission Rate (tpy) = Emissions (lb/hr) * 8,760 (hrs/yr) ÷ 2,000 (lbs/ton)

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 4. 1,680 HP Compressor Engine Emissions Calculations *(each engine)*

Engine Information:

Source ID:	**CE-6 through CE-9**
Manufacturer:	Waukesha
Model No.:	L7044GSI
Installation Date:	2012
Manufacture Date:	2012
Projected Startup Date:	Existing
Stroke Cycle:	4 stroke
Type of Burn:	Rich
Rated Horsepower (bhp):	1,680
Control Device:	NSCR
Stack Designation:	CE-6 through CE-9

Engine Fuel Information:

Fuel Type:	Natural Gas	
Higher Heating Value (HHV) (Btu/scf):	1,108	From site-specific gas analysis (see Table 16).
Specific Fuel Consumption (Btu/bhp-hr):	8,927	From manufacturer's spec sheet.
Maximum Fuel Consumption at 100% Load (scf/hr):	13,620	= 227 scfm * 60 min/hr
Heat Input (MMBtu/hr):	15.00	= 8,927 Btu/bhp-hr * 1,680 hp /1,000,000
Potential Fuel Consumption (MMBtu/yr):	131,377	= 15.00 MMBtu/hr * 8,760 hrs/yr
Max. Fuel Consumption at 100%(MMscf/hr):	0.0136	= 13,620 scf/hr ÷ 1,000,000
Max. Fuel Consumption (MMscf/yr):	119.3	= 0.0136 MMscf/hr * 8,760 hrs/yr
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Uncontrolled Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	13.2	g/bhp-hr	48.89	214.14	Mfg. Specs
VOC (NMHC excl. HCHO)	0.45	g/bhp-hr	1.67	7.30	Mfg. Specs
CO	12.0	g/bhp-hr	44.45	194.67	Mfg. Specs
CH_4	1.92	g/bhp-hr	7.11	31.15	Mfg. Specs
Formaldehyde (HCHO)	0.05	g/bhp-hr	0.19	0.81	Mfg. Specs
GHG (CO_2e)	---	---	2,020	8,846	Mfg. Specs, 40 CFR 98, Table C-2

Controlled Engine Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	0.50	g/bhp-hr	1.85	8.11	Mfg. Specs
VOC (NMHC excl. HCHO)	0.06	g/bhp-hr	0.22	0.97	Mfg. Specs
CO	0.60	g/bhp-hr	2.22	9.73	Mfg. Specs
SO_2	0.001	lb/MMBtu	0.01	0.04	AP-42, Table 3.2-3 (Aug-2000)
PM_{10}	0.02	lb/MMBtu	0.29	1.28	AP-42, Table 3.2-3 (Aug-2000)
$PM_{2.5}$	0.02	lb/MMBtu	0.29	1.28	AP-42, Table 3.2-3 (Aug-2000)
Formaldehyde (HCHO)	0.04	g/bhp-hr	0.15	0.65	Mfg. Specs
GHG (CO_2e)	See Next Table		1,954	8,558	Mfg. Specs, 40 CFR 98, Table C-2
Other (Total HAP)	See Next Table		0.33	1.43	AP-42, Table 3.2-3 (Aug-2000)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type
4. Emissions of VOC HAPs and aldehydes are expected to be reduced as a result of the NSCR catalyst. However, emissions represented here conservatively do not account for any reduction.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 4. 1,680 HP Compressor Engine Emissions Calculations *(each engine)*

Greenhouse Gas (GHG) & Hazardous Air Pollutant (HAP) Emissions Calculations:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	497	g/bhp-hr	1840.78	8062.62	Mfg. Specs
CH_4	1.21	g/bhp-hr	4.48	19.62	Mfg. Specs w/ 37% Catalyst Control
N_2O	0.0001	kg/MMBtu	0.00	0.01	40 CFR 98, Table C-2
GHG (CO_2e)			**1,954**	**8,558**	
Organic HAPs:					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	0.000	0.002	AP-42, Table 3.2-3 (Aug-2000)
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
1,3-Butadiene	6.63E-04	lb/MMBtu	0.010	0.044	AP-42, Table 3.2-3 (Aug-2000)
1,3-Dichloropropene	1.27E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Acetaldehyde	2.79E-03	lb/MMBtu	0.042	0.183	AP-42, Table 3.2-3 (Aug-2000)
Acrolein	2.63E-03	lb/MMBtu	0.039	0.173	AP-42, Table 3.2-3 (Aug-2000)
Benzene	1.58E-03	lb/MMBtu	0.024	0.104	AP-42, Table 3.2-3 (Aug-2000)
Carbon Tetrachloride	1.77E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Chlorobenzene	1.29E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Chloroform	1.37E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Ethylbenzene	2.48E-05	lb/MMBtu	0.000	0.002	AP-42, Table 3.2-3 (Aug-2000)
Ethylene Dibromide	2.13E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Methanol	3.06E-03	lb/MMBtu	0.046	0.201	AP-42, Table 3.2-3 (Aug-2000)
Methylene Chloride	4.12E-05	lb/MMBtu	0.001	0.003	AP-42, Table 3.2-3 (Aug-2000)
Naphthalene	9.71E-05	lb/MMBtu	0.001	0.006	AP-42, Table 3.2-3 (Aug-2000)
PAH	1.41E-04	lb/MMBtu	0.002	0.009	AP-42, Table 3.2-3 (Aug-2000)
Styrene	1.19E-05	lb/MMBtu	0.000	0.001	AP-42, Table 3.2-3 (Aug-2000)
Toluene	5.58E-04	lb/MMBtu	0.008	0.037	AP-42, Table 3.2-3 (Aug-2000)
Vinyl Chloride	7.18E-06	lb/MMBtu	0.000	0.000	AP-42, Table 3.2-3 (Aug-2000)
Xylene	1.95E-04	lb/MMBtu	0.003	0.013	AP-42, Table 3.2-3 (Aug-2000)
Total HAP (includes HCHO)			**0.33**	**1.43**	

Example Calculations:

Emission Rate (lbs/hr) = EF (g/bhp-hr) * Engine Rating (bhp)÷ 453.59 (g/lb)

Emission Rate (lbs/hr) = EF (lb/MMBtu) * Engine Heat Input (MMBtu/hr)

Emission Rate (lbs/hr) = EF (kg/MMBtu) * Engine Heat Input (MMBtu/hr) * 2.205 (lb/kg)

Emission Rate (tpy) = Emissions (lb/hr) * 8,760 (hrs/yr)÷ 2,000 (lbs/ton)

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 5. Natural Gas Dehydration Unit - Reboiler Emissions Calculations *(each reboiler)*

Reboiler Information:

Source ID:	**RBV-1 & RBV-2**
Stack ID:	**RBV-1 & RBV-2**
Installation Date:	2011-2012
Projected Startup Date:	Existing

Reboiler Fuel Information:

Fuel Type:	Natural Gas	
Higher Heating Value (HHV) (Btu/scf):	1,108	From site-specific gas analysis (see Table 16).
Heat Input (MMBtu/hr)	1.50	From manufacturer's spec sheet.
Potential Fuel Consumption (MMBtu/yr):	13,140	= 1.50 MMBtu/hr * 8,760 hrs/yr
Max. Fuel Consumption (MMscf/hr):	0.0014	= 1.50 MMBtu/hr ÷ 1,108 Btu/scf
Max. Fuel Consumption (MMscf/yr):	11.9	= 0.0014 MMscf/hr * 8,760 hrs/yr
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Reboiler Emissions Data:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
NO_X	100	lb/MMScf	0.14	0.59	AP-42, Table 1.4-1 (Jul-1998)
VOC	5.5	lb/MMScf	0.01	0.03	AP-42, Table 1.4-2 (Jul-1998)
CO	84	lb/MMScf	0.11	0.50	AP-42, Table 1.4-1 (Jul-1998)
SO_2	0.6	lb/MMScf	0.00	0.00	AP-42, Table 1.4-2 (Jul-1998)
PM_{10}	7.6	lb/MMScf	0.01	0.05	AP-42, Table 1.4-2 (Jul-1998)
$PM_{2.5}$	7.6	lb/MMScf	0.01	0.05	AP-42, Table 1.4-2 (Jul-1998)
Formaldehyde (HCHO)	0.08	lb/MMScf	0.00	0.00	AP-42, Table 1.4-3 (Jul-1998)
GHG (CO_2e)	See Next Table		176	769	40 CFR 98, Tables C-1 & C-2
Other (Total HAP)	Various		0.00	0.01	AP-42, Tables 1.4-2, 3 & 4 (Jul-1998)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this source type

Greenhouse Gas (GHG) & Hazardous Air Pollutant (HAP) Emissions Calculations:

Pollutant	Emission Factor	Units	Maximum Potential Emissions		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	53.06	kg/MMBtu	175.50	768.67	40 CFR 98, Table C-1
CH_4	0.001	kg/MMBtu	0.00	0.01	40 CFR 98, Table C-2
N_2O	0.0001	kg/MMBtu	0.00	0.00	40 CFR 98, Table C-2
GHG (CO_2e)			**175.68**	**769.47**	

Example Calculations:

Emission Rate (lbs/hr) = EF (lb/MMscf) * Fuel Consumption (MMscf/hr)

Emission Rate (lbs/hr) = EF (kg/MMBtu) * Heat Input (MMBtu/hr) * 2.205 (lb/kg)

Emission Rate (tpy) = Emissions (lb/hr) * 8,760 (hrs/yr)÷ 2,000 (lbs/ton)

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 6. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-1)

Dehydration Unit Information:

Source ID:	**RSV-1**	
Stack ID:	**RSV-1**	
Installation Date:	9/1/2011	
Projected Startup Date:	Existing	
Control Type:	Condenser and Routed to Reboiler	
Control Efficiency:	98%	
Rated Dehy Throughput (MMscfd):	64	Maximum rate.
Glycol Circulation Rate (gpm):	15.0	Pump rating.
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Dehydration Unit Regenerator Vent Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions		Emissions Estimation Method
	lbs/hr	tpy	lbs/hr	tpy	
VOC	32.98	144.45	1.45	6.33	GRI GLYCalc (See Next Table)
HAPs	3.23	14.14	0.08	0.37	GRI GLYCalc (See Next Table)
NO_X	---	---	---	---	GRI GLYCalc (See Next Table)
SO_2	---	---	---	---	GRI GLYCalc (See Next Table)
CO	---	---	---	---	GRI GLYCalc (See Next Table)
PM_{10}	---	---	---	---	GRI GLYCalc (See Next Table)
$PM_{2.5}$	---	---	---	---	GRI GLYCalc (See Next Table)
GHG (CO_2e)	8,477	37,128	1,571	6,879	GRI GLYCalc (See Next Table)
Other (Benzene)	0.34	1.49	0.01	0.04	GRI GLYCalc (See Next Table)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Regenerator emissions include a 20% percent compliance margin above GLYCalc outputs.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 6. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-1)

GRI GLYCalc Emissions Data - Regenerator Vent:

Pollutant	Uncontrolled Emissions			Controlled Emissions		
	lbs/hr	lbs/day	tpy	lbs/hr	lbs/day	tpy
Carbon Dioxide	0.261	6.26	1.14	129.74	3113.71	568.25
Methane	35.4350	850.440	155.2054	0.7087	17.008	3.1039
Ethane	7.0903	170.167	31.0555	0.1418	3.403	0.6211
Propane	1.9231	46.154	8.4232	0.0385	0.923	0.1685
Isobutane	0.3231	7.754	1.4151	0.0065	0.155	0.0283
n-Butane	0.4314	10.354	1.8897	0.0086	0.207	0.0378
Isopentane	0.1284	3.081	0.5624	0.0026	0.062	0.0112
n-Pentane	0.1026	2.461	0.4492	0.0021	0.049	0.0090
n-Hexane	0.0340	0.815	0.1487	0.0007	0.016	0.0030
Cyclohexane	0.0316	0.759	0.1385	0.0006	0.015	0.0028
Other Hexanes	0.0730	1.752	0.3197	0.0015	0.035	0.0064
Heptanes	0.1188	2.851	0.5202	0.0024	0.057	0.0104
Methylcyclohexane	0.0809	1.942	0.3544	0.0016	0.039	0.0071
Benzene	0.2136	5.127	0.9357	0.0043	0.102	0.0186
Toluene	0.7019	16.847	3.0745	0.0140	0.336	0.0613
Ethylbenzene	0.4973	11.935	2.1781	0.0099	0.238	0.0435
Xylenes	0.6901	16.561	3.0225	0.0138	0.330	0.0602
C8 + Heavier Hydrocarbons	0.3076	7.383	1.3473	0.0062	0.148	0.0269
Total CO_2e	**886.14**	**21,267.26**	**3,881.28**	**147.46**	**3,538.91**	**645.85**
Total Hydrocarbon Emissions	**48.18**	**1,156.38**	**211.04**	**0.96**	**23.12**	**4.22**
Total VOC Emissions	**5.66**	**135.78**	**24.78**	**0.11**	**2.71**	**0.50**
Total HAP Emissions	**2.14**	**51.29**	**9.36**	**0.04**	**1.02**	**0.19**
Total BTEX Emissions	**2.10**	**50.47**	**9.21**	**0.04**	**1.01**	**0.18**

Notes:

1. Based on GRI GLYCalc 4.0 run at maximum design conditions of dry gas flowrate at 64 MMscfd, temperature at 120 °F, and pressure at 1150 psig. This unit operates two 450 gph pumps simultaneously, with a third in place as backup. Dry gas is used as stripping gas, with an approximate flow rate of 15 scfm (assuming 1 scf per gallon of glycol circulated). Regenerator overheads are routed to a condenser for control and then routed to the reboiler for a combined 98% control efficiency.

2. Controlled emissions of CO_2 include emissions created as combustion by-products from vent streams routed to the reboiler for control.
3. CO_2e is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25).

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 6. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-1)

GRI GLYCalc Emissions Data - Flash Tank:

Pollutant	Uncontrolled Emissions			Controlled Emissions		
	lbs/hr	lbs/day	tpy	lbs/hr	lbs/day	tpy
Carbon Dioxide	2.17	52.08	9.50	852.53	20460.67	3734.07
Methane	247.0218	5928.524	1081.9556	12.3511	296.426	54.0978
Ethane	52.8456	1268.295	231.4638	2.6423	63.415	11.5732
Propane	13.2921	319.010	58.2193	0.6646	15.950	2.9110
Isobutane	2.1304	51.129	9.3310	0.1065	2.556	0.4665
n-Butane	2.7589	66.214	12.0841	0.1379	3.311	0.6042
Isopentane	0.7886	18.926	3.4540	0.0394	0.946	0.1727
n-Pentane	0.6089	14.613	2.6668	0.0304	0.731	0.1333
n-Hexane	0.1640	3.936	0.7183	0.0082	0.197	0.0359
Cyclohexane	0.0603	1.448	0.2643	0.0030	0.072	0.0132
Other Hexanes	0.3957	9.498	1.7333	0.0198	0.475	0.0867
Heptanes	0.3924	9.419	1.7189	0.0196	0.471	0.0859
Methylcyclohexane	0.1305	3.133	0.5718	0.0065	0.157	0.0286
Benzene	0.0707	1.698	0.3098	0.0035	0.085	0.0155
Toluene	0.1672	4.014	0.7325	0.0084	0.201	0.0366
Ethylbenzene	0.0757	1.816	0.3315	0.0038	0.091	0.0166
Xylenes	0.0749	1.798	0.3282	0.0037	0.090	0.0164
C8 + Heavier Hydrocarbons	0.7143	17.143	3.1285	0.0357	0.857	0.1564
Total CO_2e	**6,177.72**	**148,265.18**	**27,058.39**	**1,161.31**	**27,871.32**	**5,086.52**
Total Hydrocarbon Emissions	**321.69**	**7720.61**	**1409.01**	**16.08**	**386.03**	**70.45**
Total VOC Emissions	**21.82**	**523.79**	**95.59**	**1.09**	**26.19**	**4.78**
Total HAP Emissions	**0.55**	**13.26**	**2.42**	**0.03**	**0.66**	**0.12**
Total BTEX Emissions	**0.39**	**9.33**	**1.70**	**0.02**	**0.47**	**0.09**

Notes:

1. Based on GRI GLYCalc 4.0 run at maximum design conditions of temperature at 175 °F, and pressure at 45 psig. Flash gases are routed to the reboiler for use as fuel with a 95% control efficiency.
2. Controlled emissions of CO_2 include emissions created as combustion by-products from vent streams routed to the reboiler for control.
3. CO_2e is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25).

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 6. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-1)

Greenhouse Gas (GHG) Emissions - Controlled Vent Streams

Constituent	Condenser Vent Stream	Flash Tank Off Gas Stream	Source
	mol%	mol%	
CO_2, Y_{CO2}	0.1860	0.275	GRI-GLYCalc Output Report
Methane, Y_j	69.6000	86.000	GRI-GLYCalc Output Report
Ethane, Y_j	7.4300	9.820	GRI-GLYCalc Output Report
Propane, Y_j	1.3700	1.680	GRI-GLYCalc Output Report
Isobutane, Y_j	0.1750	0.205	GRI-GLYCalc Output Report
n-Butane, Y_j	0.2340	0.265	GRI-GLYCalc Output Report
Isopentane, Y_j	0.0561	0.061	GRI-GLYCalc Output Report
n-Pentane, Y_j	0.0448	0.047	GRI-GLYCalc Output Report
n-Hexane, Y_j	0.0124	0.011	GRI-GLYCalc Output Report
Cyclohexane, Y_j	0.0118	0.004	GRI-GLYCalc Output Report
Other Hexanes, Y_j	0.0267	0.026	GRI-GLYCalc Output Report
Heptanes, Y_j	0.0373	0.022	GRI-GLYCalc Output Report
Methylcyclohexane, Y_j	0.0260	0.007	GRI-GLYCalc Output Report
2,2,4-Trimethylpentane, Y_j	0.0000	0.000	GRI-GLYCalc Output Report
Benzene, Y_j	0.0858	0.005	GRI-GLYCalc Output Report
Toluene, Y_j	0.2390	0.010	GRI-GLYCalc Output Report
Ethylbenzene, Y_j	0.1470	0.004	GRI-GLYCalc Output Report
Xylenes, Y_j	0.2040	0.004	GRI-GLYCalc Output Report
C8 + Heavier Hydrocarbons, Y_j	0.0569	0.023	GRI-GLYCalc Output Report
Flow Rate, V_a (scfh)	1,200	6,790	GRI-GLYCalc Output Report
Control Efficiency (%)	0.98	0.95	---
Hours of Operation	8760	8760	Unrestricted Operation
Density of CO_2 (kg/ft^3 at 60F & 14.7 psia)	0.0526	0.0526	40 CFR Subpart 98 (Eq. W-36)
$E_{a,CO2}$ (combusted) - scf/hr	1,119	7,352	40 CFR Subpart 98 (Eq. W-39A)
Mass,CO_2 (combusted) - lb/hr	129.738	852.528	= E_aCO_2 (scf/hr) * Density of CO_2 (kg/scf) * 2.2 (lb/kg)
Mass,CO_2 (combusted) - tpy	568.252	3,734	= Mass, CO_2 (lb/hr) ÷ 2000 (lb/ton) * 8760 (hr/year)

Example Calculations:

GHG volumetric emissions from fuel combustion units using Equation W-39A from 40 CFR Subpart 98

$E_{a,CO2}$ = Contribution of annual CO_2 emissions from portable or stationary fuel combustion sources in cubic feet, under actual conditions.
V_a = Volume of gas sent to combustion unit in actual cubic feet, during the year.
η = Fraction of gas combusted for portable and stationary equipment determined using engineering estimation. For internal combustion devices, a default of 0.995 can be used.
Y_j = Mole fraction of hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus) in gas sent to combustion unit.
R_j = Number of carbon atoms in the hydrocarbon constituent j for: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes-plus).
Y_{CO2} = Mole fraction of carbon dioxide constituent in gas sent to combustion unit.

$$E_{a,CO2} = (V_a * Y_{CO2}) + \eta * \sum_{j=1}^{5} V_a * Y_j * R_j \qquad \text{(Eq. W-39A)}$$

GHG mass emissions using Equation W-36 from 40 CFR Subpart 98

$Mass_i$ = GHG_i (either CH_4, CO_2, or N_2O) mass emissions in metric tons.
$E_{s,i}$ = GHG_i (either CH_4, CO_2, or N_2O) volumetric emissions at standard conditions, in cubic feet.
ρ_i = Density of GHG_i. Use 0.0526 kg/ft^3 for CO_2 and N_2O, and 0.0192 kg/ft^3 for CH_4 at 60 °F and 14.7 psia.

$$Mass_i = E_{s,i} * \rho_i * 10^{-3} \qquad \text{(Eq. W-36)}$$

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 7. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-2)

Dehydration Unit Information:

Source ID:	**RSV-2**	
Stack ID:	**RSV-2**	
Projected Startup Date:	Existing	
Control Type:	Condenser and Routed to Reboiler	
Control Efficiency:	98%	
Rated Dehy Throughput (MMscfd):	60	Maximum rate.
Glycol Circulation Rate (gpm):	15.0	Pump rating.
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Dehydration Unit Regenerator Vent Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions		Emissions Estimation Method
	lbs/hr	tpy	lbs/hr	tpy	
VOC	32.96	144.36	1.44	6.33	GRI GLYCalc (See Next Table)
HAPs	3.21	14.07	0.08	0.37	GRI GLYCalc (See Next Table)
NO_X	---	---	---	---	GRI GLYCalc (See Next Table)
SO_2	---	---	---	---	GRI GLYCalc (See Next Table)
CO	---	---	---	---	GRI GLYCalc (See Next Table)
PM_{10}	---	---	---	---	GRI GLYCalc (See Next Table)
$PM_{2.5}$	---	---	---	---	GRI GLYCalc (See Next Table)
GHG (CO_2e)	8,468	37,091	1,570	6,875	GRI GLYCalc (See Next Table)
Other (Benzene)	0.34	1.49	0.01	0.04	GRI GLYCalc (See Next Table)

Notes:

1. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
2. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
3. Regenerator emissions include a 20% percent compliance margin above GLYCalc outputs.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 7. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-2)

GRI GLYCalc Emissions Data - Regenerator Vent:

Pollutant	Uncontrolled Emissions			Controlled Emissions		
	lbs/hr	lbs/day	tpy	lbs/hr	lbs/day	tpy
Carbon Dioxide	0.261	6.26	1.14	129.74	3113.69	568.25
Methane	35.4416	850.598	155.2341	0.7088	17.011	3.1045
Ethane	7.0983	170.359	31.0906	0.1420	3.407	0.6218
Propane	1.9241	46.179	8.4276	0.0385	0.924	0.1685
Isobutane	0.3235	7.763	1.4168	0.0065	0.155	0.0283
n-Butane	0.4321	10.370	1.8925	0.0086	0.207	0.0378
Isopentane	0.1286	3.087	0.5635	0.0026	0.062	0.0113
n-Pentane	0.1028	2.467	0.4503	0.0021	0.049	0.0090
n-Hexane	0.0341	0.819	0.1494	0.0007	0.016	0.0030
Cyclohexane	0.0320	0.767	0.1400	0.0006	0.015	0.0028
Other Hexanes	0.0733	1.758	0.3209	0.0015	0.035	0.0064
Heptanes	0.1197	2.872	0.5242	0.0024	0.057	0.0105
Methylcyclohexane	0.0818	1.963	0.3582	0.0016	0.039	0.0072
Benzene	0.2133	5.119	0.9343	0.0042	0.102	0.0186
Toluene	0.7001	16.802	3.0663	0.0140	0.335	0.0611
Ethylbenzene	0.4955	11.893	2.1704	0.0099	0.237	0.0433
Xylenes	0.6847	16.432	2.9989	0.0137	0.328	0.0598
C8 + Heavier Hydrocarbons	0.3124	7.498	1.3685	0.0062	0.150	0.0274
Total CO_2e	**886.30**	**21,271.21**	**3,882.00**	**147.46**	**3,538.97**	**645.86**
Total Hydrocarbon Emissions	**48.20**	**1,156.75**	**211.11**	**0.96**	**23.13**	**4.22**
Total VOC Emissions	**5.66**	**135.79**	**24.78**	**0.11**	**2.71**	**0.50**
Total HAP Emissions	**2.13**	**51.06**	**9.32**	**0.04**	**1.02**	**0.19**
Total BTEX Emissions	**2.09**	**50.25**	**9.17**	**0.04**	**1.00**	**0.18**

Notes:

1. Based on GRI GLYCalc 4.0 run at maximum design conditions of dry gas flowrate at 60 MMscfd, temperature at 120 °F, and pressure at 1150 psig. This unit operates two 450 gph pumps simultaneously, with a third in place as backup. Dry gas is used as stripping gas, with an approximate flow rate of 15 scfm (assuming 1 scf per gallon of glycol circulated). Regenerator overheads are routed to a condenser for control and then routed to the reboiler for a combined 98% control efficiency.

2. Controlled emissions of CO_2 include emissions created as combustion by-products from vent streams routed to the reboiler for control.

3. CO_2e is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25).

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 7. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-2)

GRI GLYCalc Emissions Data - Flash Tank:

Pollutant	Uncontrolled Emissions			Controlled Emissions		
	lbs/hr	lbs/day	tpy	lbs/hr	lbs/day	tpy
Carbon Dioxide	2.17	52.08	9.5	852.18	20452.28	3732.54
Methane	246.7395	5921.747	1080.7188	12.3370	296.087	54.0359
Ethane	52.8302	1267.926	231.3964	2.6415	63.396	11.5698
Propane	13.2819	318.765	58.1746	0.6641	15.938	2.9087
Isobutane	2.1293	51.104	9.3265	0.1065	2.555	0.4663
n-Butane	2.7579	66.190	12.0798	0.1379	3.310	0.6040
Isopentane	0.7884	18.921	3.4530	0.0394	0.946	0.1727
n-Pentane	0.6088	14.611	2.6665	0.0304	0.731	0.1333
n-Hexane	0.1640	3.937	0.7185	0.0082	0.197	0.0359
Cyclohexane	0.0603	1.448	0.2642	0.0030	0.072	0.0132
Other Hexanes	0.3958	9.499	1.7336	0.0198	0.475	0.0867
Heptanes	0.3926	9.423	1.7198	0.0196	0.471	0.0860
Methylcyclohexane	0.1305	3.131	0.5715	0.0065	0.157	0.0286
Benzene	0.0703	1.687	0.3079	0.0035	0.084	0.0154
Toluene	0.1658	3.978	0.7260	0.0083	0.199	0.0363
Ethylbenzene	0.0749	1.796	0.3279	0.0037	0.090	0.0164
Xylenes	0.0739	1.774	0.3237	0.0037	0.089	0.0162
C8 + Heavier Hydrocarbons	0.7140	17.137	3.1274	0.0357	0.857	0.1564
Total CO_2e	**6,170.66**	**148,095.76**	**27,027.47**	**1,160.60**	**27,854.46**	**5,083.44**
Total Hydrocarbon Emissions	**321.38**	**7,713.07**	**1,407.64**	**16.07**	**385.65**	**70.38**
Total VOC Emissions	**21.81**	**523.40**	**95.52**	**1.09**	**26.17**	**4.78**
Total HAP Emissions	**0.55**	**13.17**	**2.40**	**0.03**	**0.66**	**0.12**
Total BTEX Emissions	**0.38**	**9.24**	**1.69**	**0.02**	**0.46**	**0.08**

Notes:

1. Based on GRI GLYCalc 4.0 run at maximum design conditions of temperature at 175 °F, and pressure at 45 psig. Flash gases are routed to the reboiler for use as fuel with a 95% control efficiency.
2. Controlled emissions of CO_2 include emissions created as combustion by-products from vent streams routed to the reboiler for control.
3. CO_2e is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25).

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 7. Natural Gas Dehydration Unit - Regenerator Vent Emissions Calculations (RSV-2)

Greenhouse Gas (GHG) Emissions - Controlled Vent Streams

Constituent	Condenser Vent Stream	Flash Tank Off Gas Stream	Source
	mol%	mol%	
CO_2, Y_{CO2}	0.1860	0.276	GRI-GLYCalc Output Report
Methane, Y_j	69.6000	86.100	GRI-GLYCalc Output Report
Ethane, Y_j	7.4300	9.830	GRI-GLYCalc Output Report
Propane, Y_j	1.3700	1.680	GRI-GLYCalc Output Report
Isobutane, Y_j	0.1750	0.205	GRI-GLYCalc Output Report
n-Butane, Y_j	0.2340	0.265	GRI-GLYCalc Output Report
Isopentane, Y_j	0.0562	0.061	GRI-GLYCalc Output Report
n-Pentane, Y_j	0.0449	0.047	GRI-GLYCalc Output Report
n-Hexane, Y_j	0.0125	0.011	GRI-GLYCalc Output Report
Cyclohexane, Y_j	0.0120	0.004	GRI-GLYCalc Output Report
Other Hexanes, Y_j	0.0268	0.026	GRI-GLYCalc Output Report
Heptanes, Y_j	0.0376	0.022	GRI-GLYCalc Output Report
Methylcyclohexane, Y_j	0.0262	0.007	GRI-GLYCalc Output Report
2,2,4-Trimethylpentane, Y_j	0.0000	0.000	GRI-GLYCalc Output Report
Benzene, Y_j	0.0857	0.005	GRI-GLYCalc Output Report
Toluene, Y_j	0.2390	0.010	GRI-GLYCalc Output Report
Ethylbenzene, Y_j	0.1470	0.004	GRI-GLYCalc Output Report
Xylenes, Y_j	0.2020	0.004	GRI-GLYCalc Output Report
C8 + Heavier Hydrocarbons, Y_j	0.0578	0.024	GRI-GLYCalc Output Report
Flow Rate, V_a (scfh)	1,200	6,780	GRI-GLYCalc Output Report
Control Efficiency (%)	0.98	0.95	---
Hours of Operation	8760	8760	Unrestricted Operation
Density of CO_2 (kg/ft^3 at 60F & 14.7 psia)	0.0526	0.0526	40 CFR Subpart 98 (Eq. W-36)
$E_{a,CO2}$ (combusted) - scf/hr	1,119	7,349	40 CFR Subpart 98 (Eq. W-39A)
Mass,CO_2 (combusted) - lb/hr	129.737	852.178	= E_aCO_2 (scf/hr) * Density of CO_2 (kg/scf) * 2.2 (lb/kg)
Mass,CO_2 (combusted) - tpy	568.249	3,732.541	= Mass, CO_2 (lb/hr) ÷ 2000 (lb/ton) * 8760 (hr/year)

Example Calculations:

GHG volumetric emissions from fuel combustion units using Equation W-39A from 40 CFR 98

$E_{a,CO2}$ = Contribution of annual CO_2 emissions from portable or stationary fuel combustion sources in cubic feet, under actual conditions.

V_a = Volume of gas sent to combustion unit in actual cubic feet, during the year.

η = Fraction of gas combusted for portable and stationary equipment determined using engineering estimation. For internal combustion devices, a default of 0.995 can be used.

Y_j = Mole fraction of hydrocarbon constituents j (such as methane, ethane, propane, butane, and pentanes-plus) in gas sent to combustion unit.

R_j = Number of carbon atoms in the hydrocarbon constituent j for: 1 for methane, 2 for ethane, 3 for propane, 4 for butane, and 5 for pentanes-plus).

Y_{CO2} = Mole fraction of carbon dioxide constituent in gas sent to combustion unit.

$$E_{a,CO2} = (V_a * Y_{CO2}) + \eta * \sum_{j=1}^{5} V_a * Y_j * R_j \qquad \text{(Eq. W-39A)}$$

GHG mass emissions using Equation W-36 from 40 CFR 98

$Mass_i$ = GHG_i (either CH_4, CO_2, or N_2O) mass emissions in metric tons.

$E_{s,i}$ = GHG_i (either CH_4, CO_2, or N_2O) volumetric emissions at standard conditions, in cubic feet.

ρ_i = Density of GHG_i. Use 0.0526 kg/ft^3 for CO_2 and N_2O, and 0.0192 kg/ft^3 for CH_4 at 60 °F and 14.7 psia.

$$Mass_i = E_{s,i} * \rho_i * 10^{-3} \qquad \text{(Eq. W-36)}$$

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 8. Storage Tank Emissions Calculations - Produced Water Tanks *(T01 - T02 combined)*

Storage Tank Information:

Source ID:	**T01 - T02**	
Tank Capacity (bbls each):	300	
Tank Capacity (gallons each):	12,600	= 300 bbls * 42 gal/bbl
Tank Contents:	Produced Water	
Turnovers (per year):	72	= 904,470 gal/year ÷ 12,600 gal
Daily Throughput (bbl/day)	59	
Annual Total Throughput (gallons/year):	904,470	= 59 bbls/day * 365 days/yr * 42 gal/bbl
Assumed Percent Condensate (%):	1.0%	
Condensate Throughput (bbl/day):	0.6	= 59 bbls/day (produced water) * 1% (condensate)
Control Type:	None	
Control Efficiency:	N/A	
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Tank Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions		Emissions Estimation Method
	lbs/hr	tpy	lbs/hr	tpy	
VOC	0.03	0.13	0.03	0.13	Flash Gas Analysis
HAPs	0.00	0.02	0.00	0.02	Flash Gas Analysis
CO_2	0.05	0.24	0.05	0.24	Flash Gas Analysis
CH_4	0.18	0.80	0.18	0.80	Flash Gas Analysis
GHG (CO_2e)	4.60	20.16	4.60	20.16	Flash Gas Analysis

Notes:
1. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
2. Produced water is conservatively assumed to contain 1% condensate.
3. Calculated losses are assumed to represent all potential working, breathing, and flashing emissions from the produced water tanks.

Example Calculations:

Emissions are based on the below mass balance calculation using a representative flash gas analysis (See Table 17) from Tichenal produced water:

$$\text{Emissions (tpy)} = \frac{\text{Tank Throughput (bbl/year)} * \text{Gas-to-Water Ratio (scf/bbl)} * \text{Molecular Weight of Flash Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)} * \text{Conversion Factor (2,000 lbs/1 ton)}}$$

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 9. Storage Tank Emissions Calculations - Used Oil Tank

Storage Tank Information:

Source ID:	**T03**	
Tank Capacity (bbls):	23.8	= 1,000 gal ÷ 42 gal/bbl
Tank Capacity (gallons):	1,000	
Tank Contents:	Used Engine Oil	
Turnovers (per year):	12	
Annual Total Throughput (gallons/year):	12,000	= 1,000 gal * 12 turnovers/yr
Control Type:	None	
Control Efficiency:	N/A	
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Tank Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions	
	lbs/hr	tpy	lbs/hr	tpy
VOC	Negligible		Negligible	

Notes:
1. Tank throughput is conservatively estimated to be 12 turnovers per year

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 10. Storage Tank Emissions Calculations - TEG Tank

Storage Tank Information:

Source ID:	**T04**	
Tank Capacity (bbls):	23.8	= 1,000 gal ÷ 42 gal/bbl
Tank Capacity (gallons):	1,000	
Tank Contents:	Triethylene Glycol	
Turnovers (per year):	12	
Annual Total Throughput (gallons/year):	12,000	= 1,000 gal * 12 turnovers/yr
Control Type:	None	
Control Efficiency:	N/A	
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Tank Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions	
	lbs/hr	tpy	lbs/hr	tpy
VOC	Negligible		Negligible	

Notes:
1. Tank throughput is conservatively estimated to be 12 turnovers per year

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 11. Storage Tank Emissions Calculations - Oil Tanks *(each tank)*

Storage Tank Information:

Source ID:	**T05 & T06**	
Tank Capacity (bbls):	23.8	= 1,000 gal ÷ 42 gal/bbl
Tank Capacity (gallons):	1,000	
Tank Contents:	New Engine Oil	
Turnovers (per year):	12	
Annual Total Throughput (gallons/year):	12,000	= 1,000 gal * 12 turnovers/yr
Control Type:	None	
Control Efficiency:	N/A	
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Tank Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions	
	lbs/hr	tpy	lbs/hr	tpy
VOC	Negligible		Negligible	

Notes:
1. Tank throughput is conservatively estimated to be 12 turnovers per year

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 12. Storage Tank Emissions Calculations - Dehy Drip Fluid Tank

Storage Tank Information:

Source ID:	**T-07**	
Tank Capacity (bbls):	7	= 285 gal ÷ 42 gal/bbl
Tank Capacity (gallons):	285	
Tank Contents:	Drip Fluids	
Turnovers (per year):	12	
Annual Total Throughput (gallons/year):	3,420	= 285 gal * 12 turnovers/yr
Assumed Percent Condensate (%):	1.0%	
Condensate Throughput (bbl/day):	1.0	= 3,420 gal/yr (drip fluids) * 1% (condensate) ÷ 365 days/yr
Control Type:	None	
Control Efficiency:	N/A	
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Tank Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions	
	lbs/hr	tpy	lbs/hr	tpy
VOC	Negligible		Negligible	

Notes:
1. Tank throughput is conservatively estimated to be 12 turnovers per year

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 13. Storage Tank Emissions Calculations - Produced Water Tanks *(T08 and T09 combined)*

Storage Tank Information:

Source ID:	**T08 - T09**	
Tank Capacity (bbls each):	210	
Tank Capacity (gallons each):	8,820	= 210 bbls * 42 gal/bbl
Tank Contents:	Produced Water	
Turnovers (per year each):	71	= 628,530 gal/year ÷ 8,820 gal
Daily Throughput (bbl/day)	41	
Annual Total Throughput (gallons/year):	628,530	= 41 bbls/day * 365 days/yr * 42 gal/bbl
Assumed Percent Condensate (%):	1.0%	
Condensate Throughput (bbl/day):	0.4	= 628,530 gal/yr (produced water) * 1% (condensate) ÷ 365 days/yr
Control Type:	None	
Max. Annual Hours of Operation (hr/yr):	8,760	Unrestricted operation.

Tank Emissions Data:

Pollutant	Uncontrolled Emissions		Controlled Emissions		Emissions Estimation Method
	lbs/hr	tpy	lbs/hr	tpy	
VOC	0.02	0.09	0.02	0.09	Flash Gas Analysis
HAPs	0.00	0.01	0.00	0.01	Flash Gas Analysis
CO_2	0.04	0.16	0.04	0.16	Flash Gas Analysis
CH_4	0.13	0.55	0.13	0.55	Flash Gas Analysis
GHG (CO_2e)	3.20	14.01	3.20	14.01	Flash Gas Analysis

Notes:
1. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
2. Produced water is conservatively assumed to contain 1% condensate.
3. Calculated losses are assumed to represent all potential working, breathing, and flashing emissions from the produced water tanks.

Example Calculations:

Emissions are based on the below mass balance calculation using a representative flash gas analysis (See Table 17) from Tichenal produced water:

$$\text{Emissions (tpy)} = \frac{\text{Tank Throughput (bbl/year)} * \text{Gas-to-Water Ratio (scf/bbl)} * \text{Molecular Weight of Flash Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)} * \text{Conversion Factor (2,000 lbs/1 ton)}}$$

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 14. Produced Water Loading Emission Calculations

Liquid Loading Emissions

Uncontrolled Loading Losses: L_L (lb/10^3 gal) = 12.46 (SPM)/T

Controlled Loading Losses: L_L (lb/10^3 gal) = 12.46 (SPM)/T * (1 - Capture Efficiency * Control Efficiency)

Parameter	Value	Description
S	0.60	Saturation factor for "Submerged Loading: dedicated normal service" (AP-42 Table 5.2-1)
Capture Efficiency	0%	Capture Efficiency
Control Efficiency	0%	Control Efficiency
P	0.34	True vapor pressure of liquid loaded (psia) - from EPA TANKS run [1]
M	20.56	Molecular weight of vapors (lb/lb-mol) - from EPA TANKS run [1]
T	511.81	Bulk liquid temperature of liquids loaded (deg R) - from EPA TANKS run [1]

Description	Uncontrolled Loading Losses (lb/10^3 gal)	Maximum Throughput (bbl/hr) [2]	Maximum Throughput (gal/yr) [3]	VOC Emissions Uncontrolled (lb/hr)	VOC Emissions Controlled (lb/hr)	VOC Emissions Uncontrolled (tpy)	VOC Emissions Controlled (tpy)
Truck Loading of Produced Water	0.10	180	1,533,000	0.77	0.77	0.08	0.08

[1] Parameters for Liquid Loading calculations were obtained from EPA TANKS 4.0.9d using a representative liquid analysis from West Union Compressor Slug Catcher Hydrocarbon Liquid (Sampled 4/9/14) and assuming 1% condensate.

[2] Maximum hourly loading rate.

[3] Sum of the estimated maximum annual throughput of produced water at the site.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 14. Produced Water Loading Emission Calculations

Speciated Emission Potential:

Constituent	mol%[1]	True Vapor Pressure of Organic Compounds in liquid (psia)[2]	Partial Vapor Pressure (psia)	Mole Fraction	Molecular Weight	VOC Vapor Weight	Speciated Weight Fraction	Speciated Liquid Loading Emissions (lb/hr)[3]	Speciated Liquid Loading Emissions (tpy)[4]
Methane	3.279	---	---	---	---	---	---	---	---
Ethane	4.663	---	---	---	---	---	---	---	---
Propane	5.761	127.310	7.34	0.59	44.10	25.84	0.45	0.35	0.04
Isobutane	1.859	46.110	0.86	0.07	58.12	3.98	0.07	0.05	0.01
n-Butane	5.329	32.045	1.71	0.14	58.12	7.93	0.14	0.11	0.01
Isopentane	3.518	12.530	0.44	0.04	72.15	2.54	0.04	0.03	0.00
n-Pentane	4.472	8.433	0.38	0.03	72.15	2.17	0.04	0.03	0.00
n-Hexane	4.820	2.436	0.12	0.01	85.67	0.80	0.01	0.01	0.00
Other Hexanes	5.247	2.436	0.13	0.01	86.18	0.88	0.02	0.01	0.00
Heptanes	14.873	0.735	0.11	0.01	97.88	0.86	0.01	0.01	0.00
Benzene	0.071	1.508	0.00	0.00	78.11	0.01	0.00	0.00	0.00
Toluene	0.541	0.425	0.00	0.00	92.14	0.02	0.00	0.00	0.00
Ethylbenzene	1.086	0.151	0.00	0.00	106.17	0.01	0.00	0.00	0.00
Xylenes	2.278	0.180	0.00	0.00	106.17	0.03	0.00	0.00	0.00
2,2,4-Trimethylpentane	0.000	0.596	0.00	0.00	114.23	0.00	0.00	0.00	0.00
C8+ Heavies	42.166	3.4	1.43	0.11	107.73	12.34	0.21	0.17	0.02
	100.0		12.52			57.42	1.00		
Total Emissions:								0.77	0.08
Total HAP Emissions:								0.01	0.00

[1] A representative hydrocarbon liquid analysis from West Union Compressor Station (Sampled 5/1/14) is utilized for the composition of condensate. Tichenal produced water is conservatively assumed to contain 1% condensate and 99% water.

[2] Vapor pressures from AP-42 Section 7.1 "Liquid Storage Tanks" Tables 7.1-2, 7.1-3 and 7.1-5 (at 70 deg F or ~21 deg C) and Handbook of Chemistry and Physics: 84th Edition (at 295 K).

[3] Speciated emissions (lb/hr) = Speciated Weight Fraction x Calculated Controlled Liquid Loading Emissions (lb/hr). As methane and ethane will flash off prior to loading, the emissions from these constituents are not included in the speciation.

[4] Speciated emissions (tpy) = Speciated Weight Fraction x Calculated Controlled Liquid Loading Emissions (tpy). As methane and ethane will flash off prior to loading, the emissions from these constituents are not included in the speciation.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 15. Fugitive Emissions Calculations *(facility-wide)*

Fugitive Component Information:

Component Type	Estimated Component Count	Gas Leak Emission Factor (lb/hr/component)	Gas Leak Emission Factor Service	TOC Leak Rate (lb/hr)	TOC Leak Rate (tpy)	VOC Emissions (lb/hr)	VOC Emissions (tpy)	HAP Emissions (lb/hr)	HAP Emissions (tpy)
Sampling Connectors	0	4.41E-04	Gas	0.00	0.00	0.00	0.00	0.00	0.00
Flanges/Connectors	2,119	8.60E-04	Gas	1.82	9.58	0.09	0.47	0.00	0.00
Open-Ended Lines	0	4.41E-03	Gas	0.00	0.00	0.00	0.00	0.00	0.00
Pump Seals	0	5.29E-03	Gas	0.00	0.00	0.00	0.00	0.00	0.00
Valves	530	9.92E-03	Gas	5.26	27.64	0.26	1.37	0.00	0.01
Other	43	1.94E-02	Gas	0.83	4.38	0.04	0.22	0.00	0.00
Sampling Connectors	0	4.63E-04	Light Liquid VOC	0.00	0.00	0.00	0.00	0.00	0.00
Flanges/Connectors	0	2.43E-04	Light Liquid VOC	0.00	0.00	0.00	0.00	0.00	0.00
Open-Ended Lines	0	3.09E-03	Light Liquid VOC	0.00	0.00	0.00	0.00	0.00	0.00
Pump Seals	4	2.87E-02	Light Liquid VOC	0.11	0.60	0.00	0.01	0.00	0.00
Valves	265	5.51E-03	Light Liquid VOC	1.46	7.68	0.01	0.08	0.00	0.01
Other	0	1.65E-02	Light Liquid VOC	0.00	0.00	0.00	0.00	0.00	0.00
Total				**9.49**	**49.88**	**0.41**	**2.14**	**0.00**	**0.02**

Notes:

1. All emission factors are from Table 2-4 of "Protocol for Equipment Leak Emission Estimates" (EPA-453/R-95-017, November 1995).
2. "Other" equipment types include compressor seals, diaphragms, drains, meters, etc.
3. The component count is conservatively estimated based on the design of the facility.
4. Conservatively assumed that maximum leak rate is 20% greater than measured average leak rate for the purposes of establishing PTE.
5. VOC and HAP emissions are based on fractions of these pollutants in the representative gas and liquid analyses:

Gas	
Constituent	Weight %
VOC	4.95
HAP	0.04

Liquid	
Constituent	Weight %
VOC	0.98
HAP	0.09

The produced water composition is approximated using 1% of a representative condensate analysis.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 15. Fugitive Emissions Calculations *(facility-wide)*

GHG Fugitive Emissions from Component Leaks:

Component Type	Estimated Component Count	GHG Emission Factor (scf/hr/component)	GHG Emission Factor Service	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (lb/hr)	CO_2e Emissions (tpy)
Sampling Connectors	0	0.003	Gas	0.00	0.00	0.00	0.00
Flanges/Connectors	2,119	0.003	Gas	1.05	0.00	6.00	26.27
Open-Ended Lines	0	0.061	Gas	0.00	0.00	0.00	0.00
Pump Seals	0	13.3	Gas	0.00	0.00	0.00	0.00
Valves	530	0.027	Gas	2.37	0.01	13.50	59.14
Other	43	0.04	Gas	0.28	0.00	1.62	7.11
Sampling Connectors	0	0.007	Light Liquid VOC	0.00	0.00	0.00	0.00
Flanges/Connectors	0	0.003	Light Liquid VOC	0.00	0.00	0.00	0.00
Open-Ended Lines	0	0.05	Light Liquid VOC	0.00	0.00	0.00	0.00
Pump Seals	4	0.01	Light Liquid VOC	0.00	0.00	0.00	0.00
Valves	265	0.05	Light Liquid VOC	0.00	0.00	0.00	0.02
Other	0	0.30	Light Liquid VOC	0.00	0.00	0.00	0.00
Total				**3.70**	**0.02**	**21.13**	**92.53**

Notes:

1. All emission factors are from Table W-1A of 40 CFR 98 Subpart W (Eastern U.S. Region).
2. The component count is conservatively estimated based on the design of the facility.
3. CH_4 and CO_2 emissions are based on fractions of these pollutants in the representative gas and liquid analyses:

Gas	
Constituent	Mole %
CH_4	89.15
CO_2	0.14

Liquid	
Constituent	Mole %
CH_4	0.03
CO_2	2.6E-04

The produced water composition is approximated using 1% of a representative condensate analysis.

4. Emissions are calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98.
5. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).

VOC/GHG Fugitive Emissions from Pneumatic Devices:

Pneumatic Component Type	Estimated Component Count	Emission Factor (scf/hr-component)	VOC Emissions (lb/hr)	VOC Emissions (tpy)	HAP Emissions (lb/hr)	HAP Emissions (tpy)	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (lb/hr)	CO_2e Emissions (tpy)
Intermittent Bleed	84	13.5	2.65	11.62	0.02	0.10	187.42	0.79	1,069.92	4,686.26
Pneumatic Pumps	18	13.3	0.56	2.45	0.00	0.02	39.57	0.17	225.87	989.32
Continuous Bleed	12	5.0	0.14	0.62	0.00	0.01	9.92	0.04	56.61	247.95
Total			**3.35**	**14.69**	**0.03**	**0.12**	**236.90**	**1.00**	**1,352.40**	**5,923.53**

Notes:

1. The component count is conservatively estimated based on the design of the facility.
2. VOC, HAP, CH_4 and CO_2 emissions are based on fractions of these pollutants in the site-specific gas analysis.
3. Emissions of VOC and HAP are based on the below mass balance calculation using a representative Tichenal gas analysis (See Table 16):

$$\text{Emissions (lb/hr)} = \frac{\text{Component Count} * \text{Emission Factor (scf/hr-component)} * \text{Molecular Weight of Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)}}$$

$$\text{Emissions (tpy)} = \frac{\text{Emissions (lb/hr)} * 8760 \text{ (hr/year)}}{2000 \text{ (lb/ton)}}$$

4. Emissions of CH_4 and CO_2 are calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98.
5. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
6. The Emission Factor for Intermittent Pneumatic Devices and Pneumatic Pumps are from 40 CFR 98, Subpart W (Table W-1A, Intermittent Bleed Pneumatic Device Vents, and Pneumatic Pumps).
7. The Emission Factor for Continuous Bleed Pneumatic Devices is based on manufacturer specifications.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 15. Fugitive Emissions Calculations *(facility-wide)*

VOC/GHG Venting:

Event Type	Estimated Maximum Number of Events	Gas Volume (scf/event)	VOC Emissions (lb/hr)	VOC Emissions (tpy)	HAP Emissions (lb/hr)	HAP Emissions (tpy)	CH_4 Emissions (tpy)	CO_2 Emissions (tpy)	CO_2e Emissions (lb/hr)	CO_2e Emissions (tpy)
Station Shutdowns	2	100,000	0.05	0.23	0.00	0.00	3.77	0.02	21.54	94.35
Pigging	48	578	0.01	0.03	0.00	0.00	0.52	0.00	2.99	13.10
Rod Packing	---	3,626,640	0.97	4.24	0.01	0.04	68.42	0.29	390.61	1,710.86
Engine Startup and Shutdown	288	1,000	0.08	0.34	0.00	0.00	5.43	0.02	31.02	135.86
Compressor Blowdowns	288	10,000	0.77	3.37	0.01	0.03	54.34	0.23	310.19	1,358.63
Total			**1.88**	**8.22**	**0.02**	**0.07**	**132.49**	**0.56**	**756.35**	**3,312.80**

Notes:

1. VOC, HAP, CH_4 and CO_2 emissions are based on fractions of these pollutants in the site-specific gas analysis shown above.
2. Emissions of VOC and HAP are based on the below mass balance calculation using a representative Tichenal gas analysis (See Table 16):

$$\text{Emissions (tpy)} = \frac{\text{Number of events per year} * \text{Gas Volume (scf/event)} * \text{Molecular Weight of Gas (lb/lb-mol)} * \text{Weight Fraction of Pollutant}}{\text{Density of Natural Gas (379 scf/lb-mol)} * \text{2000 (lb/ton)}}$$

$$\text{Emissions (lb/hr)} = \frac{\text{Emissions (ton/year)} * \text{2000 (lb/ton)}}{\text{8760 (hr/year)}}$$

3. Emissions of CH_4 and CO_2 are calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98.
4. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
5. Pigging volumes were calculated according to the following pipeline specifications. The larger volume was conservatively used to represent all pigging events.

Diameter (in)	Length of pipeline (ft)	Volume of Gas Occupied in Pipeline (acf)	Pipeline Operating Pressure (psig)	Gas Volume Adjusted for Pipeline Operating Pressure (scf)
20	15.4	33.6	118	302.1
24	20.5	64.4	118	578.4

6. The total number of compressor blowdowns assumes a maximum of 32 blowdowns per compressor per year and 32 startup and shutdown events per compressor per year.
7. Rod Packing venting volume was calculated using the following parameters. Emission factors were obtained from http://www.epa.gov/gasstar/documents/ll_rodpack.pdf.

Number of Compressors	Number of Throws (Cylinders) per Compressor	Leak Factor (scf/hr/throw)	Total Gas Volume Emitted (scf/yr)
9	4	11.5	3,626,640

Total Fugitive Emissions:

Pollutant	Atmospheric Emissions		Emissions Estimation Method
	lbs/hr	tpy	
VOC	5.64	25.05	EPA Protocol, Table 2-4 & Site-Specific Gas and Liquid Analyses
HAPs	0.05	0.22	EPA Protocol, Table 2-4 & Site-Specific Gas and Liquid Analyses
GHG (CO_2e)	2,130	9,329	40 CFR 98, Table W-1A and Site-Specific Gas and Liquid Analyses

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 16. Site-Specific Gas Analysis

Sample Location:	**Tichenal Compressor Station**
Sample Date:	**2/5/2015**
HHV (Btu/scf):	**1,108**

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.138	44.01	0.061	0.003	0.339
Nitrogen	0.337	28.01	0.094	0.005	0.527
Methane	89.145	16.04	14.299	0.798	79.798
Ethane	8.573	30.07	2.578	0.144	14.387
Propane	1.354	44.10	0.597	0.033	3.332
Isobutane	0.154	58.12	0.090	0.005	0.500
n-Butane	0.183	58.12	0.106	0.006	0.594
Isopentane	0.044	72.15	0.032	0.002	0.177
n-Pentane	0.031	72.15	0.022	0.001	0.125
Cyclopentane	0.000	70.1	0.000	0.000	0.000
n-Hexane	0.006	86.18	0.005	0.000	0.029
Cyclohexane	0.001	84.16	0.001	0.000	0.005
Other Hexanes	0.016	86.18	0.014	0.001	0.077
Heptanes	0.010	100.21	0.010	0.001	0.056
Methylcyclohexane	0.002	98.19	0.002	0.000	0.011
2,2,4-Trimethylpentane	0.000	114.23	0.000	0.000	0.000
Benzene*	0.0005	78.11	0.000	0.000	0.002
Toluene	0.001	92.14	0.001	0.000	0.005
Ethylbenzene*	0.0005	106.17	0.001	0.000	0.003
Xylenes*	0.0005	106.16	0.001	0.000	0.003
C8 + Heavies	0.005	114.23	0.006	0.000	0.032
Totals	100.0	1558.83	17.92	1.00	100.0

TOC (Total)	99.53		99.13
VOC (Total)	1.81		4.95
HAP (Total)	0.01		0.04
BTEX (Total)	0.00		0.01

*A value of 0.0005 (one-half of the detection limit) was conservatively used for these constituents as the analytical result was below detection.

Total Sample Characteristics	Value
Specific Gravity	0.62
Molecular Weight (total sample - lb/lb-mol)	17.92

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 17. Flash Gas Analysis

Location:	**Tichenal Compressor Station**
Sample Date:	**3/5/2013**

Constituent	Mole %	Weight %
Hydrogen Sulfide	0.001	0.001
Nitrogen	3.602	4.681
Carbon Dioxide	8.340	17.027
Methane	77.032	57.328
Ethane	8.107	11.309
Propane	1.159	2.371
Isobutane	0.136	0.367
n-Butane	0.307	0.828
2,2 Dimethylpropane	0.020	0.067
Isopentane	0.122	0.408
n-Pentane	0.138	0.462
2,2 Dimethylbutane	0.006	0.024
Cyclopentane	0.006	0.020
2,3 Dimethylbutane	0.009	0.036
2 Methylpentane	0.074	0.296
3 Methylpentane	0.063	0.252
n-Hexane	0.174	0.696
Methylcyclopentane	0.036	0.141
Benzene	0.010	0.036
Cyclohexane	0.040	0.156
2-Methylhexane	0.024	0.112
3-Methylhexane	0.023	0.107
2,2,4 Trimethylpentane	0.000	0.000
Other C7's	0.038	0.175
n-Heptane	0.039	0.181
Methylcyclohexane	0.033	0.150
Toluene	0.019	0.081
Other C8's	0.059	0.302
n-Octane	0.015	0.079
Ethylbenzene	0.038	0.187
M & P Xylenes	0.025	0.123
O-Xylene	0.012	0.059
Other C9's	0.025	0.146
n-Nonane	0.005	0.030
Other C10's	0.207	1.357
n-Decane	0.004	0.026
Undecanes (11)	0.053	0.380
Total	*100.00*	*100.00*
% VOC	**2.9**	**9.7**
% HAP	**0.3**	**1.2**

Total Sample Characteristics	Value
Separator Pressure (psig)	218
Separator Temperature (deg F)	57
Stock Tank Pressure (psig)	0
Stock Tank Temperature (deg F)	70
Gas-Water Ratio (scf/bbl)	**2.27**
Specific Gravity	0.747
Molecular Weight (total sample - lb/lb-mol)	21.56
Gross HV (dry basis, btu/cf)	1,035
Gross HV (saturated basis, btu/cf)	1,018

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

TABLE 18. Hydrocarbon Liquid Analysis

Location:	**West Union Compressor Station**
Sample Date:	**4/9/2014**

Constituent	Mole %	Weight %
Nitrogen	0.012	0.003
Carbon Dioxide	0.026	0.012
Methane	3.279	0.551
Ethane	4.663	1.469
Propane	5.761	2.662
Isobutane	1.859	1.132
n-Butane	5.329	3.263
Isopentane	3.518	2.660
n-Pentane	4.472	3.381
Other Hexanes	5.247	4.738
Heptanes	14.873	15.307
Octanes	20.667	23.612
Nonanes	9.751	12.966
Decanes Plus	11.748	19.568
Benzene	0.071	0.058
Toluene	0.541	0.522
Ethylbenzene	1.086	1.209
Xylenes	2.278	2.534
n-Hexane	4.820	4.352
2,2,4 Trimethylpentane	0.000	0.000
Total	*100.00*	*100.00*
% VOC	**92.0**	**98.0**
% HAP	**8.8**	**8.7**

Total Sample Characteristics	Value
Separator Pressure (psig)	140
Separator Temperature (deg F)	63
Specific Gravity (total sample)	0.6928
API Gravity (at 60 deg F)	72.75
Molecular Weight (total sample - lb/lb-mol)	95.4
Vapor Volume (CF/gal)	23.04
Weight (lbs/gal)	5.77

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Crestwood Tichenal Dehy - RSV-1
File Name: Z:\Client\Crestwood\Projects\Tichenal WV\153901.0090_R13 Permit Mod\04 Drafts\2015-0714 R13 Permit Mod Draft\Att N - Emission Calculations\GLYCalc\2015-0814_Crestwood_Tichenal_Dehy RSV-1_v1.1.ddf
Date: August 14, 2015

DESCRIPTION:

Description: PTE for R13 Modification;
Gas Analysis Sampled from Dehy Inlet
2/5/2015;
Half of detection limit used for BTEX
constituents below detection limit.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.7087	17.008	3.1039
Ethane	0.1418	3.403	0.6211
Propane	0.0385	0.923	0.1685
Isobutane	0.0065	0.155	0.0283
n-Butane	0.0086	0.207	0.0378
Isopentane	0.0026	0.062	0.0112
n-Pentane	0.0021	0.049	0.0090
n-Hexane	0.0007	0.016	0.0030
Cyclohexane	0.0006	0.015	0.0028
Other Hexanes	0.0015	0.035	0.0064
Heptanes	0.0024	0.057	0.0104
Methylcyclohexane	0.0016	0.039	0.0071
Benzene	0.0043	0.102	0.0186
Toluene	0.0140	0.336	0.0613
Ethylbenzene	0.0099	0.238	0.0435
Xylenes	0.0138	0.330	0.0602
C8+ Heavies	0.0062	0.148	0.0269
Total Emissions	0.9635	23.123	4.2199
Total Hydrocarbon Emissions	0.9635	23.123	4.2199
Total VOC Emissions	0.1130	2.712	0.4950
Total HAP Emissions	0.0426	1.022	0.1866
Total BTEX Emissions	0.0419	1.006	0.1836

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	35.4350	850.440	155.2054
Ethane	7.0903	170.167	31.0555
Propane	1.9231	46.154	8.4232
Isobutane	0.3231	7.754	1.4151
n-Butane	0.4314	10.354	1.8897
Isopentane	0.1284	3.081	0.5624

n-Pentane	0.1026	2.461	0.4492
n-Hexane	0.0340	0.815	0.1487
Cyclohexane	0.0316	0.759	0.1385
Other Hexanes	0.0730	1.752	0.3197
Heptanes	0.1188	2.851	0.5202
Methylcyclohexane	0.0809	1.942	0.3544
Benzene	0.2136	5.127	0.9357
Toluene	0.7019	16.847	3.0745
Ethylbenzene	0.4973	11.935	2.1781
Xylenes	0.6901	16.561	3.0225
C8+ Heavies	0.3076	7.383	1.3473
Total Emissions	48.1826	1156.383	211.0400
Total Hydrocarbon Emissions	48.1826	1156.383	211.0400
Total VOC Emissions	5.6573	135.776	24.7791
Total HAP Emissions	2.1369	51.285	9.3595
Total BTEX Emissions	2.1029	50.470	9.2108

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	12.3511	296.426	54.0978
Ethane	2.6423	63.415	11.5732
Propane	0.6646	15.950	2.9110
Isobutane	0.1065	2.556	0.4665
n-Butane	0.1379	3.311	0.6042
Isopentane	0.0394	0.946	0.1727
n-Pentane	0.0304	0.731	0.1333
n-Hexane	0.0082	0.197	0.0359
Cyclohexane	0.0030	0.072	0.0132
Other Hexanes	0.0198	0.475	0.0867
Heptanes	0.0196	0.471	0.0859
Methylcyclohexane	0.0065	0.157	0.0286
Benzene	0.0035	0.085	0.0155
Toluene	0.0084	0.201	0.0366
Ethylbenzene	0.0038	0.091	0.0166
Xylenes	0.0037	0.090	0.0164
C8+ Heavies	0.0357	0.857	0.1564
Total Emissions	16.0846	386.031	70.4506
Total Hydrocarbon Emissions	16.0846	386.031	70.4506
Total VOC Emissions	1.0912	26.190	4.7796
Total HAP Emissions	0.0276	0.663	0.1210
Total BTEX Emissions	0.0194	0.466	0.0851

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	247.0218	5928.524	1081.9556
Ethane	52.8456	1268.295	231.4638
Propane	13.2921	319.010	58.2193
Isobutane	2.1304	51.129	9.3310
n-Butane	2.7589	66.214	12.0841
Isopentane	0.7886	18.926	3.4540
n-Pentane	0.6089	14.613	2.6668
n-Hexane	0.1640	3.936	0.7183

Cyclohexane	0.0603	1.448	0.2643
Other Hexanes	0.3957	9.498	1.7333
Heptanes	0.3924	9.419	1.7189
Methylcyclohexane	0.1305	3.133	0.5718
Benzene	0.0707	1.698	0.3098
Toluene	0.1672	4.014	0.7325
Ethylbenzene	0.0757	1.816	0.3315
Xylenes	0.0749	1.798	0.3282
C8+ Heavies	0.7143	17.143	3.1285
Total Emissions	321.6921	7720.611	1409.0116
Total Hydrocarbon Emissions	321.6921	7720.611	1409.0116
Total VOC Emissions	21.8247	523.793	95.5922
Total HAP Emissions	0.5526	13.262	2.4203
Total BTEX Emissions	0.3886	9.326	1.7020

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	13.0597	313.434	57.2017
Ethane	2.7841	66.818	12.1943
Propane	0.7031	16.874	3.0794
Isobutane	0.1130	2.712	0.4948
n-Butane	0.1466	3.518	0.6420
Isopentane	0.0420	1.008	0.1839
n-Pentane	0.0325	0.780	0.1423
n-Hexane	0.0089	0.213	0.0389
Cyclohexane	0.0036	0.088	0.0160
Other Hexanes	0.0212	0.510	0.0931
Heptanes	0.0220	0.528	0.0963
Methylcyclohexane	0.0081	0.195	0.0357
Benzene	0.0078	0.187	0.0341
Toluene	0.0224	0.536	0.0979
Ethylbenzene	0.0137	0.329	0.0600
Xylenes	0.0175	0.420	0.0767
C8+ Heavies	0.0419	1.005	0.1834
Total Emissions	17.0481	409.154	74.6705
Total Hydrocarbon Emissions	17.0481	409.154	74.6705
Total VOC Emissions	1.2042	28.902	5.2746
Total HAP Emissions	0.0702	1.686	0.3076
Total BTEX Emissions	0.0614	1.472	0.2687

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	1237.1610	57.2017	95.38
Ethane	262.5193	12.1943	95.35
Propane	66.6425	3.0794	95.38
Isobutane	10.7461	0.4948	95.40
n-Butane	13.9737	0.6420	95.41
Isopentane	4.0164	0.1839	95.42
n-Pentane	3.1160	0.1423	95.43

n-Hexane	0.8670	0.0389	95.51
Cyclohexane	0.4027	0.0160	96.03
Other Hexanes	2.0530	0.0931	95.47
Heptanes	2.2391	0.0963	95.70
Methylcyclohexane	0.9261	0.0357	96.15
Benzene	1.2455	0.0341	97.26
Toluene	3.8070	0.0979	97.43
Ethylbenzene	2.5096	0.0600	97.61
Xylenes	3.3506	0.0767	97.71
C8+ Heavies	4.4758	0.1834	95.90
Total Emissions	1620.0516	74.6705	95.39
Total Hydrocarbon Emissions	1620.0516	74.6705	95.39
Total VOC Emissions	120.3713	5.2746	95.62
Total HAP Emissions	11.7798	0.3076	97.39
Total BTEX Emissions	10.9128	0.2687	97.54

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	140.00 deg. F
Condenser Pressure:	14.70 psia
Condenser Duty:	2.28e-001 MM BTU/hr
Produced Water:	14.68 bbls/day
Ambient Temperature:	70.00 deg. F
Excess Oxygen:	5.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	2.28e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Cyclohexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
Methylcyclohexane	2.00%	98.00%
Benzene	1.99%	98.01%
Toluene	1.99%	98.01%
Ethylbenzene	2.00%	98.00%
Xylenes	1.99%	98.01%
C8+ Heavies	2.00%	98.00%

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:	5.93 lbs. H2O/MMSCF
Temperature:	120.0 deg. F
Pressure:	1150.0 psig
Dry Gas Flow Rate:	64.0000 MMSCF/day
Glycol Losses with Dry Gas:	2.9011 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	91.51 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	3.94 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	6.47%	93.53%
Carbon Dioxide	99.68%	0.32%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.92%	0.08%
Propane	99.89%	0.11%
Isobutane	99.86%	0.14%
n-Butane	99.83%	0.17%
Isopentane	99.84%	0.16%
n-Pentane	99.80%	0.20%
n-Hexane	99.71%	0.29%
Cyclohexane	98.70%	1.30%
Other Hexanes	99.77%	0.23%
Heptanes	99.53%	0.47%
Methylcyclohexane	98.72%	1.28%
Benzene	89.89%	10.11%
Toluene	86.83%	13.17%
Ethylbenzene	84.89%	15.11%
Xylenes	79.74%	20.26%
C8+ Heavies	98.55%	1.45%

FLASH TANK

Flash Control:	Combustion device
Flash Control Efficiency:	95.00 %
Flash Temperature:	175.0 deg. F
Flash Pressure:	45.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	98.94%	1.06%
Carbon Dioxide	5.11%	94.89%
Nitrogen	0.59%	99.41%
Methane	0.61%	99.39%
Ethane	1.82%	98.18%
Propane	3.68%	96.32%
Isobutane	4.95%	95.05%
n-Butane	6.11%	93.89%
Isopentane	6.52%	93.48%
n-Pentane	7.75%	92.25%
n-Hexane	11.95%	88.05%
Cyclohexane	34.79%	65.21%
Other Hexanes	9.72%	90.28%
Heptanes	19.78%	80.22%

Methylcyclohexane	39.06%	60.94%
Benzene	76.28%	23.72%
Toluene	82.22%	17.78%
Ethylbenzene	88.13%	11.87%
Xylenes	91.45%	8.55%
C8+ Heavies	36.28%	63.72%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 15.0000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	35.97%	64.03%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	3.22%	96.78%
n-Pentane	3.08%	96.92%
n-Hexane	2.39%	97.61%
Cyclohexane	7.91%	92.09%
Other Hexanes	5.30%	94.70%
Heptanes	1.73%	98.27%
Methylcyclohexane	8.79%	91.21%
Benzene	6.42%	93.58%
Toluene	9.47%	90.53%
Ethylbenzene	11.66%	88.34%
Xylenes	14.00%	86.00%
C8+ Heavies	29.25%	70.75%

STREAM REPORTS:

WET GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1164.70 psia
Flow Rate: 2.67e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.93e-001	2.45e+002
Carbon Dioxide	1.38e-001	4.27e+002
Nitrogen	3.36e-001	6.64e+002
Methane	8.90e+001	1.01e+005
Ethane	8.56e+000	1.81e+004
Propane	1.35e+000	4.20e+003
Isobutane	1.54e-001	6.29e+002
n-Butane	1.83e-001	7.48e+002

Isopentane	4.39e-002	2.23e+002
n-Pentane	3.09e-002	1.57e+002
n-Hexane	5.99e-003	3.64e+001
Cyclohexane	9.98e-004	5.92e+000
Other Hexanes	1.60e-002	9.69e+001
Heptanes	9.98e-003	7.05e+001
Methylcyclohexane	2.00e-003	1.38e+001
Benzene	4.99e-004	2.75e+000
Toluene	9.98e-004	6.48e+000
Ethylbenzene	4.99e-004	3.73e+000
Xylenes	4.99e-004	3.73e+000
C8+ Heavies	4.99e-003	5.99e+001
Total Components	100.00	1.26e+005

DRY GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1164.70 psia
Flow Rate: 2.67e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.25e-002	1.58e+001
Carbon Dioxide	1.38e-001	4.26e+002
Nitrogen	3.37e-001	6.63e+002
Methane	8.91e+001	1.00e+005
Ethane	8.57e+000	1.81e+004
Propane	1.35e+000	4.19e+003
Isobutane	1.54e-001	6.28e+002
n-Butane	1.83e-001	7.46e+002
Isopentane	4.39e-002	2.23e+002
n-Pentane	3.09e-002	1.57e+002
n-Hexane	5.98e-003	3.62e+001
Cyclohexane	9.87e-004	5.84e+000
Other Hexanes	1.60e-002	9.67e+001
Heptanes	9.95e-003	7.01e+001
Methylcyclohexane	1.97e-003	1.36e+001
Benzene	4.50e-004	2.47e+000
Toluene	8.68e-004	5.62e+000
Ethylbenzene	4.25e-004	3.17e+000
Xylenes	3.99e-004	2.98e+000
C8+ Heavies	4.93e-003	5.90e+001
Total Components	100.00	1.26e+005

LEAN GLYCOL STREAM

Temperature: 120.00 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	1.60e-012	1.35e-010
Nitrogen	2.53e-013	2.14e-011
Methane	1.12e-017	9.45e-016

Ethane	7.87e-008	6.65e-006
Propane	2.21e-009	1.87e-007
Isobutane	3.06e-010	2.58e-008
n-Butane	3.81e-010	3.22e-008
Isopentane	2.10e-005	1.77e-003
n-Pentane	1.87e-005	1.58e-003
n-Hexane	6.31e-006	5.33e-004
Cyclohexane	3.01e-005	2.55e-003
Other Hexanes	2.67e-005	2.26e-003
Heptanes	1.98e-005	1.67e-003
Methylcyclohexane	8.71e-005	7.36e-003
Benzene	1.73e-004	1.46e-002
Toluene	8.67e-004	7.32e-002
Ethylbenzene	7.76e-004	6.55e-002
Xylenes	1.33e-003	1.12e-001
C8+ Heavies	1.41e-003	1.19e-001
Total Components	100.00	8.45e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1164.70 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	3.95e+000	3.56e+002
Carbon Dioxide	2.54e-002	2.29e+000
Nitrogen	1.85e-002	1.67e+000
Methane	2.76e+000	2.49e+002
Ethane	5.98e-001	5.38e+001
Propane	1.53e-001	1.38e+001
Isobutane	2.49e-002	2.24e+000
n-Butane	3.26e-002	2.94e+000
Isopentane	9.37e-003	8.44e-001
n-Pentane	7.33e-003	6.60e-001
n-Hexane	2.07e-003	1.86e-001
Cyclohexane	1.03e-003	9.25e-002
Other Hexanes	4.87e-003	4.38e-001
Heptanes	5.43e-003	4.89e-001
Methylcyclohexane	2.38e-003	2.14e-001
Benzene	3.31e-003	2.98e-001
Toluene	1.04e-002	9.40e-001
Ethylbenzene	7.08e-003	6.37e-001
Xylenes	9.73e-003	8.76e-001
C8+ Heavies	1.25e-002	1.12e+000
Total Components	100.00	9.00e+003

FLASH TANK OFF GAS STREAM

Temperature: 175.00 deg. F
Pressure: 59.70 psia
Flow Rate: 6.79e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.17e+000	3.78e+000
Carbon Dioxide	2.75e-001	2.17e+000
Nitrogen	3.31e-001	1.66e+000
Methane	8.60e+001	2.47e+002
Ethane	9.82e+000	5.28e+001
Propane	1.68e+000	1.33e+001
Isobutane	2.05e-001	2.13e+000
n-Butane	2.65e-001	2.76e+000
Isopentane	6.11e-002	7.89e-001
n-Pentane	4.71e-002	6.09e-001
n-Hexane	1.06e-002	1.64e-001
Cyclohexane	4.00e-003	6.03e-002
Other Hexanes	2.57e-002	3.96e-001
Heptanes	2.19e-002	3.92e-001
Methylcyclohexane	7.43e-003	1.31e-001
Benzene	5.06e-003	7.07e-002
Toluene	1.01e-002	1.67e-001
Ethylbenzene	3.98e-003	7.57e-002
Xylenes	3.94e-003	7.49e-002
C8+ Heavies	2.34e-002	7.14e-001
Total Components	100.00	3.29e+002

FLASH TANK GLYCOL STREAM

Temperature: 175.00 deg. F
Flow Rate: 1.55e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.59e+001	8.31e+003
Water	4.06e+000	3.52e+002
Carbon Dioxide	1.35e-003	1.17e-001
Nitrogen	1.14e-004	9.86e-003
Methane	1.75e-002	1.52e+000
Ethane	1.13e-002	9.79e-001
Propane	5.86e-003	5.08e-001
Isobutane	1.28e-003	1.11e-001
n-Butane	2.07e-003	1.80e-001
Isopentane	6.34e-004	5.50e-002
n-Pentane	5.90e-004	5.12e-002
n-Hexane	2.57e-004	2.23e-002
Cyclohexane	3.71e-004	3.22e-002
Other Hexanes	4.91e-004	4.26e-002
Heptanes	1.12e-003	9.68e-002
Methylcyclohexane	9.65e-004	8.37e-002
Benzene	2.62e-003	2.27e-001
Toluene	8.92e-003	7.73e-001
Ethylbenzene	6.48e-003	5.62e-001
Xylenes	9.24e-003	8.01e-001
C8+ Heavies	4.69e-003	4.07e-001
Total Components	100.00	8.67e+003

FLASH GAS EMISSIONS

Flow Rate: 2.15e+004 scfh
Control Method: Combustion Device
Control Efficiency: 95.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.40e+001	6.54e+002
Carbon Dioxide	3.43e+001	8.56e+002
Nitrogen	1.05e-001	1.66e+000
Methane	1.36e+000	1.24e+001
Ethane	1.55e-001	2.64e+000
Propane	2.66e-002	6.65e-001
Isobutane	3.23e-003	1.07e-001
n-Butane	4.19e-003	1.38e-001
Isopentane	9.64e-004	3.94e-002
n-Pentane	7.45e-004	3.04e-002
n-Hexane	1.68e-004	8.20e-003
Cyclohexane	6.33e-005	3.02e-003
Other Hexanes	4.05e-004	1.98e-002
Heptanes	3.46e-004	1.96e-002
Methylcyclohexane	1.17e-004	6.53e-003
Benzene	7.99e-005	3.54e-003
Toluene	1.60e-004	8.36e-003
Ethylbenzene	6.29e-005	3.78e-003
Xylenes	6.23e-005	3.75e-003
C8+ Heavies	3.70e-004	3.57e-002
Total Components	100.00	1.53e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.72e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.31e+001	2.26e+002
Carbon Dioxide	3.93e-002	2.61e-001
Nitrogen	5.54e-002	2.34e-001
Methane	1.47e+001	3.54e+001
Ethane	1.56e+000	7.09e+000
Propane	2.89e-001	1.92e+000
Isobutane	3.69e-002	3.23e-001
n-Butane	4.93e-002	4.31e-001
Isopentane	1.18e-002	1.28e-001
n-Pentane	9.43e-003	1.03e-001
n-Hexane	2.61e-003	3.40e-002
Cyclohexane	2.49e-003	3.16e-002
Other Hexanes	5.62e-003	7.30e-002
Heptanes	7.87e-003	1.19e-001
Methylcyclohexane	5.47e-003	8.09e-002
Benzene	1.82e-002	2.14e-001
Toluene	5.06e-002	7.02e-001
Ethylbenzene	3.11e-002	4.97e-001
Xylenes	4.31e-002	6.90e-001
C8+ Heavies	1.20e-002	3.08e-001
Total Components	100.00	2.74e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 140.00 deg. F
Flow Rate: 4.28e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.14e+002	999953.
Carbon Dioxide	1.36e-004	2.90e-004	1.
Nitrogen	3.62e-006	7.75e-006	0.
Methane	1.01e-003	2.17e-003	10.
Ethane	2.22e-004	4.75e-004	2.
Propane	6.99e-005	1.50e-004	1.
Isobutane	6.28e-006	1.34e-005	0.
n-Butane	1.09e-005	2.33e-005	0.
Isopentane	2.22e-006	4.75e-006	0.
n-Pentane	1.89e-006	4.04e-006	0.
n-Hexane	5.00e-007	1.07e-006	0.
Cyclohexane	2.46e-006	5.27e-006	0.
Other Hexanes	8.77e-007	1.88e-006	0.
Heptanes	9.47e-007	2.03e-006	0.
Methylcyclohexane	2.96e-006	6.34e-006	0.
Benzene	4.23e-004	9.07e-004	4.
Toluene	1.11e-003	2.38e-003	11.
Ethylbenzene	5.77e-004	1.24e-003	6.
Xylenes	1.09e-003	2.32e-003	11.
C8+ Heavies	1.26e-006	2.71e-006	0.
Total Components	100.00	2.14e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 140.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

CONDENSER VENT STREAM

Temperature: 140.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.20e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.98e+001	1.13e+001
Carbon Dioxide	1.86e-001	2.60e-001
Nitrogen	2.63e-001	2.34e-001
Methane	6.96e+001	3.54e+001
Ethane	7.43e+000	7.09e+000
Propane	1.37e+000	1.92e+000
Isobutane	1.75e-001	3.23e-001
n-Butane	2.34e-001	4.31e-001
Isopentane	5.61e-002	1.28e-001
n-Pentane	4.48e-002	1.03e-001
n-Hexane	1.24e-002	3.40e-002

Cyclohexane	1.18e-002	3.16e-002
Other Hexanes	2.67e-002	7.30e-002
Heptanes	3.73e-002	1.19e-001
Methylcyclohexane	2.60e-002	8.09e-002
Benzene	8.58e-002	2.13e-001
Toluene	2.39e-001	7.00e-001
Ethylbenzene	1.47e-001	4.96e-001
Xylenes	2.04e-001	6.88e-001
C8+ Heavies	5.69e-002	3.08e-001
Total Components	100.00	6.00e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.92e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	8.73e+001	7.09e-001
Ethane	9.31e+000	1.42e-001
Propane	1.72e+000	3.85e-002
Isobutane	2.20e-001	6.46e-003
n-Butane	2.93e-001	8.63e-003
Isopentane	7.03e-002	2.57e-003
n-Pentane	5.61e-002	2.05e-003
n-Hexane	1.56e-002	6.79e-004
Cyclohexane	1.48e-002	6.32e-004
Other Hexanes	3.35e-002	1.46e-003
Heptanes	4.68e-002	2.38e-003
Methylcyclohexane	3.25e-002	1.62e-003
Benzene	1.08e-001	4.25e-003
Toluene	3.00e-001	1.40e-002
Ethylbenzene	1.85e-001	9.92e-003
Xylenes	2.56e-001	1.38e-002
C8+ Heavies	7.13e-002	6.15e-003
Total Components	100.00	9.63e-001

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Crestwood Tichenal Dehy - RSV-2
File Name: Z:\Client\Crestwood\Projects\Tichenal WV\153901.0090_R13 Permit Mod\04 Drafts\2015-0811 R13 Permit Mod Draft\Att N - Emission Calcs\GLYCalc\2015-0814 Crestwood_Tichenal_Dehy RSV-2_v1.1.ddf
Date: August 14, 2015

DESCRIPTION:

Description: PTE for R13 Modification;
Gas Analysis Sampled from Dehy Inlet
2/5/2015;
Half of detection limit used for BTEX
constituents below detection limit.

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.7088	17.011	3.1045
Ethane	0.1420	3.407	0.6218
Propane	0.0385	0.924	0.1685
Isobutane	0.0065	0.155	0.0283
n-Butane	0.0086	0.207	0.0378
Isopentane	0.0026	0.062	0.0113
n-Pentane	0.0021	0.049	0.0090
n-Hexane	0.0007	0.016	0.0030
Cyclohexane	0.0006	0.015	0.0028
Other Hexanes	0.0015	0.035	0.0064
Heptanes	0.0024	0.057	0.0105
Methylcyclohexane	0.0016	0.039	0.0072
Benzene	0.0042	0.102	0.0186
Toluene	0.0140	0.335	0.0611
Ethylbenzene	0.0099	0.237	0.0433
Xylenes	0.0137	0.328	0.0598
C8+ Heavies	0.0062	0.150	0.0274
Total Emissions	0.9638	23.131	4.2213
Total Hydrocarbon Emissions	0.9638	23.131	4.2213
Total VOC Emissions	0.1130	2.713	0.4951
Total HAP Emissions	0.0424	1.018	0.1858
Total BTEX Emissions	0.0417	1.002	0.1828

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	35.4416	850.598	155.2341
Ethane	7.0983	170.359	31.0906
Propane	1.9241	46.179	8.4276
Isobutane	0.3235	7.763	1.4168
n-Butane	0.4321	10.370	1.8925
Isopentane	0.1286	3.087	0.5635

n-Pentane	0.1028	2.467	0.4503
n-Hexane	0.0341	0.819	0.1494
Cyclohexane	0.0320	0.767	0.1400
Other Hexanes	0.0733	1.758	0.3209
Heptanes	0.1197	2.872	0.5242
Methylcyclohexane	0.0818	1.963	0.3582
Benzene	0.2133	5.119	0.9343
Toluene	0.7001	16.802	3.0663
Ethylbenzene	0.4955	11.893	2.1704
Xylenes	0.6847	16.432	2.9989
C8+ Heavies	0.3124	7.498	1.3685
Total Emissions	48.1978	1156.747	211.1063
Total Hydrocarbon Emissions	48.1978	1156.747	211.1063
Total VOC Emissions	5.6579	135.790	24.7816
Total HAP Emissions	2.1277	51.064	9.3193
Total BTEX Emissions	2.0936	50.246	9.1699

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	12.3370	296.087	54.0359
Ethane	2.6415	63.396	11.5698
Propane	0.6641	15.938	2.9087
Isobutane	0.1065	2.555	0.4663
n-Butane	0.1379	3.310	0.6040
Isopentane	0.0394	0.946	0.1727
n-Pentane	0.0304	0.731	0.1333
n-Hexane	0.0082	0.197	0.0359
Cyclohexane	0.0030	0.072	0.0132
Other Hexanes	0.0198	0.475	0.0867
Heptanes	0.0196	0.471	0.0860
Methylcyclohexane	0.0065	0.157	0.0286
Benzene	0.0035	0.084	0.0154
Toluene	0.0083	0.199	0.0363
Ethylbenzene	0.0037	0.090	0.0164
Xylenes	0.0037	0.089	0.0162
C8+ Heavies	0.0357	0.857	0.1564
Total Emissions	16.0689	385.654	70.3818
Total Hydrocarbon Emissions	16.0689	385.654	70.3818
Total VOC Emissions	1.0904	26.170	4.7760
Total HAP Emissions	0.0274	0.659	0.1202
Total BTEX Emissions	0.0192	0.462	0.0843

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	246.7395	5921.747	1080.7188
Ethane	52.8302	1267.926	231.3964
Propane	13.2819	318.765	58.1746
Isobutane	2.1293	51.104	9.3265
n-Butane	2.7579	66.190	12.0798
Isopentane	0.7884	18.921	3.4530
n-Pentane	0.6088	14.611	2.6665
n-Hexane	0.1640	3.937	0.7185

Cyclohexane	0.0603	1.448	0.2642
Other Hexanes	0.3958	9.499	1.7336
Heptanes	0.3926	9.423	1.7198
Methylcyclohexane	0.1305	3.131	0.5715
Benzene	0.0703	1.687	0.3079
Toluene	0.1658	3.978	0.7260
Ethylbenzene	0.0749	1.796	0.3279
Xylenes	0.0739	1.774	0.3237
C8+ Heavies	0.7140	17.137	3.1274
Total Emissions	321.3781	7713.074	1407.6360
Total Hydrocarbon Emissions	321.3781	7713.074	1407.6360
Total VOC Emissions	21.8084	523.401	95.5207
Total HAP Emissions	0.5488	13.172	2.4039
Total BTEX Emissions	0.3848	9.235	1.6854

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	13.0458	313.098	57.1404
Ethane	2.7835	66.803	12.1916
Propane	0.7026	16.862	3.0773
Isobutane	0.1129	2.710	0.4947
n-Butane	0.1465	3.517	0.6418
Isopentane	0.0420	1.008	0.1839
n-Pentane	0.0325	0.780	0.1423
n-Hexane	0.0089	0.213	0.0389
Cyclohexane	0.0037	0.088	0.0160
Other Hexanes	0.0213	0.510	0.0931
Heptanes	0.0220	0.529	0.0965
Methylcyclohexane	0.0082	0.196	0.0357
Benzene	0.0078	0.186	0.0340
Toluene	0.0222	0.534	0.0974
Ethylbenzene	0.0136	0.327	0.0597
Xylenes	0.0173	0.416	0.0760
C8+ Heavies	0.0420	1.007	0.1837
Total Emissions	17.0327	408.784	74.6031
Total Hydrocarbon Emissions	17.0327	408.784	74.6031
Total VOC Emissions	1.2034	28.883	5.2711
Total HAP Emissions	0.0699	1.677	0.3060
Total BTEX Emissions	0.0610	1.464	0.2671

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	1235.9529	57.1404	95.38
Ethane	262.4870	12.1916	95.36
Propane	66.6022	3.0773	95.38
Isobutane	10.7433	0.4947	95.40
n-Butane	13.9723	0.6418	95.41
Isopentane	4.0165	0.1839	95.42
n-Pentane	3.1168	0.1423	95.43

n-Hexane	0.8679	0.0389	95.52
Cyclohexane	0.4042	0.0160	96.04
Other Hexanes	2.0544	0.0931	95.47
Heptanes	2.2439	0.0965	95.70
Methylcyclohexane	0.9297	0.0357	96.16
Benzene	1.2422	0.0340	97.26
Toluene	3.7924	0.0974	97.43
Ethylbenzene	2.4982	0.0597	97.61
Xylenes	3.3225	0.0760	97.71
C8+ Heavies	4.4959	0.1837	95.91
Total Emissions	1618.7423	74.6031	95.39
Total Hydrocarbon Emissions	1618.7423	74.6031	95.39
Total VOC Emissions	120.3023	5.2711	95.62
Total HAP Emissions	11.7232	0.3060	97.39
Total BTEX Emissions	10.8553	0.2671	97.54

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	140.00 deg. F
Condenser Pressure:	14.70 psia
Condenser Duty:	2.28e-001 MM BTU/hr
Produced Water:	13.74 bbls/day
Ambient Temperature:	70.00 deg. F
Excess Oxygen:	5.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	2.28e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Cyclohexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
Methylcyclohexane	2.00%	98.00%
Benzene	1.99%	98.01%
Toluene	1.99%	98.01%
Ethylbenzene	2.00%	98.00%
Xylenes	1.99%	98.01%
C8+ Heavies	2.00%	98.00%

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:	5.72 lbs. H2O/MMSCF
Temperature:	120.0 deg. F
Pressure:	1150.0 psig
Dry Gas Flow Rate:	60.0000 MMSCF/day
Glycol Losses with Dry Gas:	2.7197 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	91.51 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	4.20 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	6.24%	93.76%
Carbon Dioxide	99.66%	0.34%
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	99.83%	0.17%
n-Pentane	99.79%	0.21%
n-Hexane	99.69%	0.31%
Cyclohexane	98.61%	1.39%
Other Hexanes	99.75%	0.25%
Heptanes	99.49%	0.51%
Methylcyclohexane	98.63%	1.37%
Benzene	89.25%	10.75%
Toluene	86.01%	13.99%
Ethylbenzene	83.96%	16.04%
Xylenes	78.58%	21.42%
C8+ Heavies	98.44%	1.56%

FLASH TANK

Flash Control:	Combustion device
Flash Control Efficiency:	95.00 %
Flash Temperature:	175.0 deg. F
Flash Pressure:	45.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	98.94%	1.06%
Carbon Dioxide	5.13%	94.87%
Nitrogen	0.59%	99.41%
Methane	0.62%	99.38%
Ethane	1.83%	98.17%
Propane	3.69%	96.31%
Isobutane	4.97%	95.03%
n-Butane	6.13%	93.87%
Isopentane	6.55%	93.45%
n-Pentane	7.79%	92.21%
n-Hexane	12.02%	87.98%
Cyclohexane	35.04%	64.96%
Other Hexanes	9.78%	90.22%
Heptanes	19.92%	80.08%

Methylcyclohexane	39.33%	60.67%
Benzene	76.36%	23.64%
Toluene	82.31%	17.69%
Ethylbenzene	88.20%	11.80%
Xylenes	91.49%	8.51%
C8+ Heavies	36.60%	63.40%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 15.0000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	37.41%	62.59%
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	3.21%	96.79%
n-Pentane	3.07%	96.93%
n-Hexane	2.38%	97.62%
Cyclohexane	7.86%	92.14%
Other Hexanes	5.28%	94.72%
Heptanes	1.72%	98.28%
Methylcyclohexane	8.74%	91.26%
Benzene	6.42%	93.58%
Toluene	9.46%	90.54%
Ethylbenzene	11.65%	88.35%
Xylenes	13.99%	86.01%
C8+ Heavies	29.02%	70.98%

STREAM REPORTS:

WET GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1164.70 psia
Flow Rate: 2.51e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.93e-001	2.29e+002
Carbon Dioxide	1.38e-001	4.00e+002
Nitrogen	3.36e-001	6.22e+002
Methane	8.90e+001	9.42e+004
Ethane	8.56e+000	1.70e+004
Propane	1.35e+000	3.94e+003
Isobutane	1.54e-001	5.90e+002
n-Butane	1.83e-001	7.01e+002

Isopentane	4.39e-002	2.09e+002
n-Pentane	3.09e-002	1.47e+002
n-Hexane	5.99e-003	3.41e+001
Cyclohexane	9.98e-004	5.55e+000
Other Hexanes	1.60e-002	9.09e+001
Heptanes	9.98e-003	6.60e+001
Methylcyclohexane	2.00e-003	1.29e+001
Benzene	4.99e-004	2.57e+000
Toluene	9.98e-004	6.07e+000
Ethylbenzene	4.99e-004	3.50e+000
Xylenes	4.99e-004	3.50e+000
C8+ Heavies	4.99e-003	5.61e+001
Total Components	100.00	1.18e+005

DRY GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1164.70 psia
Flow Rate: 2.50e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.21e-002	1.43e+001
Carbon Dioxide	1.38e-001	3.99e+002
Nitrogen	3.37e-001	6.22e+002
Methane	8.91e+001	9.42e+004
Ethane	8.57e+000	1.70e+004
Propane	1.35e+000	3.93e+003
Isobutane	1.54e-001	5.89e+002
n-Butane	1.83e-001	7.00e+002
Isopentane	4.39e-002	2.09e+002
n-Pentane	3.09e-002	1.47e+002
n-Hexane	5.98e-003	3.40e+001
Cyclohexane	9.86e-004	5.47e+000
Other Hexanes	1.60e-002	9.07e+001
Heptanes	9.95e-003	6.57e+001
Methylcyclohexane	1.97e-003	1.28e+001
Benzene	4.46e-004	2.30e+000
Toluene	8.60e-004	5.22e+000
Ethylbenzene	4.20e-004	2.94e+000
Xylenes	3.93e-004	2.75e+000
C8+ Heavies	4.92e-003	5.53e+001
Total Components	100.00	1.18e+005

LEAN GLYCOL STREAM

Temperature: 120.00 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	1.60e-012	1.35e-010
Nitrogen	2.54e-013	2.15e-011
Methane	1.12e-017	9.48e-016

Ethane	7.91e-008	6.68e-006
Propane	2.22e-009	1.87e-007
Isobutane	3.07e-010	2.59e-008
n-Butane	3.82e-010	3.23e-008
Isopentane	2.10e-005	1.78e-003
n-Pentane	1.87e-005	1.58e-003
n-Hexane	6.33e-006	5.34e-004
Cyclohexane	3.03e-005	2.56e-003
Other Hexanes	2.68e-005	2.26e-003
Heptanes	1.99e-005	1.68e-003
Methylcyclohexane	8.75e-005	7.39e-003
Benzene	1.72e-004	1.46e-002
Toluene	8.63e-004	7.29e-002
Ethylbenzene	7.72e-004	6.52e-002
Xylenes	1.32e-003	1.11e-001
C8+ Heavies	1.42e-003	1.20e-001
Total Components	100.00	8.45e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 120.00 deg. F
Pressure: 1164.70 psia
Flow Rate: 1.62e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.25e+001	8.31e+003
Water	3.81e+000	3.42e+002
Carbon Dioxide	2.54e-002	2.29e+000
Nitrogen	1.86e-002	1.67e+000
Methane	2.76e+000	2.48e+002
Ethane	5.99e-001	5.38e+001
Propane	1.53e-001	1.38e+001
Isobutane	2.49e-002	2.24e+000
n-Butane	3.27e-002	2.94e+000
Isopentane	9.39e-003	8.44e-001
n-Pentane	7.35e-003	6.60e-001
n-Hexane	2.07e-003	1.86e-001
Cyclohexane	1.03e-003	9.29e-002
Other Hexanes	4.88e-003	4.39e-001
Heptanes	5.46e-003	4.90e-001
Methylcyclohexane	2.39e-003	2.15e-001
Benzene	3.31e-003	2.97e-001
Toluene	1.04e-002	9.37e-001
Ethylbenzene	7.06e-003	6.35e-001
Xylenes	9.67e-003	8.69e-001
C8+ Heavies	1.25e-002	1.13e+000
Total Components	100.00	8.99e+003

FLASH TANK OFF GAS STREAM

Temperature: 175.00 deg. F
Pressure: 59.70 psia
Flow Rate: 6.78e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.13e+000	3.63e+000
Carbon Dioxide	2.76e-001	2.17e+000
Nitrogen	3.31e-001	1.66e+000
Methane	8.61e+001	2.47e+002
Ethane	9.83e+000	5.28e+001
Propane	1.68e+000	1.33e+001
Isobutane	2.05e-001	2.13e+000
n-Butane	2.65e-001	2.76e+000
Isopentane	6.11e-002	7.88e-001
n-Pentane	4.72e-002	6.09e-001
n-Hexane	1.06e-002	1.64e-001
Cyclohexane	4.01e-003	6.03e-002
Other Hexanes	2.57e-002	3.96e-001
Heptanes	2.19e-002	3.93e-001
Methylcyclohexane	7.43e-003	1.30e-001
Benzene	5.03e-003	7.03e-002
Toluene	1.01e-002	1.66e-001
Ethylbenzene	3.94e-003	7.49e-002
Xylenes	3.89e-003	7.39e-002
C8+ Heavies	2.35e-002	7.14e-001
Total Components	100.00	3.29e+002

FLASH TANK GLYCOL STREAM

Temperature: 175.00 deg. F
Flow Rate: 1.54e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.60e+001	8.31e+003
Water	3.91e+000	3.39e+002
Carbon Dioxide	1.35e-003	1.17e-001
Nitrogen	1.15e-004	9.92e-003
Methane	1.76e-002	1.53e+000
Ethane	1.14e-002	9.87e-001
Propane	5.88e-003	5.09e-001
Isobutane	1.29e-003	1.11e-001
n-Butane	2.08e-003	1.80e-001
Isopentane	6.38e-004	5.52e-002
n-Pentane	5.94e-004	5.14e-002
n-Hexane	2.59e-004	2.24e-002
Cyclohexane	3.76e-004	3.25e-002
Other Hexanes	4.95e-004	4.29e-002
Heptanes	1.13e-003	9.77e-002
Methylcyclohexane	9.77e-004	8.46e-002
Benzene	2.62e-003	2.27e-001
Toluene	8.91e-003	7.71e-001
Ethylbenzene	6.46e-003	5.60e-001
Xylenes	9.18e-003	7.95e-001
C8+ Heavies	4.76e-003	4.12e-001
Total Components	100.00	8.66e+003

FLASH GAS EMISSIONS

Flow Rate: 2.15e+004 scfh
Control Method: Combustion Device
Control Efficiency: 95.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.40e+001	6.53e+002
Carbon Dioxide	3.43e+001	8.55e+002
Nitrogen	1.05e-001	1.66e+000
Methane	1.36e+000	1.23e+001
Ethane	1.55e-001	2.64e+000
Propane	2.66e-002	6.64e-001
Isobutane	3.24e-003	1.06e-001
n-Butane	4.19e-003	1.38e-001
Isopentane	9.65e-004	3.94e-002
n-Pentane	7.45e-004	3.04e-002
n-Hexane	1.68e-004	8.20e-003
Cyclohexane	6.33e-005	3.02e-003
Other Hexanes	4.06e-004	1.98e-002
Heptanes	3.46e-004	1.96e-002
Methylcyclohexane	1.17e-004	6.52e-003
Benzene	7.95e-005	3.51e-003
Toluene	1.59e-004	8.29e-003
Ethylbenzene	6.23e-005	3.74e-003
Xylenes	6.15e-005	3.70e-003
C8+ Heavies	3.70e-004	3.57e-002
Total Components	100.00	1.53e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.43e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.22e+001	2.12e+002
Carbon Dioxide	4.14e-002	2.61e-001
Nitrogen	5.83e-002	2.34e-001
Methane	1.54e+001	3.54e+001
Ethane	1.65e+000	7.10e+000
Propane	3.05e-001	1.92e+000
Isobutane	3.89e-002	3.23e-001
n-Butane	5.19e-002	4.32e-001
Isopentane	1.25e-002	1.29e-001
n-Pentane	9.96e-003	1.03e-001
n-Hexane	2.77e-003	3.41e-002
Cyclohexane	2.65e-003	3.20e-002
Other Hexanes	5.94e-003	7.33e-002
Heptanes	8.34e-003	1.20e-001
Methylcyclohexane	5.82e-003	8.18e-002
Benzene	1.91e-002	2.13e-001
Toluene	5.31e-002	7.00e-001
Ethylbenzene	3.26e-002	4.96e-001
Xylenes	4.51e-002	6.85e-001
C8+ Heavies	1.28e-002	3.12e-001
Total Components	100.00	2.61e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 140.00 deg. F
Flow Rate: 4.01e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.01e+002	999953.
Carbon Dioxide	1.36e-004	2.72e-004	1.
Nitrogen	3.62e-006	7.26e-006	0.
Methane	1.01e-003	2.03e-003	10.
Ethane	2.22e-004	4.45e-004	2.
Propane	7.00e-005	1.40e-004	1.
Isobutane	6.28e-006	1.26e-005	0.
n-Butane	1.09e-005	2.18e-005	0.
Isopentane	2.22e-006	4.46e-006	0.
n-Pentane	1.89e-006	3.79e-006	0.
n-Hexane	5.02e-007	1.01e-006	0.
Cyclohexane	2.49e-006	4.99e-006	0.
Other Hexanes	8.80e-007	1.77e-006	0.
Heptanes	9.54e-007	1.91e-006	0.
Methylcyclohexane	2.99e-006	6.00e-006	0.
Benzene	4.23e-004	8.48e-004	4.
Toluene	1.11e-003	2.22e-003	11.
Ethylbenzene	5.75e-004	1.15e-003	6.
Xylenes	1.08e-003	2.16e-003	11.
C8+ Heavies	1.28e-006	2.57e-006	0.
Total Components	100.00	2.01e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 140.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

CONDENSER VENT STREAM

Temperature: 140.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.20e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.98e+001	1.13e+001
Carbon Dioxide	1.86e-001	2.61e-001
Nitrogen	2.63e-001	2.34e-001
Methane	6.96e+001	3.54e+001
Ethane	7.43e+000	7.10e+000
Propane	1.37e+000	1.92e+000
Isobutane	1.75e-001	3.23e-001
n-Butane	2.34e-001	4.32e-001
Isopentane	5.62e-002	1.29e-001
n-Pentane	4.49e-002	1.03e-001
n-Hexane	1.25e-002	3.41e-002

Cyclohexane	1.20e-002	3.19e-002
Other Hexanes	2.68e-002	7.33e-002
Heptanes	3.76e-002	1.20e-001
Methylcyclohexane	2.62e-002	8.18e-002
Benzene	8.57e-002	2.12e-001
Toluene	2.39e-001	6.98e-001
Ethylbenzene	1.47e-001	4.94e-001
Xylenes	2.02e-001	6.83e-001
C8+ Heavies	5.78e-002	3.12e-001
Total Components	100.00	6.00e+001

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.92e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	8.73e+001	7.09e-001
Ethane	9.32e+000	1.42e-001
Propane	1.72e+000	3.85e-002
Isobutane	2.20e-001	6.47e-003
n-Butane	2.94e-001	8.64e-003
Isopentane	7.04e-002	2.57e-003
n-Pentane	5.63e-002	2.06e-003
n-Hexane	1.56e-002	6.82e-004
Cyclohexane	1.50e-002	6.39e-004
Other Hexanes	3.36e-002	1.47e-003
Heptanes	4.72e-002	2.39e-003
Methylcyclohexane	3.29e-002	1.64e-003
Benzene	1.07e-001	4.25e-003
Toluene	2.99e-001	1.40e-002
Ethylbenzene	1.84e-001	9.89e-003
Xylenes	2.54e-001	1.37e-002
C8+ Heavies	7.24e-002	6.25e-003
Total Components	100.00	9.64e-001

FESCO, Ltd.
104 Fesco Run Rd. - Bridgeport, West Virginia 26330

For: Crestwood Marcellus Midstream LLC
801 Cherry Street, Suite 3800, Unit 20
Fort Worth, Texas 76102

Sample: Tichenal Compressor Station
Spot Sample at 1200 psig and 83° F
Dehy Inlet
Field: Clarksburg

Date Sampled: 02/05/2015 Job Number: 01692.006

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Nitrogen	0.337	
Carbon Dioxide	0.138	
Methane	89.145	
Ethane	8.573	2.292
Propane	1.354	0.373
Isobutane	0.154	0.050
n-Butane	0.179	0.056
2-2 Dimethylpropane	0.004	0.002
Isopentane	0.044	0.016
n-Pentane	0.031	0.011
Hexanes	0.022	0.009
Heptanes Plus	0.019	0.008
Totals	100.000	2.818

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.510	(Air=1)
Molecular Weight	101.41	
Gross Heating Value	5373	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	0.620	(Air=1)
Compressibility (Z)	0.9975	
Molecular Weight	17.92	
Gross Heating Value		
Dry Basis	1108	BTU/CF
Saturated Basis	1089	BTU/CF

Base Conditions: 14.730 PSI & 60 Deg F

Certified: FESCO, Ltd. - Shinnston, West Virginia

Analyst: JW
Processor: JW
Cylinder ID: T-3192

_____
Joe Weaver 304-592-3366

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Nitrogen	0.337		0.527
Carbon Dioxide	0.138		0.339
Methane	89.145		79.805
Ethane	8.573	2.292	14.385
Propane	1.354	0.373	3.332
Isobutane	0.154	0.050	0.499
n-Butane	0.179	0.056	0.581
2,2 Dimethylpropane	0.004	0.002	0.016
Isopentane	0.044	0.016	0.177
n-Pentane	0.031	0.011	0.125
2,2 Dimethylbutane	0.002	0.001	0.010
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.002	0.001	0.010
2 Methylpentane	0.007	0.003	0.034
3 Methylpentane	0.005	0.002	0.024
n-Hexane	0.006	0.002	0.029
Methylcyclopentane	0.001	0.000	0.005
Benzene	0.000	0.000	0.000
Cyclohexane	0.001	0.000	0.005
2-Methylhexane	0.002	0.001	0.011
3-Methylhexane	0.002	0.001	0.011
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.003	0.001	0.017
n-Heptane	0.002	0.001	0.011
Methylcyclohexane	0.002	0.001	0.011
Toluene	0.001	0.000	0.005
Other C8's	0.003	0.001	0.018
n-Octane	0.001	0.001	0.006
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.000	0.000	0.000
O-Xylene	0.000	0.000	0.000
Other C9's	0.001	0.001	0.007
n-Nonane	0.000	0.000	0.000
Other C10's	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	2.818	100.000

Computed Real Characteristics of Total Sample

Specific Gravity	0.620	(Air=1)
Compressibility (Z)	0.9975	
Molecular Weight	17.92	

Gross Heating Value

Dry Basis	1108	BTU/CF
Saturated Basis	1089	BTU/CF

FESCO, Ltd.

104 Fesco Run Rd. - Bridgeport, West Virginia 26330

Sample: Tichenal Compressor Station
Spot Sample at 1200 psig and 83° F
Dehy Inlet
Field: Clarksburg

Date Sampled: 02/05/2015 Job Number: 01692.006

GLYCALC FORMAT - GPA 2286

COMPONENT	MOL%	GPM	Wt %
Carbon Dioxide	0.138		0.339
Hydrogen Sulfide	----		----
Nitrogen	0.337		0.527
Methane	89.145		79.805
Ethane	8.573	2.292	14.385
Propane	1.354	0.373	3.332
Isobutane	0.154	0.050	0.499
n-Butane	0.183	0.058	0.597
Isopentane	0.044	0.016	0.177
n-Pentane	0.031	0.011	0.125
Cyclopentane	0.000	0.000	0.000
n-Hexane	0.006	0.002	0.029
Cyclohexane	0.001	0.000	0.005
Other C6's	0.016	0.007	0.078
Heptanes	0.010	0.004	0.055
Methylcyclohexane	0.002	0.001	0.011
2,2,4 Trimethylpentane	0.000	0.000	0.000
Benzene	0.000	0.000	0.000
Toluene	0.001	0.000	0.005
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000
Octanes Plus	0.005	0.002	0.031
Totals	100.000	2.818	100.000

Real Characteristics Of Octanes Plus:

Specific Gravity	3.954	(Air=1)
Molecular Weight	114.22	
Gross Heating Value	5859	BTU/CF

Real Characteristics Of Total Sample:

Specific Gravity	0.620	(Air=1)
Compressibility (Z)	0.9975	
Molecular Weight	17.92	
Gross Heating Value		
Dry Basis	1108	BTU/CF
Saturated Basis	1089	BTU/CF

March 13, 2013

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Dallas Compression Energy Solution
8150 N. Central Expressway, Suite 1100
Dallas, Texas 75206

Sample: Tichenal Compressor Station
Gas Evolved from Separator Water Flashed
From 218 psig & 57 ºF to 0 psig & 70 ºF

Date Sampled: 03/05/13 Job Number: 32228.011

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286
Sampled using GPA 2166

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	3.602	
Carbon Dioxide	8.340	
Methane	77.032	
Ethane	8.107	2.156
Propane	1.159	0.317
Isobutane	0.136	0.044
n-Butane	0.307	0.096
2-2 Dimethylpropane	0.020	0.008
Isopentane	0.122	0.044
n-Pentane	0.138	0.050
Hexanes	0.332	0.136
Heptanes Plus	0.705	0.338
Totals	100.000	3.189

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	4.055	(Air=1)
Molecular Weight	117.08	
Gross Heating Value	6107	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	0.747	(Air=1)
Compressibility (Z)	0.9969	
Molecular Weight	21.56	
Gross Heating Value		
Dry Basis	1035	BTU/CF
Saturated Basis	1018	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: MR
Processor: VT
Cylinder ID: WF# 5 S

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	3.602		4.681
Carbon Dioxide	8.340		17.027
Methane	77.032		57.328
Ethane	8.107	2.156	11.309
Propane	1.159	0.317	2.371
Isobutane	0.136	0.044	0.367
n-Butane	0.307	0.096	0.828
2,2 Dimethylpropane	0.020	0.008	0.067
Isopentane	0.122	0.044	0.408
n-Pentane	0.138	0.050	0.462
2,2 Dimethylbutane	0.006	0.002	0.024
Cyclopentane	0.006	0.002	0.020
2,3 Dimethylbutane	0.009	0.004	0.036
2 Methylpentane	0.074	0.031	0.296
3 Methylpentane	0.063	0.026	0.252
n-Hexane	0.174	0.071	0.696
Methylcyclopentane	0.036	0.012	0.141
Benzene	0.010	0.003	0.036
Cyclohexane	0.040	0.014	0.156
2-Methylhexane	0.024	0.011	0.112
3-Methylhexane	0.023	0.010	0.107
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.038	0.016	0.175
n-Heptane	0.039	0.018	0.181
Methylcyclohexane	0.033	0.013	0.150
Toluene	0.019	0.006	0.081
Other C8's	0.059	0.027	0.302
n-Octane	0.015	0.008	0.079
Ethylbenzene	0.038	0.015	0.187
M & P Xylenes	0.025	0.010	0.123
O-Xylene	0.012	0.005	0.059
Other C9's	0.025	0.013	0.146
n-Nonane	0.005	0.003	0.030
Other C10's	0.207	0.120	1.357
n-Decane	0.004	0.002	0.026
Undecanes (11)	0.053	0.032	0.380
Totals	100.000	3.189	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity	0.747	(Air=1)
Compressibility (Z)	0.9969	
Molecular Weight	21.56	
Gross Heating Value		
Dry Basis	1035	BTU/CF
Saturated Basis	1018	BTU/CF

March 19, 2013

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: Dallas Compression Energy Solution
8150 N. Central Expressway, Suite 1100
Dallas, Texas 75206

Date Sampled: 03/05/2013

Date Analyzed: 03/12/2013

Job Number: J32228

Sample: Tichenal Compressor Station

FLASH LIBERATION OF SEPARATOR WATER		
	Separator	**Stock Tank**
Pressure, psig	218	0
Temperature, °F	57	70
Gas Water Ratio (1)	------	2.27
Gas Specific Gravity (2)	------	0.747
Separator Volume Factor (3)	1.000	1.000

(1) - Scf of water saturated vapor per barrel of stock tank water
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
Analyst: A. A.

Piston No. : WF-230*

Base Conditions: 14.65 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

May 1, 2014

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Crestwood Midstream Partners LP
801 Cherry Street, Suite 3800, Unit 20
Fort Worth, Texas 76102

Sample: West Union Compressor
Slug Catcher Hydrocarbon Liquid
Sampled @ 140 psig & 63 °F

Date Sampled: 04/09/14 Job Number: 42792.002

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.012	0.003	0.003
Carbon Dioxide	0.026	0.010	0.012
Methane	3.279	1.273	0.551
Ethane	4.663	2.857	1.469
Propane	5.761	3.636	2.662
Isobutane	1.859	1.394	1.132
n-Butane	5.211	3.764	3.174
2,2 Dimethylpropane	0.117	0.103	0.089
Isopentane	3.518	2.948	2.660
n-Pentane	4.472	3.714	3.381
2,2 Dimethylbutane	0.230	0.220	0.208
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.386	0.363	0.349
2 Methylpentane	2.790	2.653	2.520
3 Methylpentane	1.840	1.721	1.662
n-Hexane	4.820	4.541	4.352
Heptanes Plus	61.015	70.801	75.776
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.7415	(Water=1)
°API Gravity	59.34	@ 60°F
Molecular Weight	118.5	
Vapor Volume	19.86	CF/Gal
Weight	6.18	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.6928	(Water=1)
°API Gravity	72.75	@ 60°F
Molecular Weight	95.4	
Vapor Volume	23.04	CF/Gal
Weight	5.77	Lbs/Gal

Base Conditions: 14.650 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: XG
Processor: JCdjv
Cylinder ID: W-985

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 42792.002

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.026	0.010	0.012
Nitrogen	0.012	0.003	0.003
Methane	3.279	1.273	0.551
Ethane	4.663	2.857	1.469
Propane	5.761	3.636	2.662
Isobutane	1.859	1.394	1.132
n-Butane	5.329	3.867	3.263
Isopentane	3.518	2.948	2.660
n-Pentane	4.472	3.714	3.381
Other C-6's	5.247	4.957	4.738
Heptanes	14.873	15.226	15.307
Octanes	20.667	22.467	23.612
Nonanes	9.751	12.190	12.966
Decanes Plus	11.748	17.502	19.568
Benzene	0.071	0.046	0.058
Toluene	0.541	0.415	0.522
E-Benzene	1.086	0.960	1.209
Xylenes	2.278	1.996	2.534
n-Hexane	4.820	4.541	4.352
2,2,4 Trimethylpentane	0.000	0.000	0.000
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.6928	(Water=1)
°API Gravity	72.75	@ 60°F
Molecular Weight	95.4	
Vapor Volume	23.04	CF/Gal
Weight	5.77	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.7746	(Water=1)
Molecular Weight	159.0	

Characteristics of Atmospheric Sample:

°API Gravity	66.85	@ 60°F
Reid Vapor Pressure (ASTM D-5191)	4.98	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-985*	W-1001
Pressure, PSIG	140	123	122
Temperature, °F	63	70	70

* Sample used for analysis

FESCO, Ltd. Job Number: 42792.002

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.012	0.003	0.003
Carbon Dioxide	0.026	0.010	0.012
Methane	3.279	1.273	0.551
Ethane	4.663	2.857	1.469
Propane	5.761	3.636	2.662
Isobutane	1.859	1.394	1.132
n-Butane	5.211	3.764	3.174
2,2 Dimethylpropane	0.117	0.103	0.089
Isopentane	3.518	2.948	2.660
n-Pentane	4.472	3.714	3.381
2,2 Dimethylbutane	0.230	0.220	0.208
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.386	0.363	0.349
2 Methylpentane	2.790	2.653	2.520
3 Methylpentane	1.840	1.721	1.662
n-Hexane	4.820	4.541	4.352
Methylcyclopentane	0.879	0.712	0.775
Benzene	0.071	0.046	0.058
Cyclohexane	0.880	0.687	0.776
2-Methylhexane	3.357	3.576	3.525
3-Methylhexane	2.823	2.969	2.965
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	1.414	1.448	1.470
n-Heptane	5.520	5.834	5.796
Methylcyclohexane	3.716	3.422	3.823
Toluene	0.541	0.415	0.522
Other C-8's	11.927	13.148	13.775
n-Octane	5.024	5.896	6.014
E-Benzene	1.086	0.960	1.209
M & P Xylenes	0.647	0.575	0.720
O-Xylene	1.630	1.420	1.814
Other C-9's	6.572	8.092	8.694
n-Nonane	3.179	4.098	4.272
Other C-10's	5.178	7.006	7.666
n-decane	1.387	1.951	2.068
Undecanes(11)	2.678	3.717	4.124
Dodecanes(12)	0.921	1.382	1.554
Tridecanes(13)	0.387	0.623	0.710
Tetradecanes(14)	0.208	0.358	0.413
Pentadecanes(15)	0.149	0.274	0.321
Hexadecanes(16)	0.106	0.209	0.246
Heptadecanes(17)	0.110	0.228	0.272
Octadecanes(18)	0.102	0.224	0.268
Nonadecanes(19)	0.085	0.195	0.236
Eicosanes(20)	0.055	0.130	0.158
Heneicosanes(21)	0.046	0.115	0.140
Docosanes(22)	0.041	0.107	0.131
Tricosanes(23)	0.044	0.119	0.146
Tetracosanes(24)	0.032	0.089	0.110
Pentacosanes(25)	0.020	0.057	0.072
Hexacosanes(26)	0.020	0.059	0.074
Heptacosanes(27)	0.017	0.053	0.067
Octacosanes(28)	0.018	0.059	0.074
Nonacosanes(29)	0.016	0.052	0.066
Triacontanes(30)	0.015	0.050	0.064
Hentriacontanes Plus(31+)	0.116	0.444	0.588
Total	100.000	100.000	100.000

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O – MONITORING, RECORDKEEPING, REPORTING, AND TESTING PLANS

No new sources are being constructed as part of this application. Changes to existing monitoring, recordkeeping, reporting, and testing practices are detailed in Appendix A.

ATTACHMENT P

Public Notice

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that E. Marcellus Asset Company, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Modification to R13 Permit No. R13-3076 for an existing Natural Gas Compressor Station located on 386 Hurst Hollow Road, Lost Creek, in Harrison County, West Virginia. The latitude and longitude coordinates are: 39.184078° N, -80.496442° W.

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

Particulate Matter (PM) = 0 tpy
Particulate Matter Less Than 10 μm in diameter (PM_{10}) = 0 tpy
Sulfur Dioxide (SO2) = 0 tpy
Volatile Organic Compounds (VOC) = 41.72 tpy
Carbon Monoxide (CO) = 0 tpy
Nitrogen Oxides (NOx) = 36.70 tpy
Hazardous Air Pollutants (HAPs) = 11.66 tpy
Benzene = 0.81 tpy
Ethylbenzene = 0.12 tpy
Formaldehyde = 5.11 tpy
n-Hexane = 0.08 tpy
Toluene = 0.20 tpy
Xylenes = 0.25 tpy
Greenhouse Gases (CO2e) = 11,081 tpy

The facility is currently operating. 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 1250, during normal business hours.
Dated this the (Day) day of October, 2015.

By: E. Marcellus Asset Company, LLC
Chris Humes
Vice President, Pipeline Operations
801 Cherry Street
Suite 3800, Unit 20
Fort Worth, TX 76102

APPENDIX A

Redline Mark-up of R13 Permit

West Virginia Department of Environmental Protection

Earl Ray Tomblin
Governor

Division of Air Quality

Randy C. Huffman
Cabinet Secretary

Permit to Modify

R13-3076

This permit is issued in accordance with the West Virginia Air Pollution Control Act (West Virginia Code §§22-5-1 et seq.) and 45 C.S.R. 13 – Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits and Procedures for Evaluation. The permittee identified at the above-referenced facility is authorized to construct the stationary sources of air pollutants identified herein in accordance with all terms and conditions of this permit.

Issued to:

E. Marcellus Asset Company, LLC
Tichenal Station
033-00200

John A. Benedict
Director

Issued: December 10, 2013 • Effective: December 10, 2013

This permit will supersede and replace Permit G35-A062A.

Facility Location:	near Tichenal, Harrison County, West Virginia
Mailing Address:	801 Cherry Street Suite 3400 Unit 20 Fort Worth, Texas 76102
Facility Description:	Natural Gas Compression Station
NAICS Codes:	486210
UTM Coordinates:	543.491 km Easting • 4,337.325 km Northing • Zone 17
Permit Type:	Modification
Description of Change:	Removal of five (5) 1,380 bhp compressor engines and installation of five (5) 1,680 bhp compressor engines.

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

The source is not subject to 45CSR30.

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1.0. Emission Units

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
CE-6	CE-6	Compressor Engine Waukesha L7044GSI	2012	1,680 bhp	~~Three-way Catalyst~~ NSCR
CE-7	CE-7	Compressor Engine Waukesha L7044GSI	2012	1,680 bhp	~~Three-way Catalyst~~ NSCR
CE-8	CE-8	Compressor Engine Waukesha L7044GSI	2012	1,680 bhp	~~Three-way Catalyst~~ NSCR
CE-9	CE-9	Compressor Engine Waukesha L7044GSI	2012	1,680 bhp	~~Three-way Catalyst~~ NSCR
~~CE-10~~	~~CE-10~~	~~Compressor Engine Waukesha L7044GSI~~	~~2013~~	~~1,680 bhp~~	~~Three-way Catalyst~~
~~CE-11~~	~~CE-11~~	~~Compressor Engine Waukesha L7044GSI~~	~~2013~~	~~1,680 bhp~~	~~Three-way Catalyst~~
~~CE-12~~	~~CE-12~~	~~Compressor Engine Waukesha L7044GSI~~	~~2013~~	~~1,680 bhp~~	~~Three-way Catalyst~~
~~CE-13~~	~~CE-13~~	~~Compressor Engine Waukesha L7044GSI~~	~~2013~~	~~1,680 bhp~~	~~Three-way Catalyst~~
~~CE-14~~	~~CE-14~~	~~Compressor Engine~~ Waukesha L7044GSI	~~2013~~	~~1,680 bhp~~	~~Three-way Catalyst~~
RSV-1	RSV-1	TEG Dehydrator Still Vent	2011	64 MMscf/day	Condenser/RBV-1
RBV-1	RBV-1	TEG Dehydrator Reboiler	2011	1.5 ~~0.20~~ MMBTU/hr	None
RSV-2	RSV-2	TEG Dehydrator Still Vent	2012	60 MMscf/day	Condenser/RBV-1
RBV-2	RBV-2	TEG Dehydrator Reboiler	2012	1.5 ~~0.20~~ MMBTU/hr	None
T01-T02	T01-T02	Produced Water Tanks	2011 ~~2007~~	300 BBL	None
T08-T09	T08-T09	Produced Water Tanks	2011 ~~2007~~	210 ~~300~~ BBL	None
T03	T03	Used Oil	2011 ~~2007~~	1,000 gallons	None
T04	T04	TEG	2011 ~~2007~~	1,000 gallons	None
T05	T05	Lube Oil	2011 ~~2007~~	1,000 gallons	None
T06	T06	Lube Oil	2011 ~~2007~~	1,000 gallons	None
T07	T07	Dehy Drains	2011 ~~2007~~	285 gallons	None
CE-1	CE-1	Compressor Engine Waukesha L5794GSI	2013	1,380 bhp	NSCR
CE-2	CE-2	Compressor Engine Waukesha L5794GSI	2011	1,380 bhp	NSCR
CE-3	CE-3	Compressor Engine Waukesha L5794GSI	2015	1,380 bhp	NSCR
CE-4	CE-4	Compressor Engine Waukesha L5794GSI	2015	1,380 bhp	NSCR
CE-5	CE-5	Compressor Engine Waukesha L5794GSI	2011	1,380 bhp	NSCR
LR-1	LR-1	Truck Loading	2011	NA	NA

2.0. General Conditions

2.1. Definitions

2.1.1. All references to the "West Virginia Air Pollution Control Act" or the "Air Pollution Control Act" mean those provisions contained in W.Va. Code §§ 22-5-1 to 22-5-18.

2.1.2. The "Clean Air Act" means those provisions contained in 42 U.S.C. §§ 7401 to 7671q, and regulations promulgated thereunder.

2.1.3. "Secretary" means the Secretary of the Department of Environmental Protection or such other person to whom the Secretary has delegated authority or duties pursuant to W.Va. Code §§ 22-1-6 or 22-1-8 (45CSR§30-2.12.). The Director of the Division of Air Quality is the Secretary's designated representative for the purposes of this permit.

2.2. Acronyms

BBL or bbl	Barrel	**NO_X**	Nitrogen Oxides
CAAA	Clean Air Act Amendments	**NSPS**	New Source Performance Standards
CBI	Confidential Business Information	**PM**	Particulate Matter
CEM	Continuous Emission Monitor	**$PM_{2.5}$**	Particulate Matter less than 2.5 µm in diameter
CES	Certified Emission Statement	**PM_{10}**	Particulate Matter less than 10µm in diameter
C.F.R. *or* CFR	Code of Federal Regulations	**Ppb**	Pounds per Batch
CO	Carbon Monoxide	**Pph**	Pounds per Hour
C.S.R. *or* CSR	Codes of State Rules	**Ppm**	Parts per Million
DAQ	Division of Air Quality	**Ppm_V or ppmv**	Parts per Million by Volume
DEP	Department of Environmental Protection	**PSD**	Prevention of Significant Deterioration
dscm	Dry Standard Cubic Meter	**Psi**	Pounds per Square Inch
FOIA	Freedom of Information Act	**SIC**	Standard Industrial Classification
HAP	Hazardous Air Pollutant	**SIP**	State Implementation Plan
HON	Hazardous Organic NESHAP	**SO_2**	Sulfur Dioxide
HP	Horsepower	**TAP**	Toxic Air Pollutant
lbs/hr	Pounds per Hour	**TPY**	Tons per Year
LDAR	Leak Detection and Repair	**TRS**	Total Reduced Sulfur
M	Thousand	**TSP**	Total Suspended Particulate
MACT	Maximum Achievable Control Technology	**USEPA**	United States Environmental Protection Agency
MDHI	Maximum Design Heat Input	**UTM**	Universal Transverse Mercator
MM	Million	**VEE**	Visual Emissions Evaluation
MMBtu/hr *or* mmbtu/hr	Million British Thermal Units per Hour	**VOC**	Volatile Organic Compounds
MMCF/hr *or* mmcf/hr	Million Cubic Feet per Hour	**VOL**	Volatile Organic Liquids
NA	Not Applicable		
NAAQS	National Ambient Air Quality Standards		
NESHAPS	National Emissions Standards for Hazardous Air Pollutants		

2.3. Authority

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

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

2.4. Term and Renewal

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

2.5. Duty to Comply

2.5.1. The permitted facility shall be constructed and operated in accordance with the plans and specifications filed in Permit Application R13-3076 and any modifications, administrative updates, or amendments thereto. The Secretary may suspend or revoke a permit if the plans and specifications upon which the approval was based are not adhered to;
[45CSR§§13-5.11 and -10.3.]

2.5.2. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the West Virginia Code and the Clean Air Act and is grounds for enforcement action by the Secretary or USEPA;

2.5.3. Violations of any of the conditions contained in this permit, or incorporated herein by reference, may subject the permittee to civil and/or criminal penalties for each violation and further action or remedies as provided by West Virginia Code 22-5-6 and 22-5-7;

2.5.4. Approval of this permit does not relieve the permittee herein of the responsibility to apply for and obtain all other permits, licenses, and/or approvals from other agencies; i.e., local, state, and federal, which may have jurisdiction over the construction and/or operation of the source(s) and/or facility herein permitted.

2.6. Duty to Provide Information

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

2.7. Duty to Supplement and Correct Information

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

2.8. Administrative Update

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

2.9. Permit Modification

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

2.10 Major Permit Modification

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

2.11. Inspection and Entry

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

a. At all reasonable times (including all times in which the facility is in operation) enter upon the permittee's premises where a source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times (including all times in which the facility is in operation) any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit;

d. Sample or monitor at reasonable times substances or parameters to determine compliance with the permit or applicable requirements or ascertain the amounts and types of air pollutants discharged.

2.12. Emergency

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

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

2.12.2. Effect of any emergency. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions of Section 2.12.3 are met.

2.12.3. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An emergency occurred and that the permittee can identify the cause(s) of the emergency;

b. The permitted facility was at the time being properly operated;

c. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and

d. The permittee submitted notice of the emergency to the Secretary within one (1) working day of the time when emission limitations were exceeded due to the emergency and made a request for variance, and as applicable rules provide. This notice must contain a detailed description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.

2.12.4. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency has the burden of proof.

2.12.5 The provisions of this section are in addition to any emergency or upset provision contained in any applicable requirement.

2.13. Need to Halt or Reduce Activity Not a Defense

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

2.14. Suspension of Activities

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

2.15. Property Rights

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

2.16. Severability

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

2.17. Transferability

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

2.18. Notification Requirements

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

2.19. Credible Evidence

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

3.0. Facility-Wide Requirements

3.1. Limitations and Standards

3.1.1. **Open burning.** The open burning of refuse by any person, firm, corporation, association or public agency is prohibited except as noted in 45CSR§6-3.1.
[45CSR§6-3.1.]

3.1.2. **Open burning exemptions.** The exemptions listed in 45CSR§6-3.1 are subject to the following stipulation: Upon notification by the Secretary, no person shall cause, suffer, allow or permit any form of open burning during existing or predicted periods of atmospheric stagnation. Notification shall be made by such means as the Secretary may deem necessary and feasible.
[45CSR§6-3.2.]

3.1.3. **Asbestos.** The permittee is responsible for thoroughly inspecting the facility, or part of the facility, prior to commencement of demolition or renovation for the presence of asbestos and complying with 40 C.F.R. § 61.145, 40 C.F.R. § 61.148, and 40 C.F.R. § 61.150. The permittee, owner, or operator must notify the Secretary at least ten (10) working days prior to the commencement of any asbestos removal on the forms prescribed by the Secretary if the permittee is subject to the notification requirements of 40 C.F.R. § 61.145(b)(3)(i). The USEPA, the Division of Waste Management, and the Bureau for Public Health - Environmental Health require a copy of this notice to be sent to them.
[40CFR§61.145(b) and 45CSR§34]

3.1.4. **Odor.** No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.
[45CSR§4-3.1] ***[State Enforceable Only]***

3.1.5. **Permanent shutdown.** A source which has not operated at least 500 hours in one 12-month period within the previous five (5) year time period may be considered permanently shutdown, unless such source can provide to the Secretary, with reasonable specificity, information to the contrary. All permits may be modified or revoked and/or reapplication or application for new permits may be required for any source determined to be permanently shutdown.
[45CSR§13-10.5.]

3.1.6. **Standby plan for reducing emissions.** When requested by the Secretary, the permittee shall prepare standby plans for reducing the emissions of air pollutants in accordance with the objectives set forth in Tables I, II, and III of 45CSR11.
[45CSR§11-5.2.]

3.2. Monitoring Requirements

[Reserved]

3.3. Testing Requirements

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

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

a. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with 40 C.F.R. Parts 60, 61, and 63 in accordance with the Secretary's delegated authority and any established equivalency determination methods which are applicable. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.

b. The Secretary may on a source-specific basis approve or specify additional testing or alternative testing to the test methods specified in the permit for demonstrating compliance with applicable requirements which do not involve federal delegation. In specifying or approving such alternative testing to the test methods, the Secretary, to the extent possible, shall utilize the same equivalency criteria as would be used in approving such changes under Section 3.3.1.a. of this permit. If a testing method is specified or approved which effectively replaces a test method specified in the permit, the permit may be revised in accordance with 45CSR§13-4. or 45CSR§13-5.4 as applicable.

c. All periodic tests to determine mass emission limits from or air pollutant concentrations in discharge stacks and such other tests as specified in this permit shall be conducted in accordance with an approved test protocol. Unless previously approved, such protocols shall be submitted to the Secretary in writing at least thirty (30) days prior to any testing and shall contain the information set forth by the Secretary. In addition, the permittee shall notify the Secretary at least fifteen (15) days prior to any testing so the Secretary may have the opportunity to observe such tests. This notification shall include the actual date and time during which the test will be conducted and, if appropriate, verification that the tests will fully conform to a referenced protocol previously approved by the Secretary.

d. The permittee shall submit a report of the results of the stack test within sixty (60) days of completion of the test. The test report shall provide the information necessary to document the objectives of the test and to determine whether proper procedures were used to accomplish these objectives. The report shall include the following: the certification described in paragraph 3.5.1.; a statement of compliance status, also signed by a responsible official; and, a summary of conditions which form the basis for the compliance status evaluation. The summary of conditions shall include the following:

    1. The permit or rule evaluated, with the citation number and language;
    2. The result of the test for each permit or rule condition; and,
    3. A statement of compliance or noncompliance with each permit or rule condition.

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

3.4. Recordkeeping Requirements

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

3.4.2. **Odors.** For the purposes of 45CSR4, the permittee shall maintain a record of all odor complaints received, any investigation performed in response to such a complaint, and any responsive action(s) taken.
[45CSR§4. *State Enforceable Only.*]

3.5. Reporting Requirements

3.5.1. **Responsible official.** Any application form, report, or compliance certification required by this permit to be submitted to the DAQ and/or USEPA shall contain a certification by the responsible official that states that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

3.5.2. **Confidential information.** A permittee may request confidential treatment for the submission of reporting required by this permit pursuant to the limitations and procedures of W.Va. Code § 22-5-10 and 45CSR31.

3.5.3. **Correspondence.** All notices, requests, demands, submissions and other communications required or permitted to be made to the Secretary of DEP and/or USEPA shall be made in writing and shall be deemed to have been duly given when delivered by hand, or mailed first class with postage prepaid to the address(es) set forth below or to such other person or address as the Secretary of the Department of Environmental Protection may designate:

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

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

3.5.4. Operating Fee

3.5.4.1. In accordance with 45CSR22 – Air Quality Management Fee Program, the permittee shall not operate nor cause to operate the permitted facility or other associated facilities on the same or contiguous sites comprising the plant without first obtaining and having in current effect a Certificate to Operate (CTO). Such Certificate to Operate (CTO) shall be renewed annually, shall be maintained on the premises for which the certificate has been issued, and shall be made immediately available for inspection by the Secretary or his/her duly authorized representative.

3.5.5. **Emission inventory.** At such time(s) as the Secretary may designate, the permittee herein shall prepare and submit an emission inventory for the previous year, addressing the emissions from the facility and/or process(es) authorized herein, in accordance with the emission inventory submittal requirements of the Division of Air Quality. After the initial submittal, the Secretary may, based upon the type and quantity of the pollutants emitted, establish a frequency other than on an annual basis.

4.0. Source-Specific Requirements

4.1. Limitations and Standards

4.1.1. **Record of Monitoring.** The permittee shall keep records of monitoring information that include the following:

a. The date, place as defined in this permit, and time of sampling or measurements;
b. The date(s) analyses were performed;
c. The company or entity that performed the analyses;
d. The analytical techniques or methods used;
e. The results of the analyses; and
f. The operating conditions existing at the time of sampling or measurement.

4.1.2. **Minor Source of Hazardous Air Pollutants (HAP).** HAP emissions from the facility shall be less than 10 tons/year of any single HAP and 25 tons/year of any combination of HAPs. Compliance with this Section shall ensure that the facility is a minor HAP source.

4.1.3. **Operation and Maintenance of Air Pollution Control Equipment.** The permittee shall, to the extent practicable, install, maintain, and operate the control devices listed in Section 1.1 and associated monitoring equipment in a manner consistent with safety and good air pollution control practices for minimizing emissions, or comply with any more stringent limits set forth in this permit or as set forth by any State rule, Federal regulation, or alternative control plan approved by the Secretary.
[45CSR§13-5.11.]

4.1.4. **Record of Malfunctions of Air Pollution Control Equipment.** For the control devices listed in Section 1.1, the permittee shall maintain records of the occurrence and duration of any malfunction or operational shutdown of the air pollution control equipment during which excess emissions occur. For each such case, the following information shall be recorded:

a. The equipment involved.
b. Steps taken to minimize emissions during the event.
c. The duration of the event.
d. The estimated increase in emissions during the event.

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

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

5.0. Source-Specific Requirements (Engines, ~~CE-6 through CE-14~~) CE-1 through CE-9

5.1. Limitations and Standards

See Appendix B for proposed updates to Sections 5.1.1. and 5.1.2. to include requirements for both engine models.

5.1.1. ~~To demonstrate compliance with Section 5.1.2., the quantity of natural gas that shall be consumed in each of the 1,680 bhp natural gas fired reciprocating engine, Waukesha L7044GSI shall not exceed 14,640 cubic feet per hour and 128.3 x 10^6 cubic feet per year.~~

~~5.1.2.~~ ~~Maximum emissions from each of the 1,680 bhp natural gas fired reciprocating engine, Waukesha L7044GSI (CE-6 through CE-14) shall not exceed the following limits:~~

~~Pollutant~~	~~Maximum Hourly Emissions (lb/hr)~~	~~Maximum Annual Emissions (ton/year)~~
~~Nitrogen Oxides~~	~~0.73~~	~~3.21~~
~~Carbon Monoxide~~	~~2.20~~	~~9.65~~
~~Volatile Organic Compounds~~	~~0.07~~	~~0.32~~

5.1.3. Requirements for Use of Catalytic Reduction Devices

a. Rich-burn natural gas compressor engines (CE-1 through CE-9) equipped with non-selective catalytic reduction (NSCR) air pollution control devices shall be fitted with a closed-loop, automatic air/fuel ratio controller to ensure emissions of regulated pollutants do not exceed the potential to emit for any engine/NSCR combination under varying load. The closed-loop, automatic air/fuel ratio controller shall control a fuel metering valve to deliver additional fuel when required to ensure a fuel-rich mixture and a resultant exhaust oxygen content of less than or equal to 0.5%. The automatic air/fuel ratio controller shall also incorporate dual-point exhaust gas temperature and oxygen sensors which provide temperature and exhaust oxygen content differential feedback. Such controls shall ensure proper and efficient operation of the engine and NSCR air pollution control device;

b. The automatic air/fuel ratio controller or closed-loop automatic feedback controller shall provide a warning or indication to the operator and/or be interlocked with the engine ignition system to cease engine operation in case of a masking, poisoning or overrich air/fuel ratio situation which results in performance degradation or failure of the catalyst element; and

c. No person shall knowingly:

1. Remove or render inoperative any air pollution or auxiliary air pollution control device installed subject to the requirements of this permit;
2. Install any part or component when the principal effect of the part or component is to bypass, defeat or render inoperative any air pollution control device or auxiliary air pollution control device installed subject to the requirements of this permit; or
3. Cause or allow engine exhaust gases to bypass any catalytic reduction device.

5.2. Monitoring Requirements

5.2.1. Catalytic Oxidizer Control Devices

a. The permittee shall regularly inspect, properly maintain and/or replace catalytic reduction devices and auxiliary air pollution control devices to ensure functional and effective operation of the engine's physical and operational design. The permittee shall ensure proper operation, maintenance and performance of catalytic reduction devices and auxiliary air pollution control devices by:

1. Maintaining proper operation of the automatic air/fuel ratio controller or automatic feedback controller.
2. Following a written operating and maintenance plan.

5.3. Recordkeeping Requirements

5.3.1. To demonstrate compliance with sections 5.1.-5.2., the permittee shall maintain records of ~~the amount of natural gas consumed in each engine and~~ the hours of operation of each engine. Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.

6.0. Source-Specific Requirements (Reboilers, RBV-1 and RBV-2)

6.1. Limitations and Standards

6.1.1. Maximum Design Heat Input. The maximum design heat input for each Reboiler (RBV-1 and ~~RBV-1~~) shall not exceed 1.5 MMBTU/hr.
RBV-2

6.1.2. Maximum emissions from each 1.5 MMBTU/hr Reboiler (RBV-1 and RBV-2) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	0.16	0.67
Carbon Monoxide	0.13	0.56

~~6.1.3. To demonstrate compliance with Section 6.1.2., the quantity of natural gas that shall be consumed in the 0.2 MMBTU/hr Reboiler RBV-1 shall not exceed 1,473 cubic feet per hour and 12.9 x 10^6 cubic feet per year.~~

6.1.4. No person shall cause, suffer, allow or permit emission of smoke and/or particulate matter into the open air from any fuel burning unit which is greater than ten (10) percent opacity based on a six minute block average.
[45CSR§2-3.1.]

6.2. Monitoring Requirements

6.2.1. At such reasonable times as the Secretary may designate, the permittee shall conduct Method 9 emission observations for the purpose of demonstrating compliance with Section 6.1.3. Method 9 shall be conducted in accordance with 40 CFR 60 Appendix A.

6.3. Testing Requirements

6.3.1. Compliance with the visible emission requirements of section 6.1.4. shall be determined in accordance with 40 CFR Part 60, Appendix A, Method 9 or by using measurements from continuous opacity monitoring systems approved by the Director. The Director may require the installation, calibration, maintenance and operation of continuous opacity monitoring systems and may establish policies for the evaluation of continuous opacity monitoring results and the determination of compliance with the visible emission requirements of section 6.1.4. Continuous opacity monitors shall not be required on fuel burning units which employ wet scrubbing systems for emission control.
[45CSR§2-3.2.]

6.4. Recordkeeping Requirements

6.4.1. ~~To demonstrate compliance with sections 6.1.1., 6.1.2., 6.1.3., the permittee shall maintain records of the amount of natural gas consumed in the 1.5 MMBTU/hr Reboilers (RBV-1 and RBV-2). Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.~~

6.4.2. The permittee shall maintain records of all monitoring data required by Section 6.2.1. documenting the date and time of each visible emission check, the emission point or equipment/source identification number, the name or means of identification of the observer, the results of the check(s), whether the visible emissions are normal for the process, and, if applicable, all corrective measures taken or planned. The permittee shall also record the general weather conditions (i.e. sunny, approximately 80°F, 6 - 10 mph NE wind) during the visual emission check(s). Should a visible emission observation be required to be performed per the requirements specified in Method 9, the data records of each observation shall be maintained per the requirements of Method 9.

6.5. Reporting Requirements

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

7.0. Source-Specific Requirements (TEG Dehydration Units, RSV-1 and RSV-2)

7.1. Limitations and Standards

7.1.1. Maximum Throughput Limitations. The maximum wet natural gas throughput to the glycol dehydration unit/still column RSV-1 shall not exceed 64.0 million standard cubic feet per day (MMscf/day). The maximum wet natural gas throughput to the glycol dehydration unit/still column RSV-2 shall not exceed 60.0 million standard cubic feet per day (MMscf/day). Compliance with the Maximum Throughput Limitations shall be determined using a twelve month rolling total. A twelve month rolling total shall mean the sum of the monthly throughput at any given time during the previous twelve consecutive calendar months.

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

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Volatile Organic Compounds	~~0.40~~ 1.45	~~1.76~~ 6.33

7.1.3. Maximum emissions from the glycol dehydration unit/still column (~~RSV-1~~ RSV-2) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Volatile Organic Compounds	~~0.41~~ 1.44	~~1.77~~ 6.33

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

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

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

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

[40CFR§63.764(e)]

7.1.7. All vapors from the flash tanks will be sent to the respective reboilers (RBV-1 and RBV-2) to be used as fuel.

7.1.8. All vapors from the still vents (RSV-1 and RSV-2) will be sent to the respective reboilers (RBV-1 and RBV-2) to be used as fuel.

routed to a condenser, then

7.2. Monitoring Requirements

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

7.2.2. In order to demonstrate compliance with the area source status, claimed within sections 7.1.2 and 7.1.3, as well as the benzene exemption provided under section 7.1.7, the following parameters shall be measured at least once ~~monthly~~, with the exception of wet gas composition, in order to define annual average values or, if monitoring is not practical, some parameters may be assigned default values as listed below.

quarterly

natural gas flowrate annual daily average, and natural gas flowrate maximum design capacity,

a. Natural Gas Flowrate
   i. Number of days operated per year
   ii. Monthly throughput (MMscf/month)
   iii. Annual daily average (MMscf/day), and
   iv. Maximum design capacity (MMscf/day)
b. Absorber temperature and pressure
c. Lean glycol circulation rate
d. Glycol pump type and maximum design capacity (gpm)
e. Flash tank temperature and pressure, if applicable
f. Stripping Gas flow rate, if applicable
g. Wet gas composition (upstream of the absorber – dehydration column) sampled in accordance with GPA method 2166 and analyzed consistent with GPA extended method 2286 as well as the procedures presented in the GRI-GLYCalc™ Technical Reference User Manual and Handbook V4
h. Wet gas water content (lbs H_2O/MMscf)
i. Dry gas water content (lbs H_2O/MMscf) at a point directly after exiting the dehydration column and before any additional separation points

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

a. Dry gas water content can be assumed to be equivalent to pipeline quality at 7 lb H_2O / MMscf
b. Wet gas water content can be assumed to be saturated
c. Lean glycol water content if not directly measured may use the default value of 1.5 % water as established by GRI
d. Lean glycol circulation rate may be estimated using the TEG recirculation ratio of 3 gal TEG / lb H_2O removed.

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

7.3. Testing Requirements

7.3.1. The permittee shall determine the composition of the wet natural gas by sampling in accordance with GPA Method 2166 and analyzing according to extended GPA Method 2286 analysis as specified in the GRI-GLYCalc™ V4 Technical Reference User Manual and Handbook. As specified in the handbook, the permittee shall sample the wet gas stream at a location prior to the glycol dehydration contactor column, but after any type of separation device, in accordance with GPA method 2166. The permittee may utilize other equivalent methods provided they are

approved in advance by DAQ as part of a testing protocol. If alternative methods are proposed, a test protocol shall be submitted for approval no later than 60 days before the scheduled test date. The initial compliance test must be conducted within 180 days of permit issuance or within 180 days of startup of the glycol dehydration unit, whichever is later.

Note: The DAQ defines a representative wet gas sample to be one that is characteristic of the average gas composition dehydrated throughout a calendar year. If an isolated sample is not indicative of the annual average composition, the permittee may opt to produce a weighted average based on throughput between multiple sampling events, which can be used to define a more representative average annual gas composition profile.
[45CSR§13-5.11]

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

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

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

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

(i) The owner or operator shall determine actual average benzene emissions using the model GRI-GLYCalc™ , Version 3.0 or higher, and the procedures presented in the associated GRI-GLYCalc™ Technical Reference Manual. Inputs to the model shall be representative of actual operating conditions of the glycol dehydration unit and may be determined using the procedures documented in Gas Research Institute (GRI) report entitled "Atmospheric Rich/Lean Method for Determining Glycol Dehydrator Emissions " (GRI-95/0368.1).
[§63.772(b)(2)(i)]

7.4. Recordkeeping Requirements

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

7.4.2. For the purpose of documenting compliance with the emission limitations, HAP major source thresholds, as well as the benzene exemption, the permittee shall maintain records of all monitoring data, wet gas sampling, and annual GRI-GLYCalc™ emission estimates. Said records shall be maintained for a period of five (5) years on site or in a readily accessible off-site location maintained by the permittee. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.
[45CSR§13-5.11]

~~7.5. Reporting Requirements~~

~~7.5.1. The permittee shall submit an emission summary for the glycol dehydration unit, which incorporates the wet gas testing results required by 7.3.1. These reports shall include an actual annual average emission estimate for the calendar year of the sample, modeled using GRI-GLYCalc™ , Version 3.0 or higher software, which incorporates site specific parameters measured in accordance with 7.2.2. The permittee shall also supply all supporting documentation where site specific operating parameters are tabulated to define the annual average values. The report shall incorporate a copy of the laboratory analysis obtained from the wet gas testing as well as a description of how and where the sample was taken. The report shall include a reference to all sampling and analytical methods utilized. Additionally, the permittee shall also define the glycol unit's maximum potential to emit (PTE) using the TEG pump's design capacity for recirculation rate input as well as the maximum design throughput of the contactor column or 1.2 times the highest documented annual average rate for any of the 5 years prior to October 15, 2012. If this calculated PTE exceeds 50% of major source thresholds then annual sampling shall be implemented in accordance with 40 CFR§63.760(c). The permittee shall also identify where the compressor station is located with respect to a custody transfer point, which is referenced within 40 C.F.R 63, subpart HH as the point where the gas enters into a natural gas transmission and/or storage pipeline. This report shall be signed by a responsible official upon submittal. The permittee shall submit a written report of the results of testing required in 7.3.1 of this permit before the close of business on the 90th day following the completion of such testing to the Director.~~
~~[45CSR§13-5.11]~~

8.0. Source-Specific Requirements (40CFR60 Subpart JJJJ Requirements, ~~CE-6 through CE-14~~) CE-2, CE-4 through CE-9

See Appendix C for applicable requirements of 40 CFR 60 Subpart JJJJ.

8.1. Limitations and Standards

8.1.1. The provisions of this subpart are applicable to owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified below. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

a. Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

1. On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP

[40CFR§60.4230(a)]

8.1.2. If you are an owner or operator of an area source subject to this subpart, you are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable. [40CFR§60.4230(c)]

8.1.3. Stationary SI ICE may be eligible for exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C (or the exemptions described in 40 CFR parts 90 and 1048, for engines that would need to be certified to standards in those parts), except that owners and operators, as well as manufacturers, may be eligible to request an exemption for national security. [40CFR§60.4230(e)]

8.2. Emission Standards for Owners and Operators

8.2.1. Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE. For owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 100 HP (except gasoline and rich burn engines that use LPG) manufactured prior to January 1, 2011 that were certified to the certification emission standards in 40 CFR part 1048 applicable to engines that are not severe duty engines, if such stationary SI ICE was certified to a carbon monoxide (CO) standard above the standard in Table 1 to this subpart, then the owners and operators may meet the CO certification (not field testing) standard for which the engine was certified. [40CFR§60.4233(e)]

8.2.2. Owners and operators of stationary SI ICE that are required to meet standards that reference 40 CFR 1048.101 must, if testing their engines in use, meet the standards in that section applicable to field testing, except as indicated in paragraph (e) of this section. [40CFR§60.4233(h)]

8.2.3. Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in §60.4233 over the entire life of the engine. [40CFR§60.4234]

8.3. Other Requirements for Owners and Operators

8.3.1. After July 1, 2010, owners and operators may not install stationary SI ICE with a maximum engine power of less than 500 HP that do not meet the applicable requirements in §60.4233. [40CFR§60.4236(a)]

8.3.2. The requirements of this section do not apply to owners and operators of stationary SI ICE that have been modified or reconstructed, and they do not apply to engines that were removed from one existing location and reinstalled at a new location. [40CFR§60.4236(e)]

8.4. Compliance Requirements for Owners and Operators

8.4.1. If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in §60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of this section.

a. Purchasing an engine certified according to procedures specified in this subpart, for the same model year and demonstrating compliance according to one of the methods specified in paragraph (a) of this section.

b. Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in §60.4233(d) or (e) and according to the requirements specified in §60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section.

1. If you are an owner or operator of a stationary SI internal combustion engine greater than 25 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test to demonstrate compliance.
2. If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

[40CFR§60.4243(b)]

8.4.2. Owners and operators of stationary SI natural gas fired engines may operate their engines using propane for a maximum of 100 hours per year as an alternative fuel solely during emergency operations, but must keep records of such use. If propane is used for more than 100 hours per year in an engine that is not certified to the emission standards when using propane, the owners and operators are required to conduct a performance test to demonstrate compliance with the emission standards of §60.4233. [40CFR§60.4243(e)]

8.4.3. If you are an owner or operator of a stationary SI internal combustion engine that is less than or equal to 500 HP and you purchase a non-certified engine or you do not operate and maintain your certified stationary SI internal combustion engine and control device according to the manufacturer's written emission-related instructions, you are required to perform initial performance testing as indicated in this section, but you are not required to conduct subsequent performance testing unless the stationary engine is rebuilt or undergoes major repair or maintenance. A rebuilt stationary SI ICE means an engine that has been rebuilt as that term is defined in 40 CFR 94.11(a). [40CFR§60.4243(f)]

8.4.4. It is expected that air-to-fuel ratio controllers will be used with the operation of three-way catalysts/non-selective catalytic reduction. The AFR controller must be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times. [40CFR§60.4243(g)]

8.5. Testing Requirements for Owners and Operators

8.5.1. Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section.

a. Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in §60.8 and under the specific conditions that are specified by Table 2 to this subpart. [40CFR§60.4244(a)]

b. You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine. [40CFR§60.4244(b)]

c. You must conduct three separate test runs for each performance test required in this section, as specified in §60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour. [40CFR§60.4244(c)]

d. To determine compliance with the NO_X mass per unit output emission limitation, convert the concentration of NO_X in the engine exhaust using Equation 1 of this section:

$$ER = \frac{C_d \times 1.912 \times 10^{-3} \times Q \times T}{HP - hr} \qquad (Eq. 1)$$

Where:
ER = Emission rate of NO_X in g/HP-hr.

C_d= Measured NO_X concentration in parts per million by volume (ppmv).

1.912×10−3 = Conversion constant for ppm NO_X to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

[40CFR§60.4244(d)]

e. To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section:

$$ER = \frac{C_d \times 1.164 \times 10^{-3} \times Q \times T}{HP - hr} \qquad (Eq. 2)$$

Where:
ER = Emission rate of CO in g/HP-hr.

C_d= Measured CO concentration in ppmv.

1.164×10−3 = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

[40CFR§60.4244(e)]

a. For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section:

$$ER = \frac{C_d \times 1.833 \times 10^{-3} \times Q \times T}{HP - hr} \qquad \text{(Eq. 3)}$$

Where:
ER = Emission rate of VOC in g/HP-hr.

C_d= VOC concentration measured as propane in ppmv.

1.833×10−3 = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

[40CFR§60.4244(f)]

b. If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

$$RF_i = \frac{C_{Mi}}{C_{Ai}} \qquad \text{(Eq. 4)}$$

Where:
RF_i= Response factor of compound i when measured with EPA Method 25A.

C_{Mi}= Measured concentration of compound i in ppmv as carbon.

C_{Ai}= True concentration of compound i in ppmv as carbon.

$$C_{icorr} = RF_i \times C_{imeas} \qquad \text{(Eq. 5)}$$

Where:
C_{icorr}= Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.

C_{imeas}= Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{Peq} = 0.6098 \times C_{imeas} \quad \text{(Eq. 6)}$$

Where:
C_{Peq}= Concentration of compound i in mg of propane equivalent per DSCM.

[40CFR§60.4244(g)]

8.6. Notification, Reports, and Records for Owners and Operators

8.6.1. Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements.

a. Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.

1. All notifications submitted to comply with this subpart and all documentation supporting any notification.
2. Maintenance conducted on the engine.
3. If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90 and 1048.
4. If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

[40CFR§60.4245(a)]

b. For all stationary SI emergency ICE greater than or equal to 500 HP manufactured on or after July 1, 2010, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. For all stationary SI emergency ICE greater than or equal to 130 HP and less than 500 HP manufactured on or after July 1, 2011 that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. For all stationary SI emergency ICE greater than 25 HP and less than 130 HP manufactured on or after July 1, 2008, that do not meet the standards applicable to non-emergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. [40CFR§60.4245(b)]

c. Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in §60.4231 must submit an initial notification as required in §60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of this section.

1. Name and address of the owner or operator;
2. The address of the affected source;
3. Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;
4. Emission control equipment; and

5. Fuel used.
[40CFR§60.4245(c)]

d. Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in §60.4244 within 60 days after the test has been completed. [40CFR§60.4245(d)]

CERTIFICATION OF DATA ACCURACY

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

Signature[1] (please use blue ink) _____ Responsible Official or Authorized Representative _____ Date

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

Telephone No. _____ Fax No. _____

[1] This form shall be signed by a "Responsible Official." "Responsible Official" means one of the following:

a. For a corporation: The president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:

(i) the facilities employ more than 250 persons or have a gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), or

(ii) the delegation of authority to such representative is approved in advance by the Director;

b. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

c. For a municipality, State, Federal, or other public entity: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of U.S. EPA); or

d. The designated representative delegated with such authority and approved in advance by the Director.

APPENDIX B

Proposed R13 Permit Changes

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

Appendix B - Proposed R13 Permit Changes

Permit Section	Permit Page #	Permit Condition #	Source ID	Current Language	Proposed Modification	Reason for Change
1.0	5	1.0	Facility	**Emission Units** • CE-6 through CE-14; Compressor Engine; Waukesha L7044GSI; 1,680 bhp, Three-way Catalyst • RBV-1 and RBV-2; TEG Dehydrator Reboiler; 0.20 MMBtu/hr • T-08 - T09; Produced Water Tanks; 300 bbl	**Emission Units** • CE-6 through CE-9; Compressor Engine; Waukesha L7044GSI; 1,680 bhp, NSCR • CE-1 through CE-4; Compressor Engine; Waukesha L5794GSI; 1,380 bhp, NSCR • RBV-1 and RBV-2; TEG Dehydrator Reboiler; 1.50 MMBtu/hr • T-08 - T09; Produced Water Tanks; 210 bbl • LR-1: Truck Loading	Update to reflect actual inventory at the station.
1.0	5	1.0	Facility	**Emission Units** T01 - T09, Year Installed : 2007	**Emission Units** T01 - T09, Year Installed : 2011	Tanks were installed in 2011
5.0	16	5.0	CE-1- through CE-9	Source Specific Requirements (Engines, CE-6 through CE-14)	Source Specific Requirements (Engines, CE-1 through CE-9)	Update to reflect actual inventory at the station.
5.0	16	5.1.1.	CE-1- through CE-9	**Limitations and Standards** To demonstrate compliance with Section 5.1.2., the quantity of natural gas that shall be consumed in each of the 1,680 bhp natural gas fired reciprocating engine, Waukesha L7044GSI shall not exceed 14,640 cubic feet per hour and 128.3 x 10^6 cubic feet per year.	**Limitations and Standards** To demonstrate compliance with Section 5.1.2., the quantity of natural gas consumed in each 1,380 bhp natural gas fired reciprocating engine, Waukesha L5794GSI (CE-1 through CE-5) shall not exceed 10,680 cubic feet per hour and 93.6 x 107 cubic feet per year. The quantity of natural gas that shall be consumed in each of the 1,680 bhp natural gas fired reciprocating engine, Waukesha L7044GSI (CE-6 through CE-9) shall not exceed 13,620 cubic feet per hour and 119.3 x 10^6 cubic feet per year.	Propose to limit the natural gas consumption of engines CE-1 through CE-9 to the maximum possible fuel consumption for each engine.
5.0	16	5.1.2.	CE-1- through CE-9	**Limitations and Standards** Maximum emissions from each of the 1,680 bhp natural gas fired reciprocating engine, Waukesha L7044GSI (CE-6 through CE-14) shall not exceed the following: Maximum Hourly Emissions (lb/hr): NOx - 0.73 CO - 2.20 VOC - 0.07 Maximum Annual Emissions (ton/year): NOx - 3.21 CO - 9.65 VOC - 0.32	**Limitations and Standards** Maximum emissions from each of the 1,380 bhp natural gas fired reciprocating engine, Waukesha L5794GSI (CE-1 through CE-5) shall not exceed the following: Maximum Hourly Emissions (lb/hr): NOx - 1.52 CO - 1.83 VOC - 0.18 Maximum Annual Emissions (ton/year): NOx - 6.66 CO - 8.00 VOC - 0.80 Maximum emissions from each of the 1,680 bhp natural gas fired reciprocating engine, Waukesha L7044GSI (CE-6 through CE-9) shall not exceed the following: Maximum Hourly Emissions (lb/hr): NOx - 1.85 CO - 2.22 VOC - 0.22 Maximum Annual Emissions (ton/year): NOx - 8.11 CO - 9.73 VOC - 0.97	Propose to update emission limitations based on revised potential emissions for the engines.

Company Name: E. Marcellus Asset Company
Facility Name: Tichenal Compressor Station
Project Description: R13 Modification Application

Appendix B - Proposed R13 Permit Changes

Permit Section	Permit Page #	Permit Condition #	Source ID	Current Language	Proposed Modification	Reason for Change
5.0	16	5.1.3.	CE-1- through CE-9	**Limitations and Standards** Requirements for Use of Catalytic Reduction Devices a. For natural gas compressor engines (CE-6 through CE-14), 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. b. Upon request by the Director, testing shall be conducted using a portable analyzer in accordance with a protocol approved by the Director. Such controls shall ensure proper and efficient operation of the engine and air pollution control devices.	**Limitations and Standards** Requirements for Use of Catalytic Reduction Devices a. Rich-burn natural gas compressor engines (CE-1 through CE-9) equipped with non-selective catalytic reduction (NSCR) air pollution control devices shall be fitted with a closed-loop, automatic air/fuel ratio controller to ensure emissions of regulated pollutants do not exceed the potential to emit for any engine/NSCR combination under varying load. The closed-loop, automatic air/fuel ratio controller shall control a fuel metering valve to deliver additional fuel when required to ensure a fuel-rich mixture and a resultant exhaust oxygen content of less than or equal to 0.5%. The automatic air/fuel ratio controller shall also incorporate dual-point exhaust gas temperature and oxygen sensors which provide temperature and exhaust oxygen content differential feedback. Such controls shall ensure proper and efficient operation of the engine and NSCR air pollution control device; b. The automatic air/fuel ratio controller or closed-loop automatic feedback controller shall provide a warning or indication to the operator and/or be interlocked with the engine ignition system to cease engine operation in case of a masking, poisoning or overrich air/fuel ratio situation which results in performance degradation or failure of the catalyst element; and c. No person shall knowingly: 1. Remove or render inoperative any air pollution or auxiliary air pollution control device installed subject to the requirements of this permit; 2. Install any part or component when the principal effect of the part or component is to bypass, defeat or render inoperative any air pollution control device or auxiliary air pollution control device installed subject to the requirements of this permit; or 3. Cause or allow engine exhaust gases to bypass any catalytic reduction device.	Engines are equipped with air/fuel ratio controllers to ensure proper and efficient operation of the engine and NSCR air pollution control device, and to ensure optimal control of regulated pollutants. Proposing to update requirements related to NSCR to those in recently issued permits.
5.0	16	5.3.1.	CE-1- through CE-9	**Recordkeeping Requirements** To demonstrate compliance with sections 5.1.-5.2., the permittee shall maintain records of the amount of natural gas consumed in each engine and the hours of operation of each engine.	**Recordkeeping Requirements** To demonstrate compliance with sections 5.1.-5.2., the permittee shall maintain records of the hours of operation of each engine.	The engines are permitted at the maximum possible volume of fuel consumption for each engine and, by design, cannot consume a greater amount than the permit limit. Recordkeeping of natural gas consumption is therefore a redundant requirement.
6.0	17	6.1.1.	RBV-1 and RBV-2	**Limitations and Standards** Maximum Design Heat Input. The maximum design heat input for each Reboiler (RBV -1 and RBV-1) shall not exceed 1.5 MMBTU/hr.	**Limitations and Standards** Maximum Design Heat Input. The maximum design heat input for each Reboiler (RBV -1 and RBV-2) shall not exceed 1.5 MMBTU/hr.	Update condition to refer to both reboiler source ID's.
6.0	17	6.1.3.	RBV-1 and RBV-2	**Limitations and Standards** To demonstrate compliance with Section 6.1.2., the quantity of natural gas that shall be consumed in the 0.2 MMBTU/hr Reboiler RBV-1 shall not exceed 1,473 cubic feet per hour and 12.9 x 10^6 cubic feet per year.	Remove condition.	Reboilers RBV-1 and RBV-2 will be permitted at the maximum rated heat input and cannot exceed the existing limit for natural gas consumption given the design of the reboilers and the typical heating value of the station's fuel gas.

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6.0	17	6.4.1.	RBV-1 and RBV-2	**Recordkeeping Requirements** To demonstrate compliance with sections 6.1.1., 6. 1.2., 6.1.3., the permittee shall maintain records of the amount of natural gas consumed in the 1.5 MMBTU/hr Reboilers (RBV-1 and RBV-2). Said records shall be maintained on site or in a readily accessible off-site location maintained by the permittee for a period of five (5) years. Said records shall be readily available to the Director of the Division of Air Quality or his/her duly authorized representative for expeditious inspection and review. Any records submitted to the agency pursuant to a requirement of this permit or upon request by the Director shall be certified by a responsible official.	Remove condition.	Each reboiler (RBV-1 and RBV-2) will be permitted at the maximum rated heat input and could not exceed the existing limit for natural gas consumption given the design of the reboiler and the typical heating value of the station's fuel gas. Recordkeeping of natural gas consumption is a redundant requirement.
7.0	19	7.1.2.	RSV-1	**Limiations and Standards** Maximum emissions from the glycol dehydration unit/still column (RSV-1) shall not exceed the following limits: Maximum Hourly Emissions (lb/hr): VOC - 0.40 Maximum Annual Emissions (ton/year): VOC - 1.76	**Limiations and Standards** Maximum emissions from the glycol dehydration unit/still column (RSV-1) shall not exceed the following limits: Maximum Hourly Emissions (lb/hr): VOC - 1.45 Maximum Annual Emissions (ton/year): VOC - 6.33	Propose to update emission limitations based on revised potential emissions for RSV-1
7.0	19	7.1.3.	RSV-2	**Limiations and Standards** Maximum emissions from the glycol dehydration unit/still column (RSV-1) shall not exceed the following limits: Maximum Hourly Emissions (lb/hr): VOC - 0.41 Maximum Annual Emissions (ton/year): VOC - 1.77	**Limiations and Standards** Maximum emissions from the glycol dehydration unit/still column (RSV-2) shall not exceed the following limits: Maximum Hourly Emissions (lb/hr): VOC - 1.44 Maximum Annual Emissions (ton/year): VOC - 6.33	Propose to update emission limitations based on revised potential emissions for RSV-2. Correct unit name to RSV-2.
7.0	20	7.1.8.	RSV-1 and RSV-2	**Limitations and Standards** All vapors from the still vents (RSV-1 and RSV-2) will be sent to the respective reboilers (RBV-1 and RBV-2) to be used as fuel.	**Limitations and Standards** All vapors from the still vents (RSV-1 and RSV-2) will be routed to a condenser, then sent to the respective reboilers (RBV-1 and RBV-2) to be used as fuel.	Update to reflect actual control of dehy still vent emissions.
7.0	20	7.2.2.	RSV-1 and RSV-2	**Monitoring Requirements** In order to demonstrate compliance with the area source status, claimed within sections 7.1.2 and 7. 1.3, as well as the benzene exemption provided under section 7.1.7, the following parameters shall be measured at least once monthly, with the exception of wet gas composition, in order to define annual average values or, if monitoring is not practical, some parameters may be assigned default values as listed below.	**Monitoring Requirements** In order to demonstrate compliance with the area source status, claimed within sections 7.1.2 and 7. 1.3, as well as the benzene exemption provided under section 7.1.7, the following parameters shall be measured at least once quarterly, with the exception of natural gas flowrate annual daily average, natural gas flowrate maximum design capacity, and wet gas composition, in order to define annual average values or, if monitoring is not practical, some parameters may be assigned default values as listed below.	Quarterly monitoring of operating parameters is sufficient to determine an annual average value for each dehy. Annual daily average of natural gas flowrate is determined on an annual basis. Maximum design capacity of natural gas flowrate is a fixed and pre-determined value based on the manufacturer's design.

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7.0	22	7.5.1	RSV-1 and RSV-2	**Reporting Requirements** 7.5.1. The permittee shall submit an emission summary for the glycol dehydration unit, which incorporates the wet gas testing results required by 7.3.1. These reports shall include an actual annual average emission estimate for the calendar year of the sample, modeled using GRI-GLYCalc™, Version 3.0 or higher software, which incorporates site specific parameters measured in accordance with 7.2.2. The permittee shall also supply all supporting documentation where site specific operating parameters are tabulated to define the annual average values. The report shall incorporate a copy of the laboratory analysis obtained from the wet gas testing as well as a description of how and where the sample was taken. The report shall include a reference to all sampling and analytical methods utilized. Additionally, the permittee shall also define the glycol unit's maximum potential to emit (PTE) using the TEG pump's design capacity for recirculation rate input as well as the maximum design throughput of the contactor column or 1.2 times the highest documented annual average rate for any of the 5 years prior to October 15, 2012. If this calculated PTE exceeds 50% of major source thresholds then annual sampling shall be implemented in accordance with 40 CFR§63.760(c). The permittee shall also identify where the compressor station is located with respect to a custody transfer point, which is referenced within 40 C.F.R 63, subpart HH as the point where the gas enters into a natural gas transmission and/or storage pipeline. This report shall be signed by a responsible official upon submittal. The permittee shall submit a written report of the results of testing required in 7.3.1 of this permit before the close of business on the 90th day following the completion of such testing to the Director.	Remove condition.	Dehy's RSV-1 and RSV-2 are exempt from the reporting requirements of 40 CFR 63 Subpart HH per 40 CFR § 63.760(e). Tichenal's compliance with recordkeeping requirements adequately demonstrates compliance with the emission limits for these units.
8.0	23	8.0	CE-2, CE-4 through CE-9	40 CFR 60 Subpart JJJJ Requirements	See Appendix C for applicable requirements of 40 CFR 60 Subpart JJJJ.	See Appendix C for applicable requirements of 40 CFR 60 Subpart JJJJ.

APPENDIX C

Applicable Provisions of 40 CFR 60 Subpart JJJJ

Company Name: E. Marcellus Asset Company
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Project Description: R13 Modification Application

Appendix C – List of Applicable 40 CFR 60 Subpart JJJJ Provisions for Inclusion

Source ID(s)	Type of Condition	Proposed Language
CE-2 CE-4 CE-5 CE-6 CE-7 CE-8 CE-9	Limitations and Standards	§ 60.4230 Am I subject to this subpart? (a) The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. (1) - (3) NA (4) Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured: (i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP); (ii) - (iv) NA (5) Owners and operators of stationary SI ICE that are modified or reconstructed after June 12, 2006, and any person that modifies or reconstructs any stationary SI ICE after June 12, 2006. (6) The provisions of § 60.4236 of this subpart are applicable to all owners and operators of stationary SI ICE that commence construction after June 12, 2006. (b) NA (c) If you are an owner or operator of an area source subject to this subpart, you are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable. (d) For the purposes of this subpart, stationary SI ICE using alcohol-based fuels are considered gasoline engines. (e) Stationary SI ICE may be eligible for exemption from the requirements of this subpart as described in 40 CFR part 1068, subpart C (or the exemptions described in 40 CFR parts 90 and 1048, for engines that would need to be certified to standards in those parts), except that owners and operators, as well as manufacturers, may be eligible to request an exemption for national security. (f) Owners and operators of facilities with internal combustion engines that are acting as temporary replacement units and that are located at a stationary source for less than 1 year and that have been properly certified as meeting the standards that would be applicable to such engine under the appropriate nonroad engine provisions, are not required to meet any other provisions under this subpart with regard to such engines.
	Emission Standards for Owners and Operators	§ 60.4233 What emission standards must I meet if I am an owner or operator of a stationary SI internal combustion engine? (a) - (d) NA (e) Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE. For owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 100 HP (except gasoline and rich burn engines that use LPG) manufactured prior to January 1, 2011 that were certified to the certification emission standards in 40 CFR part 1048 applicable to engines that are not severe duty engines, if such stationary SI ICE was certified to a carbon monoxide (CO) standard above the standard in Table 1 to this subpart, then the owners and operators may meet the CO certification (not field testing) standard for which the engine was certified. Table 1 to Subpart JJJJ of Part 60 - NOX, CO, and VOC Emission Standards for Stationary Non-Emergency SI Engines > 100 HP (Except Gasoline and Rich Burn LPG), Stationary SI Landfill/Digester Gas Engines, and Stationary Emergency Engines >25 HP Engine Type: Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≤HP<1,350) > 500 HP Manufacture Date: 7/1/2007 Emission Standards: NOX: 2.0 g/bhp-hr, 160 ppmvd at 15% O_2 CO: 4.0 g/bhp-hr, 540 ppmvd at 15% O2 VOC: 1.0 g/bhp-hr, 86 ppmvd at 15% O2 Manufacture Date: 7/1/2010 Emission Standards (g/bhp-hr): NOX: 1.0 g/bhp-hr, 82 ppmvd at 15% O2 CO: 2.0 g/bhp-hr, 270 ppmvd at 15% O2 VOC: 0.7 g/bhp-hr, 60 ppmvd at 15% O2 (f) NA (g) Owners and operators of stationary SI wellhead gas ICE engines may petition the Administrator for approval on a case-by-case basis to meet emission standards no less stringent than the emission standards that apply to stationary emergency SI engines greater than 25 HP and less than 130 HP due to the presence of high sulfur levels in the fuel, as specified in Table 1 to this subpart. The request must, at a minimum, demonstrate that the fuel has high sulfur levels that prevent the use of aftertreatment controls and also that the owner has reasonably made all attempts possible to obtain an engine that will meet the standards without the use of aftertreatment controls. The petition must request the most stringent standards reasonably applicable to the engine using the fuel. (h) Owners and operators of stationary SI ICE that are required to meet standards that reference 40 CFR 1048.101 must, if testing their engines in use, meet the standards in that section applicable to field testing, except as indicated in paragraph (e) of this section. § 60.4234 How long must I meet the emission standards if I am an owner or operator of a stationary SI internal combustion engine? Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in § 60.4233 over the entire life of the engine.

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Appendix C – List of Applicable 40 CFR 60 Subpart JJJJ Provisions for Inclusion

Source ID(s)	Type of Condition	Proposed Language
CE-2 CE-4 CE-5 CE-6 CE-7 CE-8 CE-9	Other Requirements for Owners and Operators	§ 60.4235 What fuel requirements must I meet if I am an owner or operator of a stationary SI gasoline fired internal combustion engine subject to this subpart? NA § 60.4236 What is the deadline for importing or installing stationary SI ICE produced in previous model years? (a) NA (b) After July 1, 2009, owners and operators may not install stationary SI ICE with a maximum engine power of greater than or equal to 500 HP that do not meet the applicable requirements in § 60.4233, except tha lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP that do not meet the applicable requirements in § 60.4233 may not be installed after January 1, 2010. (c) - (d) NA (e) The requirements of this section do not apply to owners and operators of stationary SI ICE that have been modified or reconstructed, and they do not apply to engines that were removed from one existing location and reinstalled at a new location.
	Compliance Requirements for Owners and Operators	§ 60.4243 What are my compliance requirements if I am an owner or operator of a stationary SI internal combustion engine? (a) NA (b) If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in § 60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of this section. (1) Purchasing an engine certified according to procedures specified in this subpart, for the same model year and demonstrating compliance according to one of the methods specified in paragraph (a) of this section. (2) Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in § 60.4233(d) or (e) and according to the requirements specified in § 60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section. (i) NA (ii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance. (c) - (d) NA (e) Owners and operators of stationary SI natural gas fired engines may operate their engines using propane for a maximum of 100 hours per year as an alternative fuel solely during emergency operations, but mus keep records of such use. If propane is used for more than 100 hours per year in an engine that is not certified to the emission standards when using propane, the owners and operators are required to conduct a performance test to demonstrate compliance with the emission standards of § 60.4233. (f) NA (g) It is expected that air-to-fuel ratio controllers will be used with the operation of three-way catalysts/non-selective catalytic reduction. The AFR controller must be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times. (h) - (i) NA
	Testing Requirements for Owners and Operators	§ 60.4244 What test methods and other procedures must I use if I am an owner or operator of a stationary SI internal combustion engine? Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section. (a) Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in § 60.8 and under the specific conditions that are specified by Table 2 to this subpart. (b) You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in § 60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine. (c) You must conduct three separate test runs for each performance test required in this section, as specified in § 60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour. (d) To determine compliance with the NOX mass per unit output emission limitation, convert the concentration of NOX in the engine exhaust using Equation 1 of this section: [See rule text] (e) To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section: [See rule text] (f) For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section: [See rule text] (g) If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section. [See rule text]

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Source ID(s)	**Type of Condition**	**Proposed Language**
CE-2 **CE-4** **CE-5** **CE-6** **CE-7** **CE-8** **CE-9**	Notifications, Reporting, and Recordkeeping Requirements for Owners and Operators	§ 60.4245 What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary SI internal combustion engine? Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements. (a) Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section. (1) All notifications submitted to comply with this subpart and all documentation supporting any notification. (2) Maintenance conducted on the engine. (3) If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable. (4) If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to § 60.4243(a)(2), documentation that the engine meets the emission standards. (b) NA (c) Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in § 60.4231 must submit an initial notification as required in § 60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of this section. (1) Name and address of the owner or operator; (2) The address of the affected source; (3) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement; (4) Emission control equipment; and (5) Fuel used. (d) Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in § 60.4244 within 60 days after the test has been completed. (e) NA