MODIFICATION APPLICATION

CONE Midstream Partners, LP > Shirley Compressor Station

R13-3207

Prepared By:

TRINITY CONSULTANTS
4500 Brooktree Rd.
Suite 103
Wexford, PA 15090
(724) 935-2611

July 2015

Project 143901.0035

Trinity Consultants

Environmental solutions delivered uncommonly well

TABLE OF CONTENTS

1. INTRODUCTION 3

1.1. FACILITY AND PROJECT DESCRIPTION 3

1.2. R-13 APPLICATION ORGANIZATION 4

2. SAMPLE EMISSION SOURCE CALCULATIONS 5

3. R13 APPLICATION FORM 6

ATTACHMENT A: CURRENT BUSINESS CERTIFICATE

ATTACHMENT B: 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 SHEET

ATTACHMENT N: SUPPORTING EMISSION CALCULATIONS

ATTACHMENT O: MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

ATTACHMENT P: PUBLIC NOTICE

1. INTRODUCTION

CONE Midstream Partners, LP (CONE) is submitting this modification application to the West Virginia Department of Environmental Protection (WVDEP) for a natural gas compressor station located in Tyler County, West Virginia (Shirley Station). Specifically, this application seek to authorize an increase in the current liquid loading throughputs and increase the existing dehydration unit capacity (from 150 to 200 million standard cubic feet per day), as well as install one (1) additional dehydration unit with associated reboiler and ground flare, one (1) compressor engine, one (1) microturbine generator, one (1) Hot Oil Heater associated with a condensate stabilizer, three (3) storage tanks, one (1) blowdown flare, and one (1) backup vapor destruction unit [VDU]. The Shirley Station is currently permitted under Permit no. R13-3207.

1.1. FACILITY AND PROJECT DESCRIPTION

The Shirley Compressor Station (Shirley Compressor Station) is a natural gas gathering facility covered under Standard Industrial Classification (SIC) code 4922. Natural gas from nearby wells will undergo compression, and then dehydration before it is transported to a gathering line for additional processing. Condensate and water separated from the gas stream are stored in storage vessels. The station currently consists of the following equipment

- One (1) 150 MMSCFD triethylene glycol (TEG) dehydration unit with associated reboiler (rated at 2.00 MMBtu/hr) and enclosed ground flare (rated at 6.0 MMBtu/hr);
- One (1) backup vapor destruction unit (VDU) rated at 18.4 MMBtu/hr;
- Four (4) natural gas fired 2,370 HP Caterpillar compressor engines, each engine is equipped with an oxidation catalyst for carbon monoxide (CO), volatile organic compounds (VOC), and formaldehyde control;
- One (1) 450- bbl feed storage tank; controlled by two (2) vapor recovery units. The VRUs will be powered by a natural gas-fired four stroke, rich burn engines which will operate full time (i.e., 8760 hours per year). During periods of VRU downtime, emissions from the storage tanks will be routed to the aforementioned backup VDU for control;
- One (1) 400- bbl produced water storage tank controlled by the aforementioned VRUs and the backup vapor destruction unit;
- One (1) 400- bbl condensate storage tank controlled by the aforementioned VRUs and the backup vapor destruction unit;
- One (1) 68 HP Arrow VRG 330 natural gas fired engine powering the low pressure VRU;
- One (1) 118 HP Cummins 8.3 M302 natural gas fired engine powering the high pressure VRU; and
- One (1) 464 HP Cummins emergency generator diesel fired engine.

In anticipation of increased gas flow to the facility, CONE is proposing to install the following equipment:

- One (1) 200 MMSCFD triethylene glycol (TEG) dehydration unit with associated reboiler (rated at 2.86 MMBtu/hr) and enclosed vapors combustor (rated at 6.0 MMBtu/hr), also known as ground flare;
- Condensate Stabilizer. There will be no emissions associated with this process;
- One (1) natural gas fired 2,370 HP Caterpillar compressor engine, the engine is equipped with an oxidation catalyst for carbon monoxide (CO), volatile organic compounds (VOC), and formaldehyde control;
- Three (3) 400- bbl condensate storage tanks controlled by the existing VRUs and/or the backup VDUs;
- One (1) backup VDU (rated at 18.4 MMBtu/hr) to control emissions from the three (3) condensate storage tanks;
- One (1) natural gas fired hot oil process heater (rated at 8.0 MMBtu/hr) associated with the condensate stabilizer;
- One (1) blowdown flare (rated at 7660 MMBtu/hr);
- One (1) capstone microturbine generator (rated at 1.0 MW); and
- One (1) 1,000 gallon triethylene glycol (TEG) tank;
- Ten (10) 500 gallon (each) lube oil tanks; and
- Two (2) 500 gallon (each) methanol tanks.

Additionally, this application:

- Seeks to increase the current permit liquid throughput limits (L1) at the facility from 4,599,000 gal/yr (300 barrels per day[bpd]) to 49,543,000 gal/yr (3,232 bpd);
- Seeks to increase the current permit throughput of the existing dehydration unit (S5) from 150 MMSCFD to 200 MMSCFD, and revise the current rating of the existing reboiler (S6) to 2.86 MMBtu/hr;
- Request that the department limit the hours of operation of the existing and new backup VDUs from 8760 hours to 500 hours in Section 10.1 of the permit.
- Request that the department include the diesel fired emergency generator engine in Table 1.0 of the permit.
- Request that the department update the VOC emission limit of the Caterpillar Compressor engines in Section 5.1.2 of the permit. The VOC control efficiency of the oxidation catalyst (C1) has been updated from 61% to 70% based on the new vendor guarantee.
- Request that the department update the nitrogen oxides (NO_X), CO, and VOC emission limits of the Cummins 8.3/M302 engine in Section 5.1.3 of the permit. The engine has been retrofitted with a three way catalyst for NO_X, CO, and VOC control.
- Convert the feed storage tank to a condensate storage tank. The functionality of the feed storage tank will be handled with a low-pressure separator to perform the phase separation originally performed by that tank.

A process flow diagram is included as Attachment F.

The current permit, R13-3207, was issued with no sources aggregated with the Shirley Station. No changes have been made with respect to nearby sources and/or wells feeding the station since that time. Therefore, the stationary source determination is the same for the facility.

1.2. 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: 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 Sheet;
- Attachment N: Supporting Emission Calculations;
- Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans
- Attachment P: Public Notice; and
- Application Fee.

2. SAMPLE EMISSION SOURCE CALCULATIONS

The characteristics of air emissions from the Shirley Compressor Station, along with the methodology used for calculating emissions from the proposed new sources, are described in narrative form below. Detailed supporting calculations are also provided in Attachment N.

Emissions from the proposed project will result from the TEG dehydration unit, natural gas combustion in the compressor engine, microturbine, hot oil process heater, and reboiler, and flashing, working, and breathing losses from the storage tanks. In addition, fugitive emissions from component leaks will result from the operation of the station. The methodologies employed in calculating emissions from these sources have been summarized below.

- **Compressor and VRU Engines:** Potential emissions of NO_x, CO, VOC, formaldehyde, carbon dioxide (CO_2), and methane (CH_4) are calculated using factors provided by the engine and catalyst manufacturer. Potential emissions of sulfur dioxide (SO_2), particulate matter ($PM/PM_{10}/PM_{2.5}$), and all other hazardous air pollutants (HAPs) are calculated using U.S. EPA's AP-42 factors for natural gas-fired engines. Potential emissions of greenhouse gas pollutants (GHGs) are calculated using manufacturer's data as available (CO_2 and CH_4 in this case) and U.S. EPA's emission factors from 40 CFR Part 98, Subpart C for all others.

- **Emergency Generator Engine:** Potential emissions of NO_x, CO, VOC, and PM are calculated using the Tier 3 limits under NSPS Subpart IIII. Potential emissions of remaining non-GHG pollutants are calculated using U.S. EPA's AP-42 factors for diesel-fired engines. Potential emissions of GHGs are calculated using U.S. EPA's emission factors from 40 CFR Part 98, Subpart C.

- **Reboilers and Hot Oil Process Heater:** Potential emissions from the proposed natural gas-fired reboiler and hot oil process heater of all criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for natural gas combustion equipment. These calculations assume a site-specific heat content of natural gas. Greenhouse gas emissions are calculated according to 40 CFR 98 Subpart C.

- **Dehydration Unit:** Potential emissions of HAPs, VOC, and methane from the dehydration units are calculated using GRI-GLYCalc. Note that the maximum pump rate is utilized in accordance with recent revisions in Subpart HH. Emissions of other criteria pollutants are calculated for natural gas combustion in the flare using U.S. EPA's AP-42 factors for external combustion of natural gas. Greenhouse gas emissions from combustion in the flare are calculated according to the procedures in 40 CFR 98 Subpart C.

- **Microturbine Generator:** Potential emissions of NO_X, CO, VOC, and carbon dioxide (CO2) are calculated using manufacturer's emission data. Emissions of all other criteria pollutants and HAPs are calculated using U.S. EPA's AP-42 factors for stationary gas turbines.

- **Storage Tanks and Loading:** Working, standing, and flash loss emissions of VOC and HAPs from the condensate/water stored in the tanks at the facility are calculated using ProMax® software.

3. R13 APPLICATION FORM

The WVDEP permit application forms contained in this application include all applicable R13 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):*
CONE Midstream Partners, LP

2. Federal Employer ID No. ***(FEIN):***
45-3344658

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

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

5A. Applicant's mailing address:
1000 Consol Energy Drive

Canonsburg PA

5B. Facility's present physical address:
9425 Middle Road, Alma, WV 26320

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**

– If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**

– If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

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

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

– If **YES,** please explain: CONE Midstream owns 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 Compressor Station

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

11A. DAQ Plant ID No. (for existing facilities only):
095 – 00039

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-3207

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 Middlebourne, WV, Head southwest on WV-18 S/Main St toward Bridgeway Rd for approximately 10 miles, turn right and travel ¾ mile. Station is on the right

12.B. New site address (if applicable):	12C. Nearest city or town: Centerville	12D. County: Tyler
12.E. UTM Northing (KM): 4,363.1	12F. UTM Easting (KM): 513.4	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
CONE is proposing to increase the natural gas compression and dehydration capacity, and the amount of liquid processed at the Shirley Compressor Station. This will be accomplished by installing additional equipment that includes: a compressor engine, dehydration unit, storage tanks, hot oil process heater, microturbines, and miscellaneous control devices

14A. Provide the date of anticipated installation or change: Upon issuance of permit – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: February/March 2015 (diesel generator only)	14B. Date of anticipated Start-Up if a permit is granted: Q4-2015

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 Year52

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

☐ Absorption Systems
☐ Adsorption Systems
☐ Afterburner
☐ Baghouse
☐ Condenser
☐ Electrostatic Precipitator
☒ Flare – VDU
☐ Mechanical Collector
☐ Wet Collecting System
☒ Other Collectors, specify Oxidation Catalyst, 3-Way Catalyst

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

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

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE Robert H Kheck per Joe Fink DATE: 8/6/15

(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: Joseph Fink		35C. Title: Chief Operating Officer
35D. E-mail: joefink@consolenergy.com	36E. Phone: 724-485-3524	36F. FAX:
36A. Printed name of contact person (if different from above): Patrick Flynn		36B. Title: Air Quality Engineer
36C. E-mail: PatrickFlynn@consolenergy.com	36D. Phone: 724-485-3156	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

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

ATTACHMENT A

Current Business Certificate

ATTACHMENT B

Map

Figure 1 - Map of Shirley Compressor Station

UTM Northing (KM): 4,363.1
UTM Easting (KM): 513.4
Elevation: 963 ft

ATTACHMENT C

Startup and Installation Schedule

ATTACHMENT C

Schedule of Planned Installation and Start-Up

Unit	Installation Schedule	Startup Schedule
150 MMSCFD (S5) Dehydration Unit – *Modified throughput increase*	2015 modification	Upon issuance of permit
Reboiler (S6) – *Modified heat input rating*	2015 modification	Upon issuance of permit
Loading Rack (L1) – *Modified throughput increase*	2015 modification	Upon issuance of permit
Cummins 8.3/M302 VRU Engine (C4) – *Modified with 3-way catalyst*	2015 modification	Upon issuance of permit
Cummins Emergency Generator (E-20)	2015	2015
One (1) CAT 3608 Compressor Engine (S7)	2015	Upon issuance of permit
200 MMSCFD Dehydration Unit (S10)	2015	Upon issuance of permit
One (1) 2.86 MMBtu/hr Reboiler (S11)	2015	Upon issuance of permit
One (1) 6.00 MMBtu/hr Enclosed Ground Flare (C7)	2015	Upon issuance of permit
One (1) 1.0 MW Capstone Microturbine (S8)	2015	Upon issuance of permit
One (1) 8.0 MMBtu/hr Hot Oil Process Heater (S9)	2015	Upon issuance of permit
Three (3) 400 bbl Condensate Tanks (T04-T06)	2015	Upon issuance of permit
One (1) 1000 gal TEG Storage Tank (T07)	2015	Upon issuance of permit
One (1) 18.4 MMBtu/hr Vapor Destruction Unit (C6)	2015	Upon issuance of permit
One (1) 7660 MMBtu/hr Blowdown flare (BDF-1)	2015	Upon issuance of permit
Ten (10) 500 gallon (each) lube oil tanks T08-T17	2015	Upon issuance of permit
Two (2) 500 gallon (each) methanol tanks T18-T19	2015	Upon issuance of permit

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;
- 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 R13A permit application forms. 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 Shirley Compressor 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 Shirley Compressor Station. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

Prevention of Significant Deterioration (PSD) Source Classification

Federal construction permitting programs regulate new and modified sources of attainment pollutants under Prevention of Significant Deterioration (PSD) and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). PSD and NNSR regulations apply when a major source makes a change, such as installing new equipment or modifying existing equipment, and a significant increase in emissions results from the change. The Shirley Compressor Station is not a major source with respect to these programs since its potential emissions are below all the NNSR/PSD thresholds. As such, NNSR/PSD permitting is not triggered by this construction activity. CONE will monitor future construction activities at the site closely and will compare any future increase in emissions with the NSR/PSD thresholds to ensure these activities will not trigger this program.

Title V Operating Permit Program

Title 40 of the Code of Federal Regulations Part 70 (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 Code of State Regulations (CSR) 45-30. 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, and 100 tpy of all other regulated pollutants.[1] The potential emissions of all regulated pollutants are below the corresponding threshold(s) at this facility after the proposed project. Therefore, the Shirley Station is not a major source for Title V purposes.

New Source Performance Standards

New Source Performance Standards (NSPS), located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable

[1] 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. .

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 Shirley Compressor Station.

NSPS Subparts GG – Stationary Gas Turbines

Subpart GG – Standards of Performance for Stationary Gas Turbines, applies to stationary gas units with a heat input at peak load equal to or greater than 10 MMBtu/hr, based on the lower heating value of the fuel, commencing construction after October 3, 1977. The proposed microturbine generators at the Shirley Station have a peak load of 200 kilowatts (2.28 MMBtu/hr) and as such, are not subject to this subpart.

NSPS Subparts KKKK – Stationary Combustion Turbines

Subpart KKKK – Standards of Performance for Stationary Combustion Turbines, applies to stationary combustion units with a heat input at peak load equal to or greater than 10 MMBtu/hr, based on the higher heating value of the fuel, commencing construction after February 18, 2005. The proposed microturbine generators at the Shirley Station have a peak load of 200 kilowatts (2.84 MMBtu/hr) each and as such, are not subject to this subpart. Note that the combined unit, called a C1000, is actually made of several units.

NSPS Subparts K, Ka, and Kb

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 prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 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 (VOL) storage tanks constructed, reconstructed, or modified after July 23, 1984 with a capacity equal to or greater than 75 m3 (~19,813 gallons). The three (3) proposed storage tanks as part of this project will have a capacity of 19,000 gallons or less. As such, Subparts K, Ka, and Kb do not apply to the storage tanks at the Shirley Station.

NSPS Subparts IIII – Stationary Compression Ignition Internal Combustion Engines

This subpart applies to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines. The Shirley Station has an emergency diesel-fired engine subject to the rule. The engine is certified to meet the Tier 3 limits for engines in accordance with 60.4202(a).

NSPS Subparts JJJJ – Stationary Spark Ignition Internal Combustion Engines

NSPS Subpart JJJJ affects owners and operators of stationary spark ignition internal combustion engines (SI ICE) that commence construction, reconstruction or modification after June 12, 2006. Applicability dates are based on the manufacture date for new engines. The applicability dates for new engines range from July 1, 2007 to January 1, 2009, depending upon the engine horsepower (hp) and application. The proposed engine meets the applicability criteria of NSPS Subpart JJJJ. The proposed unit falls into the same class of engines as the existing units in the R-13 permit. Therefore, by complying with JJJJ requirements outlined in the existing R13 permit (see Section 11), the facility will maintain compliance with this subpart

NSPS 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. This NSPS was published in the Federal Register on August 16, 2012, with an effective date of October 15, 2012. The list of potentially affected facilities includes:

- Gas wells

- Centrifugal compressors
- Reciprocating compressors
- Pneumatic controllers
- Storage vessels
- Equipment (as defined in §60.5430) located at onshore natural gas processing plants
- Sweetening units located onshore that process natural gas produced from either onshore or offshore wells

The Shirley Compressor Station does not include gas wells or centrifugal compressors, therefore, the only potentially applicable requirements are those for reciprocating compressors, storage vessels, and pneumatic controllers. Rule applicability for each of these affected categories is discussed below.

Reciprocating Compressors- 40 CFR 60.5385 requires owners and operators of affected reciprocating compressors to change the rod packing prior to operating 26,000 hours or prior to 36 months since start up or the last packing replacement. CONE will comply with this requirement for the proposed engine

Storage Vessels - As part of this project, CONE is proposing to install three (3) condensate storage vessels. Emissions from all storage vessels (existing and new) will be controlled by two (2) vapor recovery unit (VRU) and two (2) enclosed combustors (the combustors will operate as the primary control measure only in instance when the VRU is down). The three proposed storage vessels at the facility will each have potential VOC emissions less than 6 tpy. As such, per 60.5365(e), the proposed tanks are not storage vessel affected facilities under the rule.

Pneumatic Controllers – The pneumatic controllers were ordered and installed after August 23, 2011 and are therefore potentially subject to NSPS 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. No pneumatic controllers installed will meet the definition of a pneumatic controller affected facility. Therefore, these units are not subject to the requirements of Subpart OOOO.

Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for natural gas processing plants (Subpart OOOO), internal combustion engines (Subparts IIII and JJJJ), and associated equipment (Subparts D-Dc and K-Kb), the applicability of a particular NSPS to the Shirley Compressor Station can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to natural gas compressor stations.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular major source. 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 Shirley Compressor Station will be 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:

- 40 CFR Part 63 Subpart HH – Oil and Natural Gas Production Facilities
- 40 CFT Part 63 HHH – Natural Gas Transmission and Storage Facilities
- 40 CFR Part 63 Subpart ZZZZ- Stationary Reciprocating Internal Combustion Engines (RICE)
- 40 CFR Part 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers

The applicability of these NESHAP Subparts is discussed in the following sections.

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

This subpart applies to affected emission points that are located at facilities that are major and area sources of HAP and either process, upgrade, or store hydrocarbon liquids prior to custody transfer or that process, upgrade, or store natural gas prior to entering the natural gas transmission and storage source category. For purposes of this subpart, natural gas enters the natural gas transmission and storage source category after the natural gas processing plant, if present.

The Shirley station is an area source of HAP emissions. CONE is proposing to install one (1) TEG dehydration unit and as such will be subject to this subpart. Benzene emissions from the glycol dehydrator vents are less than 0.90 megagrams per year (1 tpy). Therefore, the Shirley Station is exempt from the requirements of NESHAP Subpart HH pursuant to 40 CFR §63.764(e)(1)(ii), except for the requirement to keep records of the actual average natural gas flow rate or actual average benzene emissions from the dehydrator, per 40 CFR §63.774(d)(1). Note that the unit being modified will continue to comply with the Subpart HH provisions in the current permit.

40 CFR 63 Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines

40 CFR §63.6590(c) states that a new or reconstructed stationary reciprocating internal combustion engines (RICE) located at an area HAP source must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for such engines under NESHAP Subpart ZZZZ. The Shirley Compressor Station is a minor (area) source of hazardous air pollutants and the proposed compressor engine is considered a new stationary RICE. Therefore, the requirements contained in §63.6590(c) are applicable. CONE will be in compliance with applicable requirements of 40 CFR 63 Subpart ZZZZ by meeting the applicable requirements of 40 CFR 60 Subpart JJJJ.

40 CFR 63 Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers (Area Source Boiler MACT)

This MACT standard applies to industrial, commercial, and institutional boilers of various sizes and fuel types. The Shirley Station will not have any boilers, and therefore the requirements of this subpart will not apply

West Virginia SIP Regulations

The Shirley Compressor Station is potentially subject to regulations contained in the West Virginia Code of State Regulations, Chapter 45 (Code of State Regulations). 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).

45 CSR 2: 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 reboiler and Hot Oil process heater are fuel burning units and therefore must comply with this regulation. Per 45 CSR 2-3, opacity of emissions from this unit shall not exceed 10 percent based on a six minute block average.

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 compressor station is generally subject to this requirement. However, due to the nature of the process at the station, production of objectionable odor from the compressor station during normal operation is unlikely.

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 enclosed combustor and blowdown flare are incinerators and therefore must comply with this regulation. Per 45 CSR 6-4.3, opacity of emissions from this unit shall not exceed 20 percent, except as provided by 4.4. PM emissions from this unit will not exceed the levels calculated in accordance with 6-4.1.

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 such, by complying with all applicable requirements of 40 CFR Part 60 at the Shirley Station, CONE will be complying with 45 CSR 16.

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.

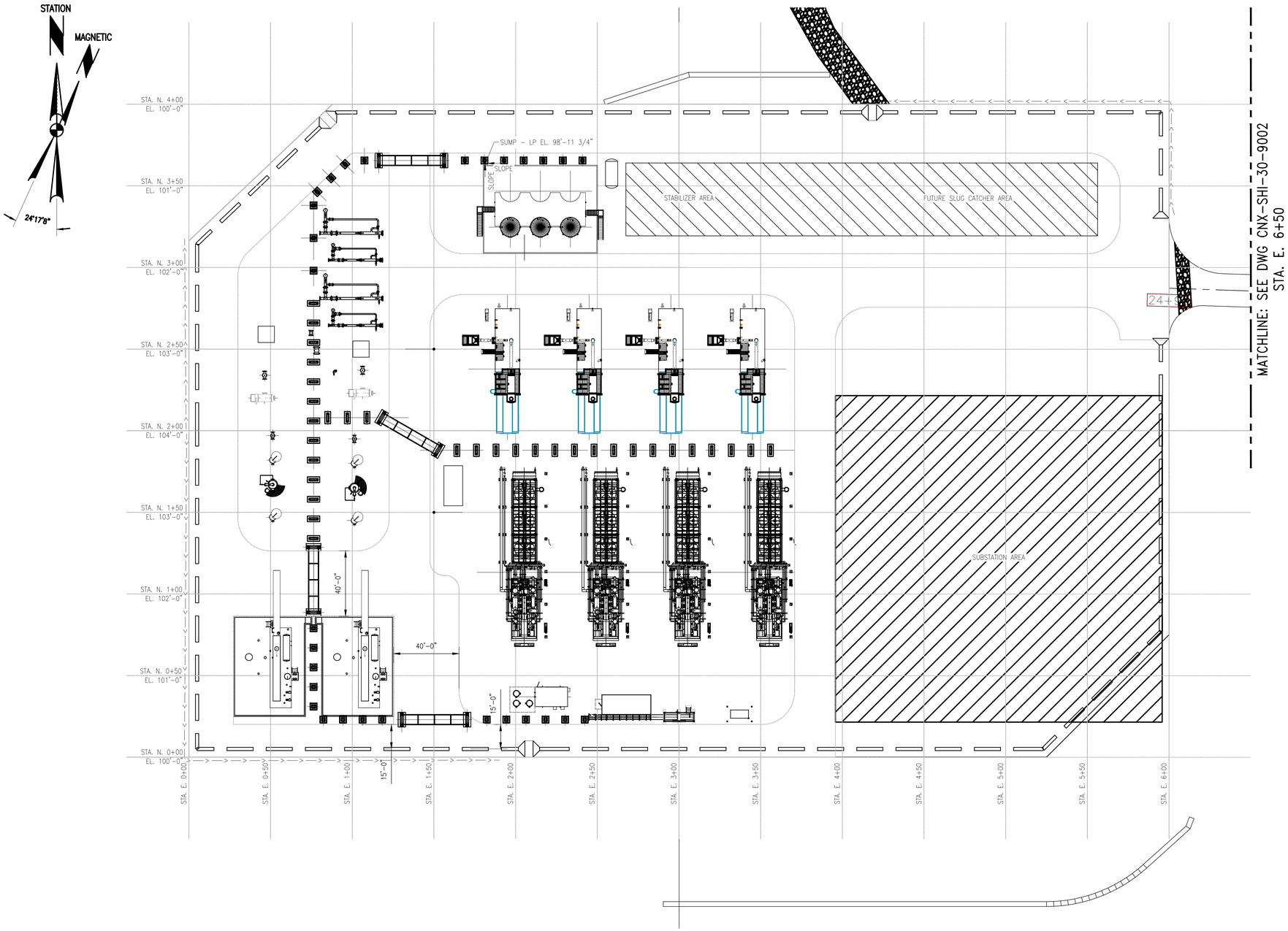
Due to the nature of the activities at the Shirley Station it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, CONE will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any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

45 CSR 21-28: Petroleum Liquid Storage in Fixed Roof Tanks

45 CSR 21-28 applies to any fixed roof petroleum liquid storage tank with a capacity greater than 40,000 gallons. The capacity of the new storage tanks proposed for the Shirley Compressor Station is less than 40,000 gallons; therefore, 45 CSR 21-28 will not apply.

ATTACHMENT E

Plot Plan



SHIRLEY COMPRESSOR STATION
EQUIPMENT LIST

PR-0010	16"X20" PIG RECEIVER
PL-XXXX	12"x16" PIG LAUNCHER
PR-0030	16"X20" PIG RECEIVER
PL-XXXX	12"x16" PIG LAUNCHER
SC-0100	SLUG CATCHER
VS-0210	INLET GAS SCRUBBER
FS-0610	HORIZONTAL FILTER
COMP-1100	USA COMPRESSOR SKID (GAS)
COMP-1200	USA COMPRESSOR SKID (GAS)
COMP-1300	USA COMPRESSOR SKID (GAS)
VS-2100	DISCHARGE SCRUBBER
FS-2500	DEHY INLET FILTER SEPARATOR
V-3100	GLYCOL CONTACTOR TOWER
E-3150	GAS / GLYCOL HEAT EXCHANGER
H-3210	GLYCOL REBOILER
FS-4100	DEHY OUTLET FILTER SEPARATOR
G-3420	REGENERATOR SKID
G-3420	GROUND FLARE
TK-3400	DRAIN TANK
FG-5700	FUEL & INSTRUMENT GAS SKID
T-5500	GUN BARREL TANK
T-5600	CONDENSATE STORAGE TANK
T-5525	CONDENSATE WATER TANK
P-5590	LOW PRESSURE SUMP PUMP
AS-1150	COMPRESSED AIR BUILDING
V-5110	DRY AIR RECEIVER
V-5120	DRY AIR RECEIVER
V-5130	DRY AIR RECEIVER
FD-8000	HORIZONTAL FLARE DRUM

FUTURE EQUIPMENT

	YY"xZZ" PIG LAUNCHER
	SLUG CATCHER
	INLET GAS SCRUBBER
	HORIZONTAL FILTER
	USA COMPRESSOR SKID
	USA COMPRESSOR SKID
	USA COMPRESSOR SKID
	USA COMPRESSOR SKID
	USA COMPRESSOR SKID
	DISCHARGE SCRUBBER
	DEHY INLET FILTER SEPARATOR
	GLYCOL CONTACTOR TOWER
	GAS / GLYCOL HEAT EXCHANGER
	GLYCOL REBOILER
	DEHY OUTLET FILTER SEPARATOR
	REGENERATOR SKID
	GROUND FLARE
	DRAIN TANK
	FUEL & INSTRUMENT GAS SKID
	CONDENSATE STORAGE TANK
	CONDENSATE WATER TANK
	CONDENSATE STORAGE TANK
	COMPRESSED AIR BUILDING

0' 5' 15' 25' 35' 45' 70' 100'
SCALE: 1/32" = 1'-0"
(FOR 36" x 24" DRAWING SIZE ONLY)

1. ALL STATION COORDINATES ARE IN FEET.
2.

NOTES

DRAWING NUMBER	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	CK'D	APP
B		KJW	ISSUE FOR		
A	04/18/14	KJW	ISSUE FOR DESIGN	RSM	EHS

REVISIONS

DRAFTING
DRAWN BY K. WINGARD DATE 03/27/14
CK'D BY S. MILLER DATE 04/17/14

ENGINEERING
ENGINEER M. McGOWAN DATE 04/17/14
APP'D E. SCHAEFER DATE 04/17/14

PLOT DATE
4/25/2014 1:32 PM

SCALE: 1/32" = 1'-0"

URS
PROCESS ENGINEERING GROUP
FOSTER PLAZA 6
681 ANDERSEN DRIVE, SUITE #400
PITTSBURGH, PA 15220

NOTE: THIS DRAWING IS THE PROPERTY OF URS CORPORATION AND SHALL NOT TO BE TRACED, PHOTOGRAPHED, OR REPRODUCED IN ANY MANNER, NOR USED FOR ANY PURPOSE WHATSOEVER EXCEPT BY WRITTEN PERMISSION OF URS CORPORATION. NOT VALID FOR CONSTRUCTION UNLESS CERTIFIED.

CONSOL ENERGY

SHIRLEY COMPRESSOR STATION
PLOT PLAN
COMPRESSOR PAD

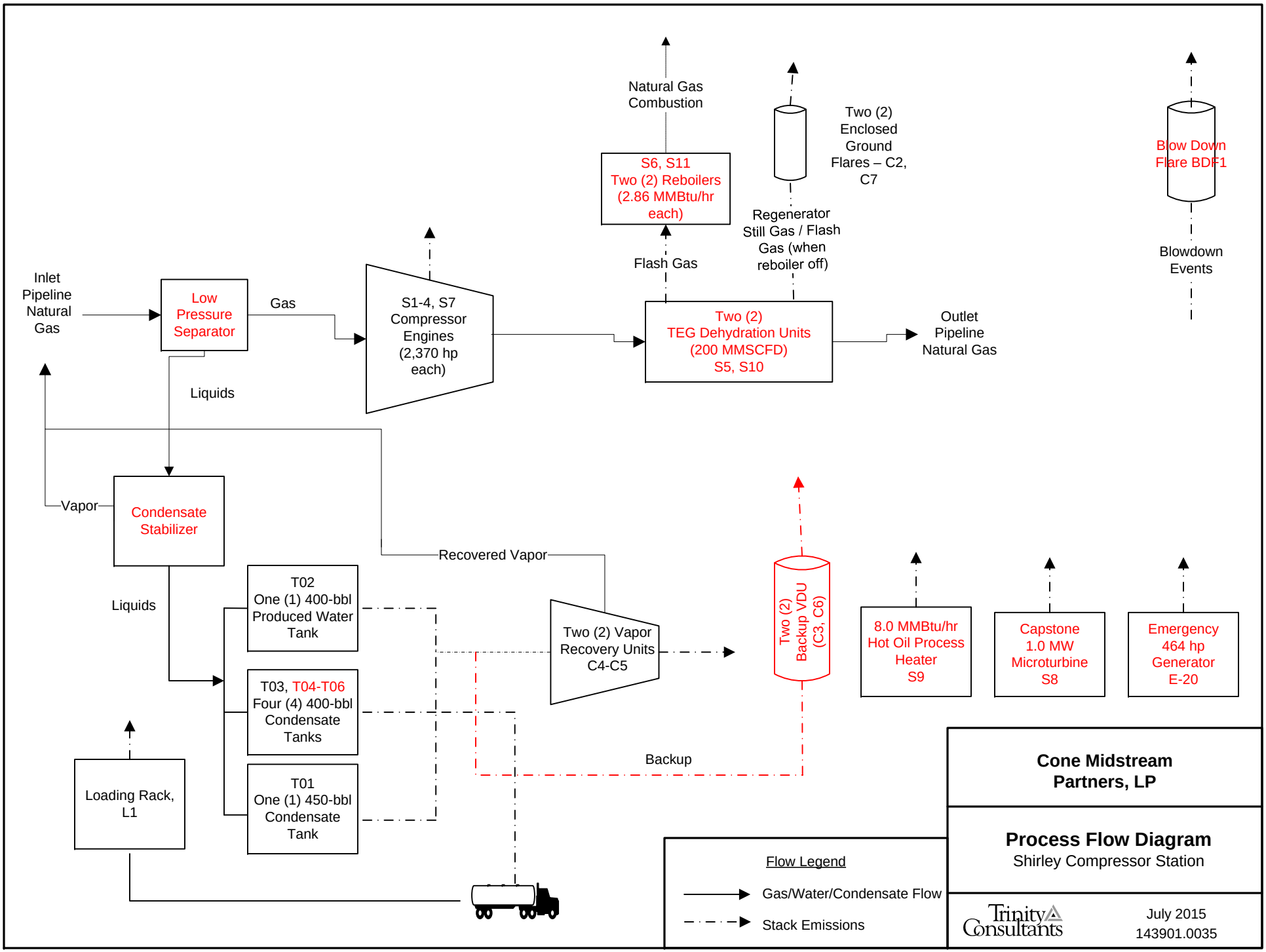
TYLER COUNTY WEST VIRGINIA

JOB NO.	DRAWING NO.	REV.
39940766	CNX-SHI-30-9001	B

Y:\PROJECTS\1747\CONSOL ENERGY\39940766- SHIRLEY WV COMPRESSOR ENGINEERING\PIPING\DRAWINGS\PLOT_PLANS\CNX-SHI-30-9001_4.23.DWG

ATTACHMENT F

Detailed Process Flow Diagram


Natural Gas Combustion
S6, S11
Two (2) Reboilers
(2.86 MMBtu/hr each)
Two (2) Enclosed Ground Flares – C2, C7
Regenerator Still Gas / Flash Gas (when reboiler off)
Flash Gas
Blow Down Flare BDF1
Blowdown Events
Inlet Pipeline Natural Gas
Low Pressure Separator
Gas
S1-4, S7 Compressor Engines (2,370 hp each)
Two (2) TEG Dehydration Units (200 MMSCFD) S5, S10
Outlet Pipeline Natural Gas
Liquids
Vapor
Condensate Stabilizer
Recovered Vapor
Liquids
T02
One (1) 400-bbl Produced Water Tank
T03, T04-T06
Four (4) 400-bbl Condensate Tanks
T01
One (1) 450-bbl Condensate Tank
Two (2) Vapor Recovery Units C4-C5
Two (2) Backup VDU (C3, C6)
8.0 MMBtu/hr Hot Oil Process Heater S9
Capstone 1.0 MW Microturbine S8
Emergency 464 hp Generator E-20
Backup
Loading Rack, L1
Flow Legend
Gas/Water/Condensate Flow
Stack Emissions
Cone Midstream Partners, LP
Process Flow Diagram
Shirley Compressor Station
Trinity Consultants
July 2015
143901.0035

ATTACHMENT G

Process Description

ATTACHMENT G – PROCESS DESCRIPTION

As part of this application. CONE is proposing to install additional equipment in order to increase the liquid throughputs, dehydration and compression capacity of natural gas at the Shirley station. Additionally, CONE is proposing to install a condensate stabilizer which will allow for more effective recovery of the vapors from the lighter hydrocarbons present in the condensate.

Natural gas enters the station via a pipeline system and is compressed using one of the five (5) natural gas-fired compressor engines (each rated at 2,370 hp). The compressed natural gas stream is then processed through the triethylene glycol (TEG) dehydration units (with associated reboiler). The dehydration units will introduce TEG to the gas stream in a contact tower to absorb water vapor from the gas to a level not exceeding 7 pounds per million standard cubic feet (lb/MMscf). The TEG is then sent to the natural gas-fired reboiler. The water is evaporated from the TEG in the reboiler and discharged, and the glycol is then sent back to the contact tower for reuse. The dehydration unit is equipped with an enclosed ground flare which will control emissions from the dehydration still vent, and the emissions from the flash tank will be routed to the reboiler for use as fuel, with backup to the enclosed ground flare when the reboiler is down. The natural gas stream from the contact tower flows into the pipeline to be transported further along the pipeline system. Liquids coming off the low pressure separator will pass through a condensate stabilizer, whose resulting vapors will be routed back to the station inlet pipeline. Following the condensate stabilizer, the liquid will be routed the six (6) produced water/condensate storage tanks. Emissions from the storage tank will be controlled by two (2) vapor recovery units (VRU). Vapors recovered from the VRU will be routed to the inlet pipeline of the station for recompression and dehydration. During periods of VRU downtime, emissions from the storage tanks will be routed to a back-up vapor destruction unit (VDU) for control. Once the tanks are filled, the contents are loaded into trucks for transport. Truck loading is vapor balanced and controlled by the VRU, with VDU backup.

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]
T01	E9, E10, E8, E16	Condensate Tank	2015	450 bbl	Modified – Increased throughput	C4/C5 (C3 and/or C6 backup)
T02	E9, E10, E8, E16	Produced Water Storage Tank	2015	400 bbl	Existing	C4/C5 (C3 and/or C6 backup)
T03	E9, E10, E8, E16	Condensate Tank	2015	400 bbl	Modified – Increased throughput	C4/C5 (C3 backup)
S1	E1	Caterpillar 3608 Compressor Engine	2015	2,370 hp	Modified – Revised control efficiency	C1 (Oxidation Catalyst)
S2	E2	Caterpillar 3608 Compressor Engine	2015	2,370 hp	Modified – Revised control efficiency	C1 (Oxidation Catalyst)
S3	E3	Caterpillar 3608 Compressor Engine	2015	2,370 hp	Modified – Revised control efficiency	C1 (Oxidation Catalyst)
S4	E4	Caterpillar 3608 Compressor Engine	2015	2,370 hp	Modified – Revised control efficiency	C1 (Oxidation Catalyst)
S5	E7	TEG Dehydration Unit	2015	200 MMSCFD	Modified – Throughput Increase	C2
S6	E6	TEG Dehydration Unit Reboiler	2015	2.86 MMbtu/hr	Modified – Revised Heat Input Rating	None
C2	E7	Dehydration Unit Enclosed Ground Flare	2015	6.00 MMbtu/hr	Existing	None
C3	E8	Backup Vapor Destruction Unit	2015	18.4 MMbtu/hr	Existing	None
C4	E9	Cummins G8.3/H302 VRU	2015	118 hp	Modified- Revised control efficiency	C8 (3-Way Catalysts)
C5	E10	Arrow VRG 3330 VRU	2015	68 hp	Existing	None
S7	E11	Caterpillar 3608 Compressor Engine	2015	2,370 hp	New	C1 (Oxidation Catalyst)

S8	E12	Capstone Microturbine	2015	1.0 MW	New	None
S9	E13	Hot Oil Process Heater	2015	8.0 MMbtu/hr	New	None
S10	E17	TEG Dehydration Unit #2	2015	200 MMSCFD	New	C7
S11	E15	TEG Dehydration Unit Reboiler #2	2015	2.86 MMbtu/hr	New	None
C6	E16	Backup Vapor Destruction Unit	2015	18.4 MMbtu/hr	New	None
C7	E17	Dehydration Unit Enclosed Ground Flare # 2	2015	6.00 MMbtu/hr	New	None
BDF-1	E18	Blowdown Flare	2015	7660 MMbtu/hr	New	None
T04	E9, E10, E8, E16	Condensate Tank	2015	400 bbl	New	C4/C5 (C3 and /or C6 backup)
T05	E9, E10, E8, E16	Condensate Tank	2015	400 bbl	New	C4/C5 (C3 and /or C6 backup)
T06	E9, E10, E8, E16	Condensate Tank	2015	400 bbl	New	C4/C5 (C3 and/or C6 backup)
T07	E19	TEG Tank	2015	1,000 gal	New	None
E-20	E-20	Cummins Emergency Generator	2015	464 hp	Existing	None
L1	L1 (fug) E9, E10, E8, E16	Product Loadout Rack	2015	49,543,000 gal/yr	Modified	C4/C5 (C3 and /or C6 backup)
T08-T17	E21-E30	Ten (10) Lube Oil tanks	2015	500 gal (each)	New	None
T18-T19	E31-E32	Two (2) Methanol tanks	2015	500 gal (each)	New	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.

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			
E1-E4, E11 (Each Engine)	Upward Vertical stack	S1-S4, S7	Compressor Engines (Each engine)	C1	Oxidation Catalyst	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 HAPs CO2e Formaldehyde	2.61 14.37 4.65 0.01 0.18 1.71 2,945 1.36	11.44 62.93 20.37 0.05 0.78 7.47 12,901 5.95	2.61 1.01 1.25 0.01 0.18 0.60 2,945 0.26	11.44 4.41 5.46 0.05 0.78 2.65 12,901 1.13	Gas/Vapor	O[A] O[A] O[A] O[B] O[B] O[A,B] O[A,C] O[A]	
E7, E17 (each dehy)	Upward Vertical Stack	S5, S10	Dehydration Unit (each dehy)	C2, C7	Ground flares	NA	NA	VOC HAP Benzene CO2e	99.03 2.15 0.84 4,468	433.75 9.44 3.67 19,570	1.98 0.04 0.02 91.22	8.68 0.19 0.07 399.52	Gas/Vapor	O[D]	
E7, E17 (Each unit)	Upward Vertical Stack	C2, C7	Dehy Enclosed Ground Flares (each unit)	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 CO2e	0.51 0.43 0.04 <0.01 744	2.24 1.88 0.17 0.01 3,257	0.51 0.43 0.04 <0.01 744	2.24 1.88 0.17 0.01 3,257	Gas/Vapor	O[F] O[F] O[F] O[F] O[C]	
E6, E15 (Each unit)	Upward Vertical Stack	S6, S11	Reboilers (Each Unit)	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 VOC CO2e	0.23 0.19 0.02 <0.01 0.01 335	1.01 0.84 0.08 0.01 0.06 1,466	0.23 0.19 0.02 <0.01 0.01 335	1.01 0.84 0.08 0.01 0.06 1,466	Gas/Vapor	O[F] O[F] O[F] O[F] O[F] O[C]	
E9, E10, E8, E16	Upward Vertical Stack	T02	Produced Water Storage Tank	C4/C5 C3, C6 backup	VRU Backup VDU	NA	NA	VOC HAP	0.06 <0.01	0.28 0.01	<0.01 <0.01	0.01 <0.01	Gas/Vapor	O[E]	
E9, E10, E8, E16 (Total tanks)	Upward Vertical Stack	T01, T03, T04-T06	Condensate Storage Tanks (Total Tanks)	C4/C5 C3, C6 backup	VRU Backup VDU	NA	NA	VOC HAP	10.25 0.17	44.91 0.73	0.21 <0.01	0.90 0.02	Gas/Vapor	O[E]	

L1 (fug) E9, E10, E8, E16	Fugitive (uncaptured), Upward Vertical Stack (captured)	L1	Liquid Loading	C4/C5 C3, C6 backup	VRU Backup VDU	NA	NA	VOC HAP	NA NA	433.09 7.05	NA NA	14.18 0.23	Gas/Vapor	O[E]	
E8, E16 (Each unit)	Upward Vertical Stack	C3, C6 (Each unit)	Backup VDUs	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 CO2e	1.50 1.26 0.11 0.01 2,190	0.47 0.40 0.04 <0.01 692	1.50 1.26 0.11 0.01 2,190	0.47 0.40 0.04 <0.01 692	Gas/Vapor	O[F] O[F] O[F] O[F] O[C]	
E9	Upward Vertical stack	C4	Cummins VRU Engine	C8	3-Way Catalyst	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 HAPs CO2e Formaldehyde	3.38 2.24 0.27 <0.01 0.02 0.02 118 0.01	14.81 9.80 1.18 <0.01 0.08 0.09 515 0.04	0.52 1.04 0.27 <0.01 0.02 0.02 118 0.01	2.28 4.56 1.18 <0.01 0.08 0.09 515 0.04	Gas/Vapor	O[A] O[A] O[A] O[G] O[G] O[A,G] O[C] O[G]	
E10	Upward Vertical stack	C5	Arrow VRU Engine	NA	NA	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 HAPs CO2e Formaldehyde	2.16 2.44 0.03 0.01 0.01 0.02 72 0.01	9.46 10.70 0.13 0.03 0.05 0.09 314 0.05	2.16 2.44 0.03 0.01 0.01 0.02 72 0.01	9.46 10.70 0.13 0.03 0.05 0.09 314 0.05	Gas/Vapor	O[A] O[A] O[A] O[G] O[G] O[A,G] O[C] O[G]	
E18	Upward Vertical Stack	BDF-1	Blowdown Flare	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 VOC	520.89 2834.21 <0.01 <0.01	0.59 2.93 <0.01 <0.01 22.54	520.89 2834.21 <0.01 <0.01	0.59 2.93 <0.01 <0.01 1.13	Gas/Vapor	O[I] O[I] O[I] O[I] O[L]	
E13	Upward Vertical Stack	S9	Hot Oil Heater	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 VOC CO2e	0.64 0.54 0.05 <0.01 0.04 937	2.82 2.37 0.21 0.02 0.15 4,104	0.64 0.54 0.05 <0.01 0.04 937	2.82 2.37 0.21 0.02 0.15 4,104	Gas/Vapor	O[F] O[F] O[F] O[F] O[F] O[C]	
E12	Upward Vertical Stack	S8	Microturbine	NA	NA	NA	NA	NOx CO PM/PM10/PM2.5 SO2 VOC CO2e HAP Formaldehyde	0.40 1.10 0.08 0.04 0.10 1,331 0.01 0.01	1.75 4.82 0.33 0.17 0.44 5,831 0.05 0.04	0.40 1.10 0.08 0.04 0.10 1,331 0.01 0.01	1.75 4.82 0.33 0.17 0.44 5,831 0.05 0.04	Gas/Vapor	O[A] O[A] O[H] O[H] O[A] O[C] O[H] O[H]	
E20	Upward Vertical Stak	E-20	Diesel Emergency Generator	NA	NA	NA	NA	NOx CO VOC SO2 PM/PM10/PM2.5 HAPs CO2e	3.05 2.67 3.05 0.95 0.15 0.01 527	0.76 0.67 0.76 0.24 0.04 0.003 132	3.05 2.67 3.05 0.95 0.15 0.01 527	0.76 0.67 0.76 0.24 0.04 0.003 132	Gas/Vapor	O[J] O[J] O[J] O[K] O[J] O[K] O[C]	

A- Manufacturer's specific pollutant emission Factor
B- AP-42 Section 3.2, Table 3.2-2.
C- 40 CFR 98, Subpart C for natural gas fired combustion.
D- GRI-GLYCalc
E- Bryan and Research Engineering Promax Software

F- AP-42 Section 1.4 Tables 1.4-1, 1.4-2 and 1.4-3, July 1998.
G- Emission factors from AP-42 Section 3.2, Table 3.2-3.
H- AP-42 Section 3.1, Table 3.1-3
I- AP-42 Section 13.5,
J- Tier 1 emission limits under NSPS IIII
K- AP-42 Section 3.3
L- Mass Balance

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. (^{o}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
	TBD							

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

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☐ Yes ☒ No ☐ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No ☒ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☒ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA	--	--	--	--	--
Unpaved Haul Roads	NA	--	--	--	--	--
Storage Pile Emissions	NA	---	---	---	---	---
Loading/Unloading Operations	VOC HAP	N/A	433.09 7.05	N/A	14.18 0.23	O[B]
Wastewater Treatment Evaporation & Operations	NA	---	---	---	---	---
Equipment Leaks (blowdowns reported under blowdown flare)	VOC HAP	N/A	4.36 0.06	N/A	4.36 0.06	O[A]
General Clean-up VOC Emissions	NA	---	---	---	---	---
Other	NA	---	---	---	---	---

A – Oil *and Gas Production Operations Average Emission Factors*, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, Table 2-4, November 1995.
B- Bryan Research Engineering Promax Software

[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).

LEAK-SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]	2	0		769
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC	290	0		2,406
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC				
Safety Relief Valves[11]	Gas VOC	10	0		1,446
	Non VOC				
Open-ended Lines[12]	VOC	16	0		38
	Non-VOC				
Sampling Connections[13]	VOC				
	Non-VOC				
Compressors	VOC				
	Non-VOC				
Flanges	VOC	966	0		2,457
	Non-VOC				
Other	VOC	10	0		1,601
	Non-VOC				

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

Notes for Leak Source Data Sheet

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

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

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

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

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

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

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

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

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

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

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

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

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

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

13. Do not include closed-purge sampling connections.

ATTACHMENT L

Emission Unit Data Sheet

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): S8 – Microturbines

1. Name or type and model of proposed affected source: Capstone microturbine generator – 1.0 MW (consists of 5 identical 200 kW units)
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials. Electrical generation from natural gas.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Combustion of natural gas

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

6. Combustion Data (if applicable):

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

natural gas – 9,162 scf/hr

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

natural gas

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

Unknown @ °F and psia.

(d) Percent excess air: Unknown

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

Five (5) 2.28 MMBtu/hr stationary gas turbines

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

NA

(g) Proposed maximum design heat input: 2.28 (each) $\times 10^6$ BTU/hr.

7. Projected operating schedule:

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

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

@ °F and psia

a.	NO_X	0.40	lb/hr	grains/ACF
b.	SO_2	0.04	lb/hr	grains/ACF
c.	CO	1.10	lb/hr	grains/ACF
d.	PM_{10}	0.08	lb/hr	grains/ACF
e.	Hydrocarbons	0.10	lb/hr	grains/ACF
f.	VOCs	0.10	lb/hr	grains/ACF
g.	Pb	NA	lb/hr	grains/ACF
h.	Specify other(s)			
	CO_2e	1,331	lb/hr	grains/ACF
	HAP	0.01	lb/hr	grains/ACF
	Formaldehyde	0.01	lb/hr	grains/ACF
			lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Fuel throughput	Fuel Throughput
REPORTING	TESTING
None	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 PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

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

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

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

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

See attached manufacturer's specification sheet

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): Compressor Engines S1-S4, S7

1. Name or type and model of proposed affected source: Compressor Engines – Five (5) Caterpillar 3608 natural gas fired compressor engines
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials. Compresses natural gas to maintain pipeline pressure.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Internal combustion of natural gas.

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

6. Combustion Data (if applicable):

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

Pipeline quality natural gas – 14,349 scf/hr (each engine), 125.69 MMscf/yr (each engine)

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

Natural gas with negligible H_2S and ash content.

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

@ °F and psia.

(d) Percent excess air: Unknown

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

17.85 MMBtu/hr spark ignition reciprocating internal combustion engine (each).

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

NA

(g) Proposed maximum design heat input: 17.85 $\times 10^6$ BTU/hr.

7. Projected operating schedule:

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

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

@ 857 °F and 14.7 psia

a.	NO_X	2.61	lb/hr	grains/ACF
b.	SO_2	0.01	lb/hr	grains/ACF
c.	CO	14.37	lb/hr	grains/ACF
d.	PM_{10}	0.18	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs (Includes CH2O)	4.65	lb/hr	grains/ACF
g.	Pb	NA	lb/hr	grains/ACF
h.	Specify other(s)			
	Benzene	0.01	lb/hr	grains/ACF
	Toluene	0.01	lb/hr	grains/ACF
	Xylene	0.003	lb/hr	grains/ACF
	Formaldehyde	1.36	lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Replace the reciprocating compressor rod packing before 26,000 hours or 36 months from the date of the most recent rod packing element Monitor the number of hours of operation for each reciprocating compressor	Maintain records of maintenance conducted on the engine Maintain records of all notification submitted Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e) Maintain records of the cumulative hours of operation or number of months since initial start up Maintain records of the date and time of each reciprocating compressor rod packing element Maintain records of the deviations in cases where the compressor was not operated in compliance with 60.5383
REPORTING	TESTING
Submission of an initial notification as required in 40 CFR 60.7(a)(1) Submit a copy of each performance test Submit an annual NSPS OOOO report one year from the initial annual report	Initial performance test and subsequent performance testing every 8760 hours or every three years, whichever comes first.

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

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

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

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

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
See attached manufacturer specification sheet

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): Dehydration Units and reboilers-S5, S6, S10, S11

1. Name or type and model of proposed affected source: 200 MMSCFD dehydration unit with 2.86 MMbtu/hr duty (Heat Input rated) reboiler (each)
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: 200 million standard cubic feet per day of natural gas, each
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce a material – removes water from wet natural gas
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: External combustion of natural gas in reboiler

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

6. Combustion Data (if applicable):

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

Reboiler - Natural gas – 2,296 scf/hr (each) 20.11 MMscf/yr (each)

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

Natural gas with negligible H_2S and ash content.

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

Unknown @ °F and psia.

(d) Percent excess air: Unknown

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

natural gas fired external combustion heater – 2.86 MMbtu/hr input rating (each)

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

NA

(g) Proposed maximum design heat input: 2.86 (each) $\times 10^6$ BTU/hr.

7. Projected operating schedule:

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

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

@ Unknown °F and psia

a.	NO_X	0.23	lb/hr	reboiler	grains/ACF
b.	SO_2	0.001	lb/hr	reboiler	grains/ACF
c.	CO	0.19	lb/hr	reboiler	grains/ACF
d.	PM_{10}	0.01	lb/hr	reboiler	grains/ACF
e.	Hydrocarbons	364.62	lb/hr	dehy	grains/ACF
f.	VOCs	99.03	lb/hr	dehy	grains/ACF
g.	Pb		lb/hr		grains/ACF
h.	Specify other(s)				
	HAP	2.15	lb/hr	dehy	grains/ACF
	Benzene	0.84	lb/hr	dehy	grains/ACF
	Toluene		lb/hr		grains/ACF
			lb/hr		grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Throughput of wet natural gas. Operating parameters of dehydration unit for GLYCalc (temperature, pressure, glycol flow rate) Conduct visual inspections one per month confirming the pilot is lit.	Annual benzene emissions calculated with GLYCalc. Maintain records of all potential to emit (PTE) HAP calculations for the entire affected facility Maintain records of the times and duration of all periods which the pilot flame was absent Maintain records of the visible emission opacity tests
REPORTING None.	TESTING Conduct a Method 22 opacity test for at least two hours on a quarterly basis

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

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

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

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

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

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): E-20

1. Name or type and model of proposed affected source: Diesel Fired Emergency Generator Engine
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials. Provides electricity during power outages and other upset conditions.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Internal combustion of diesel fuel.

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

6. Combustion Data (if applicable):

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

Diesel – 23.5 gal/hr, 11,750 gal/yr

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

Diesel fuel with 15 ppm sulfur.

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

@ °F and psia.

(d) Percent excess air: Unknown

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

3.22 MMBtu/hr compression ignition reciprocating internal combustion engine.

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

NA

(g) Proposed maximum design heat input: 3.22 $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	1	Days/Week	1	Weeks/Year	52

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

@ °F and psia

a.	NO_X	3.05 lb/hr	grains/ACF
b.	SO_2	0.95 lb/hr	grains/ACF
c.	CO	2.67 lb/hr	grains/ACF
d.	PM_{10}	0.15 lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs (Includes CH2O)	3.05 lb/hr	grains/ACF
g.	Pb	NA lb/hr	grains/ACF
h.	Specify other(s)		
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Hours of operation	Maintain records of maintenance conducted on the engine Maintain hours of operation
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 PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

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

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

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

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
See attached manufacturer specification sheet

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

S9 - Hot Oil Process Heater

Control Device ID No. (must match List Form): None

Equipment Information

1. Manufacturer: TBD	2. Model No. TBD Serial No. TBD
3. Number of units: 1	4. Use Process Heat
5. Rated Boiler Horsepower: NA hp	6. Boiler Serial No.: TBD
7. Date constructed: 2015	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: 8 $\times 10^6$ BTU/hr	10. Peak heat input per unit: 8 $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: NA - no steam LB/hr psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 7 Weeks/Year 52
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☒ Natural Gas Burner ☐ Others, specify	14. Proposed type of burners and orientation: ☐ Vertical ☐ Front Wall ☐ Opposed ☐ Tangential ☐ Others, specify
15. Type of draft: ☐ Forced ☐ Induced	16. Percent of ash retained in furnace: NA %
17. Will flash be reinjected? ☐ Yes ☒ No	18. Percent of carbon in flash: NA %

Stack or Vent Data

19. Inside diameter or dimensions: TBD ft.	20. Gas exit temperature: TBD °F
21. Height: TBD ft.	22. Stack serves: ☒ This equipment only ☐ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: TBD ft^3/min	
24. Estimated percent of moisture: TBD %	

Fuel Requirements

25. **Type**	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Other:
Quantity (at Design Output)	gph@60°F	6430 ft^3/hr	ft^3/hr	TPH	
Annually	$\times 10^3$ gal	56.32 $\times 10^6$ ft^3/yr	$\times 10^6$ ft^3/hr	tons	
Sulfur	Maximum: wt. % Average: wt. %	neg gr/100 ft^3	gr/100 ft^3	Maximum: wt. %	
Ash (%)				Maximum	
BTU Content	BTU/Gal. Lbs/Gal.@60°F	1,244 BTU/ft^3	BTU/ft^3	BTU/lb	
Source					
Supplier					
Halogens (Yes/No)		No			
List and Identify Metals		NA			

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☐ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture:

28. Oil burner manufacture:

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure ☐ Compressed Air ☐ Rotary Cup ☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☒ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
@ °F, PSIA, % moisture

33. Emission rate at rated capacity: TBD lb/hr

34. Percent excess air actually required for combustion of the fuel described: %

Coal Characteristics

35. Seams:

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur:
% of Moisture: % of Volatile Matter:
% of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	0.54			
Hydrocarbons				
NO_x	0.64			
Pb				
PM_{10}	0.05			
SO_2	<0.01			
VOCs	0.04			
Other (specify) CO_2e	937			

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	0.54			
Hydrocarbons				
NO_x	0.64			
Pb				
PM_{10}	0.05			
SO_2	<0.01			
VOCs	0.04			
Other (specify) CO_2e	937			

39. How will waste material from the process and control equipment be disposed of?

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit.

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet?

42. **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 PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Monitor fuel usage throughput (scf/yr)

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.
None

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Maintain records of fuel throughput (scf/yr)

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

None

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

N/A

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): VRU Engine – C5

1. Name or type and model of proposed affected source: Arrow VRG 330
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Internal combustion of natural gas.

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

6. Combustion Data (if applicable):

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

Pipeline quality natural gas – 492 scf/hr, 4.31 MMscf/yr

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

Pipeline quality natural gas with negligible H_2S and ash content.

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

@ °F and psia.

(d) Percent excess air: Unknown

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

0.61 MMBtu/hr spark ignition reciprocating internal combustion engine.

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

NA

(g) Proposed maximum design heat input: 0.61 $\times 10^6$ BTU/hr.

7. Projected operating schedule:

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

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

@ 857 °F and 14.7 psia

a.	NO_X	2.16	lb/hr	grains/ACF
b.	SO_2	<0.01	lb/hr	grains/ACF
c.	CO	2.44	lb/hr	grains/ACF
d.	PM_{10}	0.01	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs (Includes CH2O)	0.02	lb/hr	grains/ACF
g.	Pb	NA	lb/hr	grains/ACF
h.	Specify other(s)			
	Formaldehyde	0.01	lb/hr	grains/ACF
	CO_2e	72	lb/hr	grains/ACF
	HAPs	0.02	lb/hr	grains/ACF
			lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Change engine oil and filter, inspect spark plus, and inspect /replace as necessary all hoses and belts every 1,440 hours	Maintain records of maintenance conducted on the engine Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e) Maintain records of the amount of natural gas consumed in each engine Maintain records of the hours of operation of each engine
REPORTING	TESTING
None	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 PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

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

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

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

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
See attached manufacturer specification sheet

EMISSIONS UNIT DATA SHEET
GENERAL

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

Identification Number (as assigned on *Equipment List Form*): VRU Engine – C4

1. Name or type and model of proposed affected source: VRU Engine – Cummins G8.3 Engine
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: Does not produce any materials.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Internal combustion of natural gas.

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

6. Combustion Data (if applicable):

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

Natural gas – 762 scf/hr, 6.67 MMscf/yr

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

Natural gas with negligible H_2S and ash content.

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

@ °F and psia.

(d) Percent excess air: Unknown

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

0.95 MMBtu/hr spark ignition reciprocating internal combustion engine.

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

NA

(g) Proposed maximum design heat input: 0.95 $\times 10^6$ BTU/hr.

7. Projected operating schedule:

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

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:			
@ 857 °F and 14.7 psia			
a.	NO_X	3.38 lb/hr	grains/ACF
b.	SO_2	<0.01 lb/hr	grains/ACF
c.	CO	2.24 lb/hr	grains/ACF
d.	PM_{10}	0.02 lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs (Includes CH2O)	0.27 lb/hr	grains/ACF
g.	Pb	NA lb/hr	grains/ACF
h.	Specify other(s)		
	Formaldehyde	0.01 lb/hr	grains/ACF
	CO_2e	118 lb/hr	grains/ACF
	HAPs	0.02 lb/hr	grains/ACF
		lb/hr	grains/ACF

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

(2) Complete the Emission Points Data Sheet.

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

MONITORING	RECORDKEEPING
Change engine oil and filter, inspect spark plus, and inspect /replace as necessary all hoses and belts every 1,440 hours	Maintain records of maintenance conducted on the engine Maintain documentation that the engine meets the emission standards of 40 CFR 60.4233(e) Maintain records of the amount of natural gas consumed in each engine Maintain records of the hours of operation of each engine
REPORTING	TESTING
None	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 PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

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

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

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

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
See attached manufacturer specification sheet

Attachment L

EMISSIONS UNIT DATA SHEET
STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Shirley Station	2. Tank Name Condensate Storage Tanks
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) T04 through T06	4. Emission Point Identification No. (as assigned on *Equipment List Form*) E9, E10, E8, E16
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) Not Applicable	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. T04-T06 :400 bbl	
9A. Tank Internal Diameter (ft) 12	9B. Tank Internal Height (or Length) (ft) 20
10A. Maximum Liquid Height (ft) 20	10B. Average Liquid Height (ft) 10
11A. Maximum Vapor Space Height (ft) 10	11B. Average Vapor Space Height (ft) 10
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 375 bbl	

13A. Maximum annual throughput (gal/yr) 9,811,200 (each tank)	13B. Maximum daily throughput (gal/day) ~26,880 (each tank)

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
~584 (each tank)

15. Maximum tank fill rate (gal/min) TBD

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

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

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

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

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

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

20A. Shell Color White	20B. Roof Color White	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☒ NO

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

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

23. Operating Pressure Range (psig): 0

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

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft) 0.0625

25. Complete the following section for **Floating Roof Tanks** ☒ Does Not Apply

25A. Year Internal Floaters Installed:

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

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

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

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

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

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

27. Provide the city and state on which the data in this section are based. Huntington, WV	
28. Daily Average Ambient Temperature (°F)	
29. Annual Average Maximum Temperature (°F) 65.3	
30. Annual Average Minimum Temperature (°F) 45	
31. Average Wind Speed (miles/hr)	6.6
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))	1,176
33. Atmospheric Pressure (psia)	14.33

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

34. Average daily temperature range of bulk liquid: 56.74	
34A. Minimum (°F)	34B. Maximum (°F) 61.79
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F) 56.74	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F) 61.79	38B. Corresponding Vapor Pressure (psia)

39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.

39A.	Material Name or Composition	Condensate (mixture)		
39B.	CAS Number	N/A		
39C.	Liquid Density (lb/gal)	6.5 – 7.5		
39D.	Liquid Molecular Weight (lb/lb-mole)	18.27		
39E.	Vapor Molecular Weight (lb/lb-mole)	34.09		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	22.95 9.79		
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
See attached Emissions Calculation					

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

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

Attachment L

EMISSIONS UNIT DATA SHEET
STORAGE TANKS

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

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Shirley Station	2. Tank Name Condensate Tanks
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) T01, T03	4. Emission Point Identification No. (as assigned on *Equipment List Form*) E9, E10, E8, E16
5. Date of Commencement of Construction (for existing tanks) 2014/5	
6. Type of change ☐ New Construction ☐ New Stored Material ☒ Other Tank Modification	
7. Description of Tank Modification (if applicable) Throughput increase	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): None	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. T01: 450 bbl T03 :400 bbl	
9A. Tank Internal Diameter (ft) 12 – 400 bbl, 450 bbl	9B. Tank Internal Height (or Length) (ft) 20 – 400bbl, 22.5 – 450 bbl
10A. Maximum Liquid Height (ft) 20- 400 bbl, 22.5- 450 bbl	10B. Average Liquid Height (ft) 10
11A. Maximum Vapor Space Height (ft) 10	11B. Average Vapor Space Height (ft) 10
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 375 bbls - 400 bbl tank, 425 bbls – 450 bbl tank	

13A. Maximum annual throughput (gal/yr) 9,811,200 (each tank)	13B. Maximum daily throughput (gal/day) ~26,880 (each tank)

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
~584 (each tank)

15. Maximum tank fill rate (gal/min) TBD

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

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

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

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

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

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

20A. Shell Color White	20B. Roof Color White	20C. Year Last Painted

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

22A. Is the tank heated? ☐ YES ☒ NO

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

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

23. Operating Pressure Range (psig): 0

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

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft) 0.0625

25. Complete the following section for **Floating Roof Tanks** ☒ Does Not Apply

25A. Year Internal Floaters Installed:

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

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

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

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

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

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

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

27. Provide the city and state on which the data in this section are based. Huntington, WV	
28. Daily Average Ambient Temperature (°F)	
29. Annual Average Maximum Temperature (°F) 65.3	
30. Annual Average Minimum Temperature (°F) 45	
31. Average Wind Speed (miles/hr)	6.6
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))	1,176
33. Atmospheric Pressure (psia)	14.33

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

34. Average daily temperature range of bulk liquid: 56.74	
34A. Minimum (°F)	34B. Maximum (°F) 61.79
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F) 56.74	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F) 61.79	38B. Corresponding Vapor Pressure (psia)

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

39A.	Material Name or Composition	Condensate (mixture)		
39B.	CAS Number	N/A		
39C.	Liquid Density (lb/gal)	6.5-7.5		
39D.	Liquid Molecular Weight (lb/lb-mole)	18.27		
39E.	Vapor Molecular Weight (lb/lb-mole)	34.09		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	22.95 9.79		
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet.

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

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
See attached Emissions Calculation					

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

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

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

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

Identification Number (as assigned on *Equipment List Form*):	
1. Loading Area Name: Produced Liquids (Condensate and Produced Water)	
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply): ☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks	
3. Loading Rack or Transfer Point Data:	
Number of pumps	1
Number of liquids loaded	1
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1
4. Does ballasting of marine vessels occur at this loading area? ☐ Yes ☐ No ☒ Does not apply	
5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:	
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. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7

weeks/quarter	13	13	13	13

8. Bulk Liquid Data *(add pages as necessary):*							
Pump ID No.		NA					
Liquid Name		Produced Liquids (Condensate and Produced Water)					
Max. daily throughput (1000 gal/day)		135.7					
Max. annual throughput (1000 gal/yr)		49,543					
Loading Method [1]		Vapor balanced					
Max. Fill Rate (gal/min)		TBD					
Average Fill Time (min/loading)							
Max. Bulk Liquid Temperature (^{o}F)		~62					
True Vapor Pressure [2]		< 7 psia					
Cargo Vessel Condition [3]		Unknown					
Control Equipment or Method [4]		O = Vapor return with VRU and combustion controls					
Minimum control efficiency (%)		98.7% Capture/ 98% control efficiency					
Maximum Emission Rate	Loading (lb/hr)	~3.23 lb/hr VOC & 0.05 lb/hr HAP					
	Annual (lb/yr)	~28,359 lb/yr VOC & 462 lb/hr HAP					
Estimation Method [5]		Bryan Research Engineering Promax Software					

[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 AdsorptionCO = 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 (descibe)

[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 Monitor the throughput to the vapor recovery units (C4/C5) on a monthly basis Monitor the vapor recovery units (C4/C5) in accordance with the manufacturer's plan	RECORDKEEPING Throughput of loaded liquids at site (gal/yr) on a monthly and rolling twelve month total. Maintain records of the vapor recovery unit (C4/C5) equipment inspection and maintenance Maintain records of any downtime associated with the VRU
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 PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.	
RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.	
REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.	
TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.	
10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty	

ATTACHMENT M

Air Pollution Control Device Sheet

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): BDF-1: Blowdown Emergency Flare

Equipment Information

1. Manufacturer: Sonic Flare Model No. MACH 1-16”	2. Method: ☒ Elevated flare ☐ Ground flare ☐ Other Describe
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. Method of system used: ☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted	
5. Maximum capacity of flare: ~ 25,540 scf/min ~426 scf/hr	6. Dimensions of stack: Diameter 1.33 ft ft. Height 150 ft.
7. Estimated combustion efficiency: (Waste gas destruction efficiency) Estimated: > 98 % Minimum guaranteed: 98 %	8. Fuel used in burners: ☒ Natural Gas ☐ Fuel Oil, Number ☐ Other, Specify:
9. Number of burners: Rating: 7660 MMBTU/hr	11. Describe method of controlling flame:
10. Will preheat be used? ☐ Yes ☐ No	
12. Flare height: 150 ft	14. Natural gas flow rate to flare pilot flame per pilot light: scf/min ~65 scf/hr
13. Flare tip inside diameter: 1.33 ft	
15. Number of pilot lights: Two (2) Total 0.16 MMBTU/hr	16. Will automatic re-ignition be used? ☐ Yes ☐ No
17. If automatic re-ignition will be used, describe the method:	
18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, Describe:	
19. Hours of unit operation per year: 8760 for pilot	

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
See attached emissions calculations			

30. Estimate total combustible to flare: ~ 1,386 LB/hr (Maximum mass flow rate of waste gas) 426 scfm	
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:	
32. Give composition of carrier gases:	
33. Temperature of emission stream: 60 °F Heating value of emission stream: 1,244 BTU/ft^3 Mean molecular weight of emission stream: MW = 22.45 lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: ~4 scf/min
37. Flare gas heat content: 1,189 BTU/ft^3	38. Flare gas exit velocity: ~ 20 scf/min
39. Maximum rate during emergency for one major piece of equipment or process unit: scf/min	
40. Maximum rate during emergency for one major piece of equipment or process unit: BTU/min	
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
42. Describe the collection material disposal system:	
43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet?	

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

MONITORING:	RECORDKEEPING:
Presence of pilot (temperature) Blowdown volumes (scf/yr)	
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 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.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
VOC – 100%
HAP – 100%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
VOC – 98%
HAP – 98%

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

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): C3, C6 – Backup Vapor Destruction Unit

Equipment Information

1. Manufacturer: National Oilwell Varco Model No. MEVC 200	2. Method: ☐ Elevated flare ☐ Ground flare ☒ Other Describe Enclosed Flare
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. Method of system used: ☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted	
5. Maximum capacity of flare: ~ 139 scf/min	6. Dimensions of stack: Diameter 3.91 ft. Height 8 ft.
7. Estimated combustion efficiency: (Waste gas destruction efficiency) Estimated: 99 % Minimum guaranteed: 99 %	8. Fuel used in burners: ☒ Natural Gas ☐ Fuel Oil, Number ☐ Other, Specify:
9. Number of burners: Rating: 18.4 MMBTU/hr 10. Will preheat be used? ☐ Yes ☒ No	11. Describe method of controlling flame:
12. Flare height: 20 ft 13. Flare tip inside diameter: ft	14. Natural gas flow rate to flare pilot flame per pilot light: 4 scf/min
15. Number of pilot lights: One (1) Total 0.29 MMBTU/hr	16. Will automatic re-ignition be used? ☐ Yes ☐ No
17. If automatic re-ignition will be used, describe the method:	
18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, Describe:	
19. Hours of unit operation per year: 500 (pilot 8760)	

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
See attached emissions calculations			

30. Estimate total combustible to flare: LB/hr
(Maximum mass flow rate of waste gas) 69.5 scfm

31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:

32. Give composition of carrier gases:

33. Temperature of emission stream: >70 °F Heating value of emission stream: Variable BTU/ft^3 Mean molecular weight of emission stream: MW = 28.7284 lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: scf/min
37. Flare gas heat content: BTU/ft^3	38. Flare gas exit velocity: scf/min

39. Maximum rate during emergency for one major piece of equipment or process unit: scf/min

40. Maximum rate during emergency for one major piece of equipment or process unit: BTU/min

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

42. Describe the collection material disposal system:

43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet?

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

MONITORING:	RECORDKEEPING:
Monitor the presence of pilot flame (temperature) using a thermocouple or equivalent device	Maintain records of the times and duration of all periods where the pilot flame was absent Maintain records of visible emission opacity tests
REPORTING:	TESTING:
	Conduct a Method 22 opacity test as required

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.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
VOC – 98%
HAP – 98%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
VOC – 98%
HAP – 98%

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

NA

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): C2, C7 – Enclosed Ground Flare

Equipment Information

1. Manufacturer: Model No.	2. Method: ☐ Elevated flare ☐ Ground flare ☒ Other Describe Enclosed Combustor
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. Method of system used: ☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted	
5. Maximum capacity of flare: ~ 200 scf/min scf/hr	6. Dimensions of stack: Diameter 3.5 ft. Height 6 ft.
7. Estimated combustion efficiency: (Waste gas destruction efficiency) Estimated: 98 % Minimum guaranteed: 98 %	8. Fuel used in burners: ☒ Natural Gas ☐ Fuel Oil, Number ☐ Other, Specify:
9. Number of burners: Rating: 6 MMBTU/hr 10. Will preheat be used? ☐ Yes ☐ No	11. Describe method of controlling flame:
12. Flare height: 6 ft 13. Flare tip inside diameter: 3.5 ft	14. Natural gas flow rate to flare pilot flame per pilot light: scf/min ~294 scf/hr
15. Number of pilot lights: One (1) Total 0.35 MMBTU/hr	16. Will automatic re-ignition be used? ☐ Yes ☐ No
17. If automatic re-ignition will be used, describe the method:	
18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, Describe:	
19. Hours of unit operation per year: 8760	

Steam Injection

20. Will steam injection be used? ☐ Yes ☒ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^3	Quantity (LB/hr, ft^3/hr, etc)	Source of Material
See attached emissions calculations			

30. Estimate total combustible to flare: 663 LB/hr
(Maximum mass flow rate of waste gas) scfm

31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.:
VOC ~ 663 LB/hr

32. Give composition of carrier gases:

33. Temperature of emission stream: >70 °F Heating value of emission stream: Variable BTU/ft^3 Mean molecular weight of emission stream: MW = 28.7284 lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: ~84 scf/min
37. Flare gas heat content: BTU/ft^3	38. Flare gas exit velocity: ~ 84 scf/min

39. Maximum rate during emergency for one major piece of equipment or process unit: scf/min

40. Maximum rate during emergency for one major piece of equipment or process unit: BTU/min

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

42. Describe the collection material disposal system:

43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet?

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

MONITORING:	RECORDKEEPING:
Monitor the presence of pilot flame (temperature) using a thermocouple or equivalent device	Maintain records of the times and duration of all periods where the pilot flame was absent Maintain records of visible emission opacity tests
REPORTING:	TESTING:
None	Conduct a Method 22 opacity test as required

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.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
VOC – 100%
HAP – 100%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
VOC – 98%
HAP – 98%

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

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C8 – 3 Way Catalyst

Equipment Information

1. Manufacturer: Miratech Model No. VXC-1408-04-HSG	2. Control Device Name: C8 (Oxidation Catalyst) Type: 3-Way Catalyst
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: CO – 53% NOx – 84.6%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 528 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal.	

Gas Stream Characteristics

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

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

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

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
528 ACF @ 1127 °F and
PSIA

20. Gas stream temperature:
Inlet: 1127 °F
Outlet: 1350 °F

21. Gas flow rate:
Design Maximum: ACFM
Average Expected: 528 ACFM

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

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

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A CO	2.24		100	0.52		53.5
B NOx	3.38		100	1.04		84.6
C						
D						
E						

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

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

Particulate Distribution

26. Complete the table:

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system:

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

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

MONITORING:	RECORDKEEPING:
Operate and maintain catalyst element according to the recommendations of the manufacturer	Maintain records of all catalytic reduction device maintenance
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 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.
53.5% for CO, 84.6% for NOx

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
53.5% for CO, 84.6% for NOx

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

High temperature shutdowns have been installed in the engines. Engine will shut-down if exhaust temperatures get too high.

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): C1

Equipment Information

1. Manufacturer: DCL America Model No. 3-DC64-20 or equivalent	2. Control Device Name: C1 (Oxidation Catalyst) Type: Catalytic Oxidation Catalyst
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: CO – 93% NMNEHC – 70% Formaldehyde – 81%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. NA	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal.	

Gas Stream Characteristics

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

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

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

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
16,094 ACF @ 857 °F and
PSIA

20. Gas stream temperature:
Inlet: 857 °F
Outlet: 900 (+/-)°F

21. Gas flow rate:
Design Maximum: ACFM
Average Expected: 16,094 ACFM

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

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

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A CO	14.37		100	1.01		93
B NMNEHC	3.29		100	0.99		70
C Formaldehyde	1.36		100	0.26		81
D						
E						

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

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

Particulate Distribution

26. Complete the table:

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

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system:

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

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

MONITORING:	RECORDKEEPING:
Operate and maintain catalyst element according to the recommendations of the manufacturer	Maintain records of all catalytic reduction device maintenance
REPORTING: None	TESTING: See engine testing

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

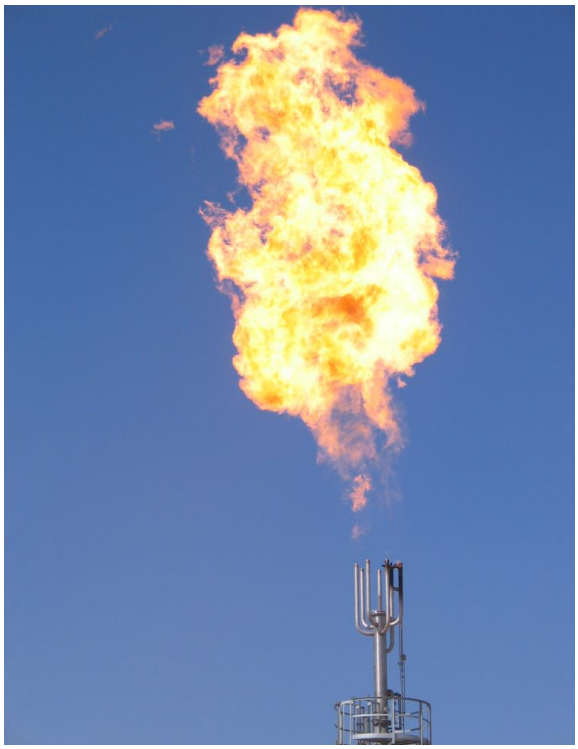
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
93% for CO, 70% for NMNEHC, and 81% for HCHO

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
93% for CO, 70% for NMNEHC, and 81% for HCHO

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

High temperature shutdowns have been installed in the engines. Engine will shut-down if exhaust temperatures get too high.

MACH-1 Sonic Flares



Description

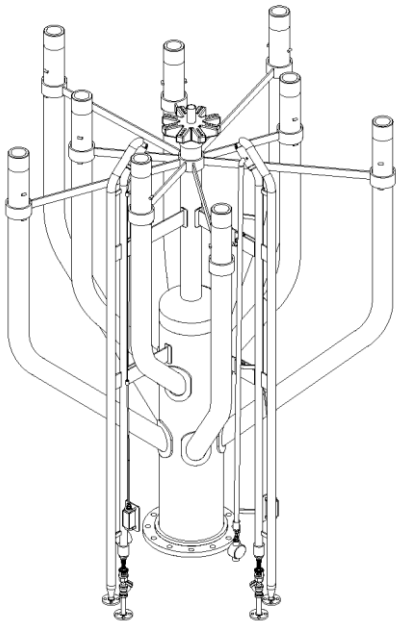
MACH-1 is the speed of sound. AEREON's cutting edge MACH-1 sonic flaring technology operates at this □elocity in order to combust waste gas smo□eless. Sonic flares utili□e multi-point exit no□□les to dispose of high pressure waste gas streams.

The MACH-1 Sonic Flare Tip utili□es the pressure of the waste stream (creating sonic exit □elocities) to create turbulent mixing and induce excess quantities of air for more complete combustion. Sonic flare tips emit reduced le□els of radiation and can be placed at lower, less □isible ele□ations. This ad□anced flaring technology is excellent for applications with high pressure waste gases and high capacity smo□eless requirements.

Advantages

- High smo□eless capacity due to high □elocity air induction and multi-point design
- □ong ser□ice life under normal flow conditions
- □ower radiant heat
- Effecti□e cost solution for offshore platform use reduces si□e and expense of flare boom
- Able to burn entrained liquids without smo□e formation or liquid droplet fallout

MACH-1 Sonic Flares



Principal Applications

- Offshore production
- Pipeline transportation
- Petrochemical production
- Natural gas compression and production
- High pressure waste gas
- Steam or air assist is undesirable or unavailable

Specifications

DIMENSIONS

Length:	10’ - 0” (3m)
Diameter:	4” - 84” (0.1-2.13m)

MATERIALS

Upper Section:	304, 316, 310 SS	Incoloy 800H
Arm Material:	304, 316, 310 SS	Incoloy 800H
Lower Section:	Carbon Steel	

Design Features

- Flow rates up to sonic velocity
- Flame stabilization from center spider burner
- Multiple arm design
- Single point ignition source
- Wide range of diameters
- High alloy construction in the heat affected zone

Design Results and Summary

Quote No.:	14-27991	**Customer:**	CONSOL Energy	**Location:**	Shirley Flare
Description:	Sonic Flare			**Prepared by:**	SDB
	MACH1-16"			**Date:**	3/19/2015

AMBIENT CONDITIONS

	USCS		SI	
Ambient Temperature*:	80	°F	27	°C
Wind Speed (Radiation Only):	20	mph	32.2	km/hr
Solar Radiation:	300	Btu/ft^2-hr	946	W/m^2

*Used only in Brzustowski's Radiation Calculation Method.

INPUT PARAMETERS

Molecular Weight:	22.45		22.45	
Max. Volumetric Flow Rate*:	150.0	MMSCFD	4248000.0	m^3/day
Max. Mass Flow Rate:	370085.2	lbs/hr	167866.9	kg/hr
Inlet Gas Temperature:	60.0	°F	15.6	°C
Total Heat Release:	7.66E+09	Btu/Hr	2.24E+06	kW

*Volumetric flow rate is considered at standard conditions.

FLARE TIP CALCULATIONS

Proposed Flare Tip:	**16'' Mach 1 Sonic Flare**			
Flare Tip Diameter:	16.0	in	406.4	mm
Exit Velocity:	1208.9	ft/sec	368.5	m/sec
Pressure Drop of Tip & Seal:	54.4	psi	375.0	kPa

FLARE RISER CALCULATIONS

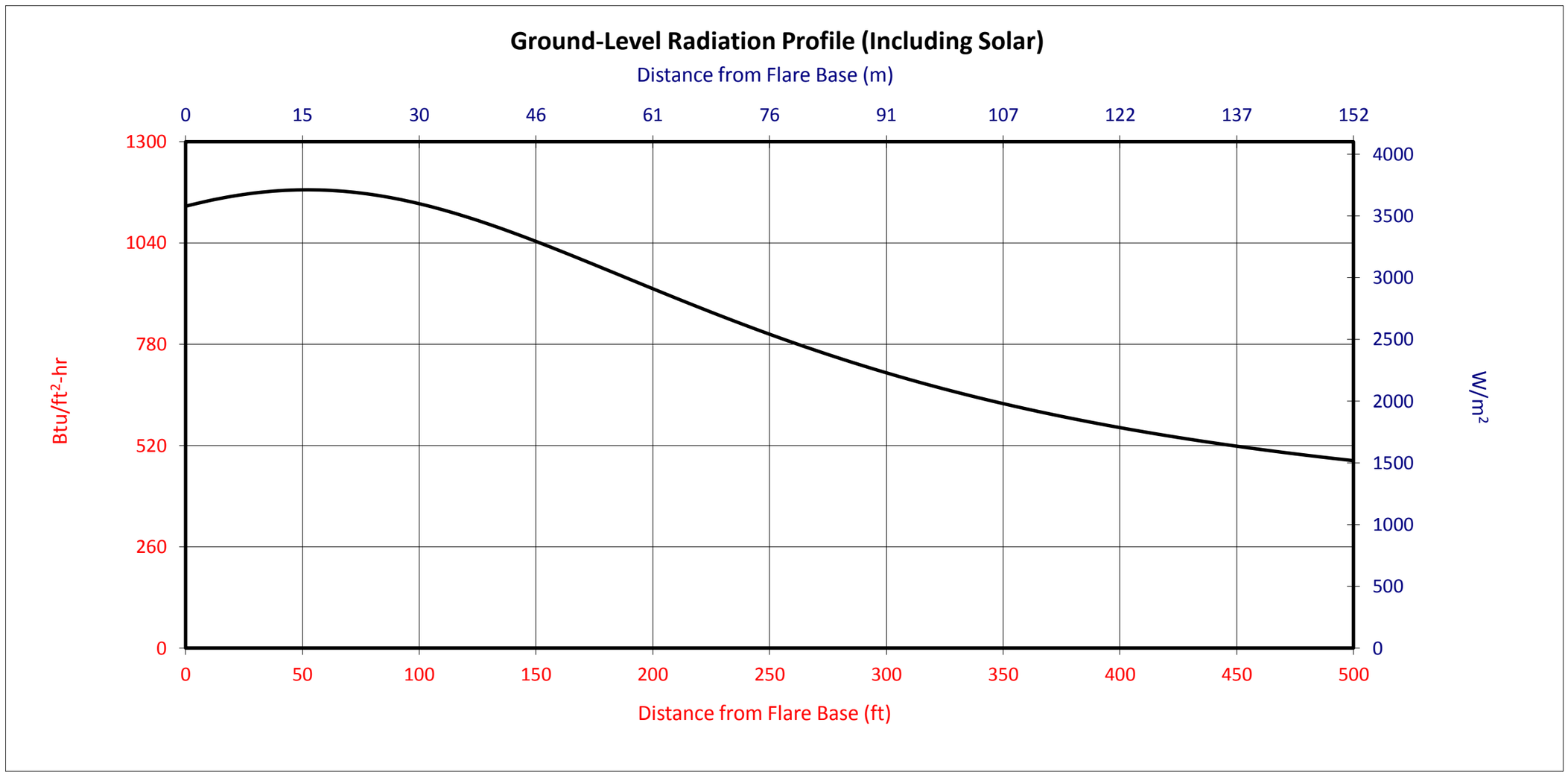
Minimum Flare Height:	150.0	Ft	45.7	m
Pressure Drop of Inlet and Riser:	5.6	psi	38.7	kPa
Total Pressure Drop of Flare**:	60.0	psi	413.7	kPa

**Includes predicted inlet losses.

RADIATION RESULTS

Maximum Radiation at Grade***:	1176.3	Btu/ft^2-hr	3710.7	W/m^2
Solar Radiation Considered:	300.0	Btu/ft^2-hr	946.4	W/m^2
Distance to Maximum Radiation:	50.0	ft	15.2	m

***Maximum Radiation includes solar radiation.



Pressure/Flow Rate Modeling

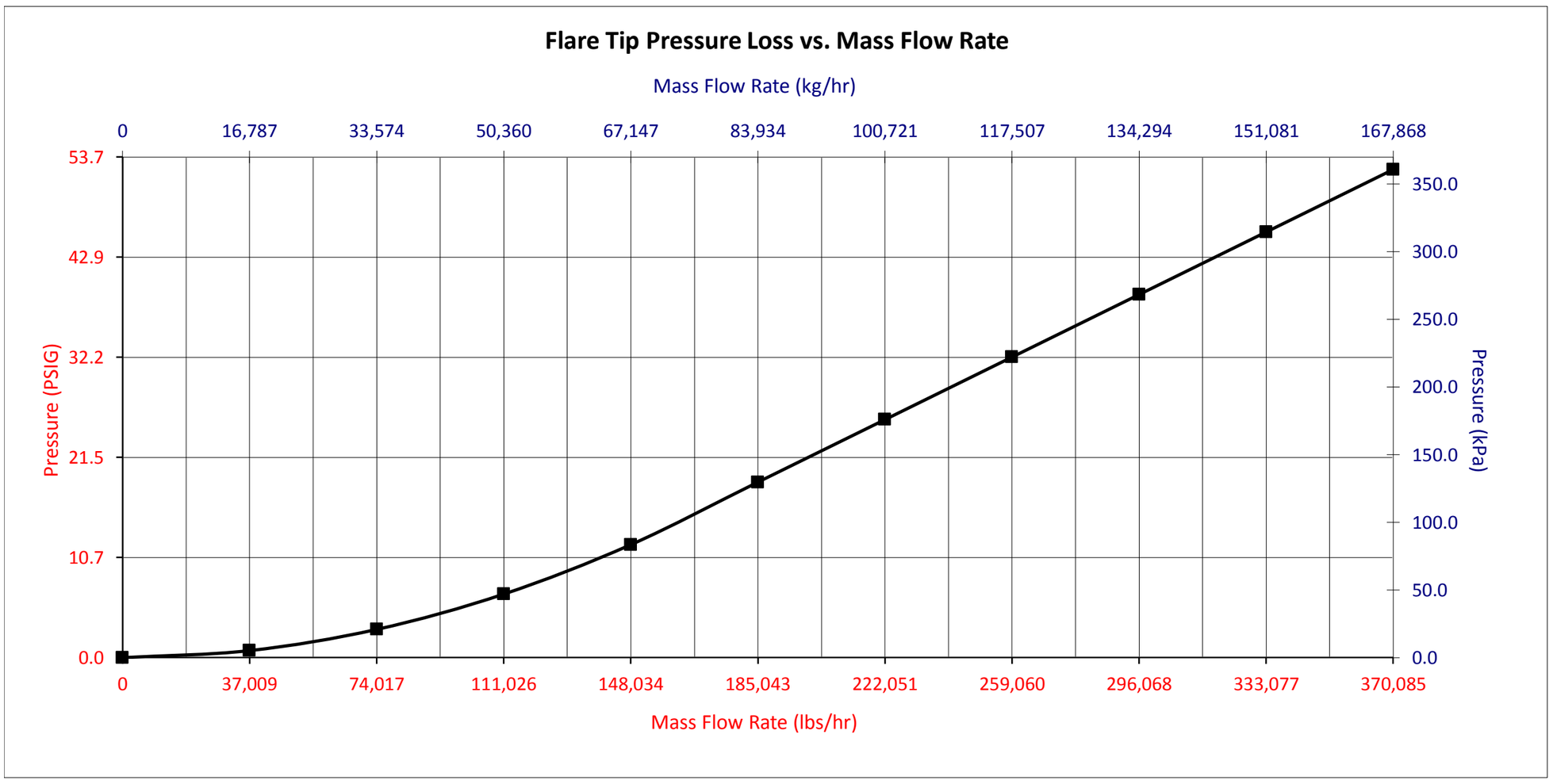
Quote No.:	14-27991	**Customer:**	CONSOL Energy	**Location:**	Shirley Flare
Description:	Sonic Flare			**Prepared by:**	SDB
	MACH1-16"			**Date:**	3/19/2015

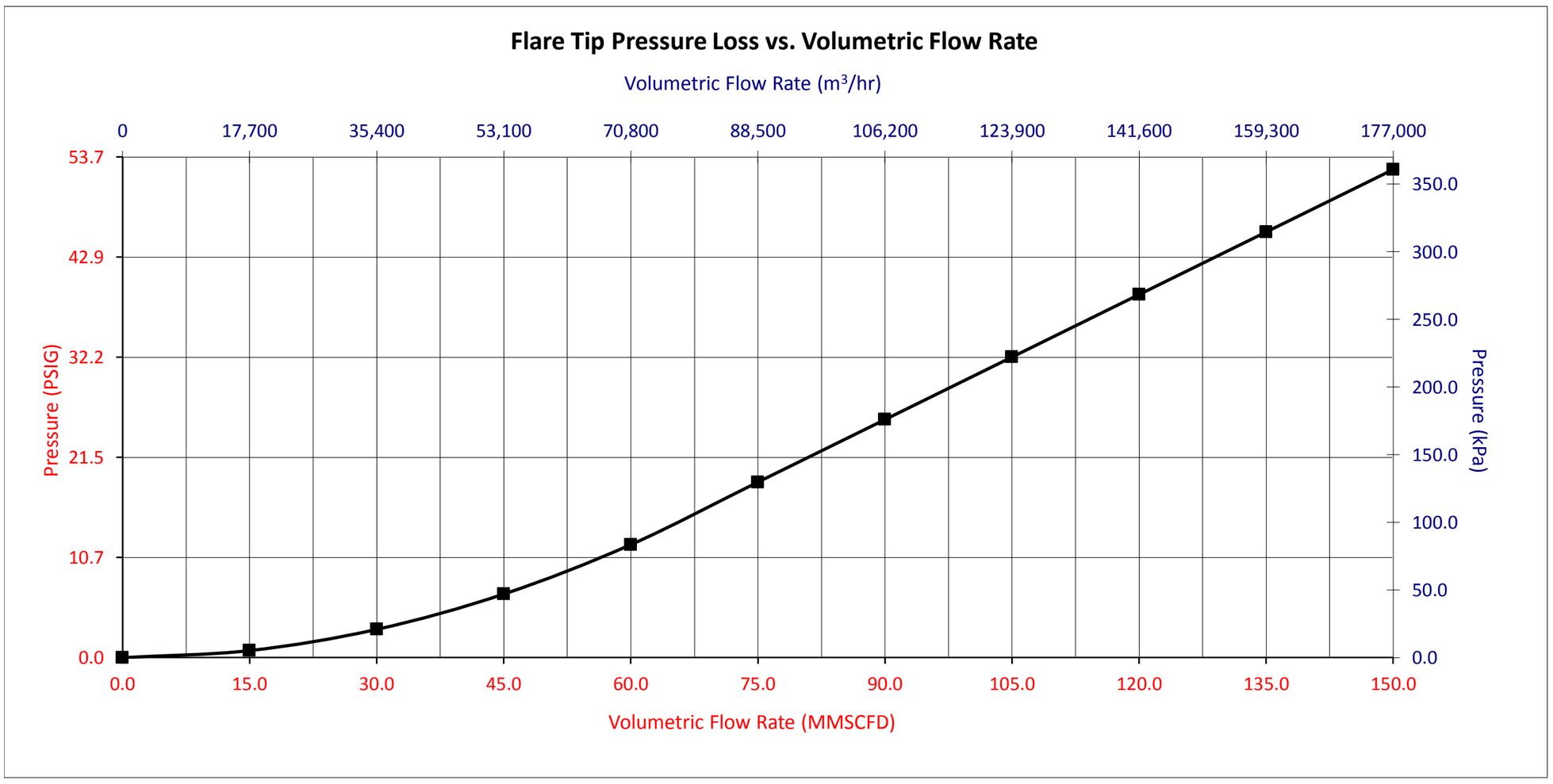
INPUT PARAMETERS	**USCS**		**SI**	
Molecular Weight:	22.45		22.45	
Max. Volumetric Flow Rate*:	150.0	MMSCFD	4248000.0	m^3/day
Max. Mass Flow Rate:	370085.2	lbs/hr	167866.9	kg/hr
Inlet Gas Temperature:	60.0	°F	15.6	°C

*Volumetric flow rate is considered at standard conditions.

FLARE TIP CALCULATIONS				
Proposed Flare Tip:	**16'' Mach 1 Sonic Flare**			
Flare Tip Diameter:	16.0	in	406.4	mm
Exit Velocity:	1208.9	ft/sec	368.5	m/sec
Total Pressure Drop of Flare*:	60.0	psi	413.7	kPa

*Includes predicted inlet losses.





□ 2014 F□AREDES V4.5

Sound Analysis

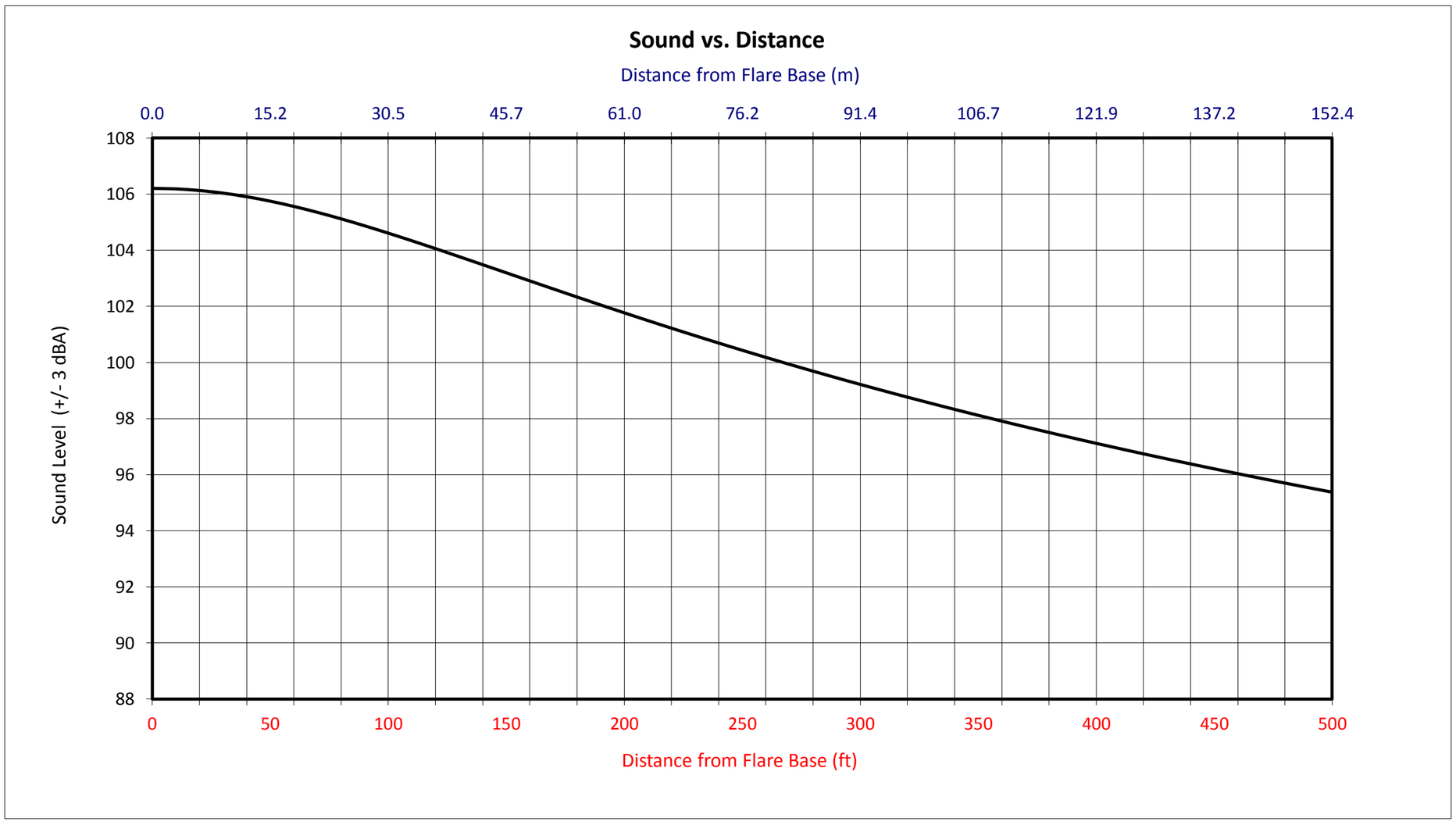
Quote No.:	14-27991	**Customer:**	CONSOL Energy	**Location:**	Shirley Flare
Description:	Sonic Flare			**Prepared by:**	SDB
	MACH1-16"			**Date:**	3/19/2015

INPUT PARAMETERS	**USCS**		**SI**	
Molecular Weight:	22.45		22.45	
Max. Volumetric Flow Rate*:	150.0	MMSCFD	4248000.0	m^3/day
Max. Mass Flow Rate:	370085.2	lbs/hr	167866.9	kg/hr
Inlet Gas Temperature:	60.0	°F	15.6	°C

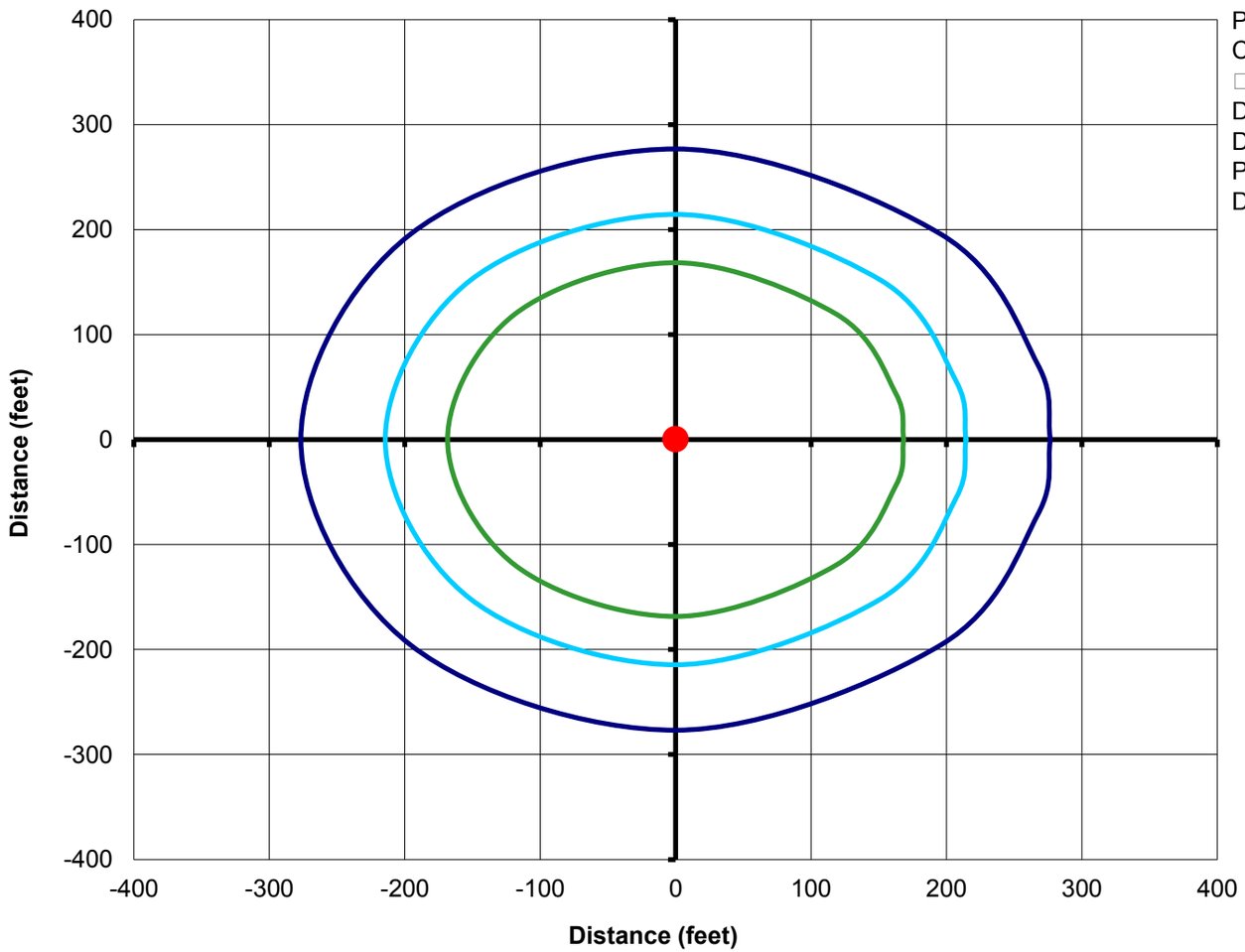
*Volumetric flow rate is considered at standard conditions.

FLARE TIP CALCULATIONS

Proposed Flare Tip:	**16" Mach 1 Sonic Flare**			
Flare Tip Diameter:	16.0	in	406.4	mm
Exit Velocity:	1,208.9	ft/sec	368.5	m/sec
Maximum Sound Level:	106.2	dB (A)		



RADIATION ISOPLETH - Plan □iew / Top □iew Relative to Ground Level
(Omni-directional wind)



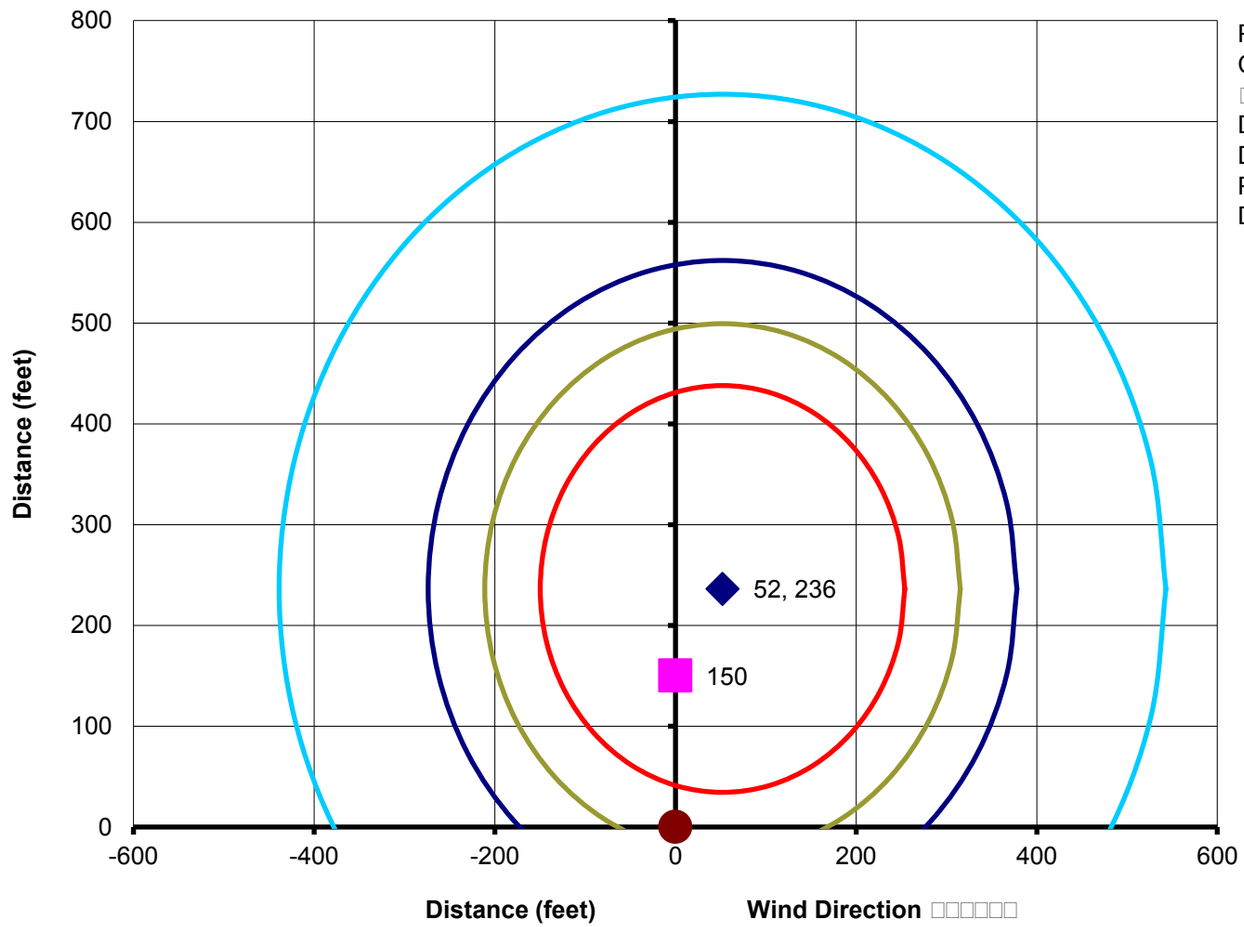
Pro□ect # / □uote #:	14-27□□1
Customer Name:	CONSO□ Energy
□ocation:	Shirley Flare
Description:	Sonic Flare
Description:	MACH1-16"
Prepared By:	SDB
Date:	3/1□/2015

Wind Speed:	20 mph
Solar Radiation:	300 Btu/ft^2-hr

- Flare Base
- 887 Btu/ft2-hr
- 750 Btu/ft2-hr
- 1000 Btu/ft2-hr
- 1500 Btu/ft2-hr

□ 2014 F□AREDES V4.5

RADIATION ISOPLETH - Elevation □iew Relative to Flare Tip
(Fixed Wind Direction)



Pro□ect # / □uote #:	14-27□□1
Customer Name:	CONSO□ Energy
□ocation:	Shirley Flare
Description:	Sonic Flare
Description:	MACH1-16"
Prepared By:	SDB
Date:	3/1□/2015

Wind Speed:	20 mph
Solar Radiation:	300 Btu/ft^2-hr

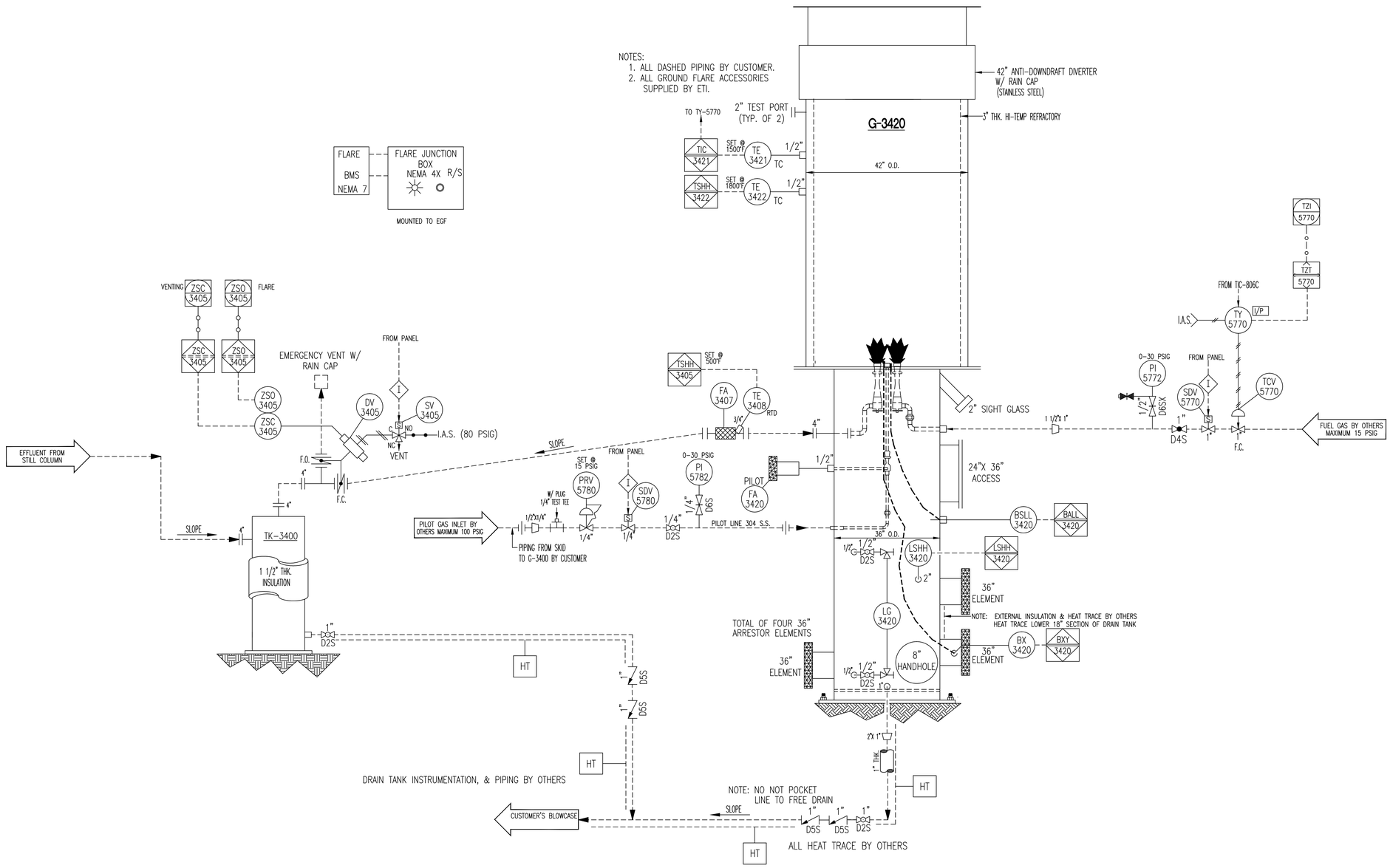
- Flare Base
- Flare Tip
- Flame Center
- 500 Btu/ft2-hr
- 750 Btu/ft2-hr
- 1000 Btu/ft2-hr
- 1500 Btu/ft2-hr

□ 2014 F□AREDES V4.5

TAG:
SERVICE:
SIZE:
DESIGN:
INSULATION:

TK-3400
DRAIN TANK
16" O.D. X 36" OAH X ATM (NON-CODE)

G-3420
ENCLOSED GROUND FLARE
36" X 42" O.D. X 34'-8" OAL X 6.0 MM BTU/HR
DESIGN PRESSURE = ATMOSPHERIC
2" HOT LOWER SECTION ONLY



FOR APPROVAL

☐ - APPROVED
☐ - APPROVED AS NOTED
BY: _____
DATE: _____
3/9/15

NO.	DATE	BY	CHEK'D	CUST. APP'D.	APP'D. DATE	DESCRIPTION
A	3/9/15	CGS				ISSUED FOR CUSTOMER'S APPROVAL

REVISIONS

DWG NO.	DESCRIPTION
	ASSEMBLY DWG.

REFERENCE DRAWINGS

ETI
ENGINEERING | TECHNOLOGY | INNOVATION

THIS DRAWING IS THE PROPERTY OF ENGINEERING TECHNOLOGY & INNOVATION, LLC. TULSA, OKLAHOMA AND IS NOT TO BE REPRODUCED WITHOUT PRIOR WRITTEN CONCENT.

FLOW DIAGRAM FOR
GROUND FLARE
6.0 MM BTU/HR
JOB SITE: TYLER CO. WEST VIRGINIA - SHIRLEY B

DRAWN	SCALE	CHEK'D	APP'D
BC	NONE	NJ	

CUSTOMER CNX GAS COMPANY, LLC

JOB NUMBER: D0020315
DWG. NO. D0020315-103A
DATE DRAWN: 3/9/15
REVISION NO. A
D0020315-103
SHEET 1 OF 1

DWG FILE = D0020315-103A PLOT DATE= 3/9/2015 9:02:35 AM

ATTACHMENT N

Supporting Emission Calculations

Cone Midstream Partners LP - Shirley Station
Facility-Wide Emissions Summary

	Shirley Station																
	CAT G3608 Compressor Engines	Diesel Cummins Emergency Generator	Capstone Microturbine	Hot Oil Process Heater	Cummins 8.3 Vapor Recovery Unit Engine	Arrow VRG 330 Vapor Recovery Unit Engine	Dehydration Unit with Enclosed Ground Flare	Reboiler	Condensate Storage Tanks	Produced Water Storage Tank	Blowdown Flare	Backup VDU	Tank Liquid Loading Operations	Station Fugitives Component Leaks		Current Shirley Station PTE	Project Emissions Increase
Emissions Unit IDs	S1-S4, S7	E-20	S8	S9	C4	C5	S5, C2 & S10, C7	S6, S11	T01, T03 T04 - T06	T02	BDF-1	C3, C6	NA	NA			
Emissions Point IDs	E1-E4, E11	E-20	E12	E13	E9	E10	E7, E17	E6, E11	E8, E9, E10, E16	E8, E9, E10, E16	BDF-1	E8, E16	E8, E9, E10, E16	NA			
Equipment Status	4 Existing + 1 New	Existing	New	New	Existing	Existing	1 Existing + 1 New	1 Existing + 1 New	3 New + 2 Existing	Existing	New	1 Existing + 1 New	Existing	Existing			
Fuel Type	Natural Gas	Diesel	Natural Gas	Natural Gas	Natural Gas	Natural Gas	---	Natural Gas	NA	NA	Natural Gas	Natural Gas	NA	NA			
Capacity	2,370	464	1	8	118	68	200	2.86	Four - 400 One - 450	400	7,660	18					
Unit	bhp	bhp	MW	MMBtu/hr	bhp	bhp	MMSCFD	MMBtu/hr	bbl	bbl	MMBtu/hr	MMBtu/hr					
# of Emission Units	5	1	1	1	1	1	2	2	5	1	1	2	ALL	ALL			
Hours per Year	8,760	500	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	NA	500	8,760	8,760			
Pollutant	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy
PM_{10}	3.90	0.04	0.33	0.21	0.08	0.05	0.34	0.15	---	---	0.00	0.07	---	---	**5.2**	3.95	1.24
$PM_{2.5}$	3.90	0.04	0.33	0.21	0.08	0.05	0.34	0.15	---	---	0.00	0.07	---	---	**5.2**	3.95	1.24
SO_X	0.23	0.24	0.17	0.02	0.00	0.00	0.03	0.01	---	---	0.00	0.01	---	---	**0.7**	0.20	0.50
CO	22.03	0.67	4.82	2.37	4.56	10.70	3.76	1.69	---	---	2.93	0.80	---	---	**54.3**	46.52	7.79
NO_X	57.21	0.76	1.75	2.82	2.28	9.46	4.47	2.01	---	---	0.59	0.95	---	---	**82.3**	80.00	2.30
VOC (incl. HCHO)	27.28	0.76	0.44	0.15	1.18	0.13	17.35	0.11	0.90	0.01	1.13	---	14.18	4.36	**68.0**	65.78	2.20
CO_2	50,461	131	5,825	4,100	515	314	6,524	2,928	--	--	995	1,382	---	0.75	**73,177**	55,063	18,113
CH_4	560.68	0.01	0.11	0.08	0.01	0.01	31.44	0.06	---	---	0.02	0.03	---	18.38	**611**	507.3	103.46
N_2O	0.09	0.00	0.01	0.01	0.00	0.00	0.01	0.01	---	---	0.00	0.00	---	---	**0.1**	0.10	0.03
CO_2e	64,504	132	5,831	4,104	516	314	7,314	2,931	---	---	995.93	1,384	---	460	**88,485**	67,776	20,710
Formaldehyde	5.65	0.00	0.04	0.00	0.04	0.05	---	0.002	---	---	---	---	---	---	**5.8**	4.62	1.17
Total HAPs (including HCHO)	13.24	0.00	0.05	0.05	0.09	0.09	0.19	0.04	0.01	0.00	0.00	---	0.23	0.06	**14.1**	18.9	-4.88

1. VOC and HAP emissions are included in the storage tank emissions.

Compressor Engine

Source Designation:	
Manufacturer:	Caterpillar
Model No.:	3608
Stroke Cycle:	4-stroke
Type of Burn:	Ultra Lean Burn
Year Installed/Date Manufactured	TBD
Fuel Used:	Natural Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,244
Rated Horsepower (bhp):	2,370
Specific Fuel Consumption (Btu/bhp-hr)	7,533
Maximum Fuel Consumption at 100% Load (scf/hr):	14,349
Heat Input (MMBtu/hr)	17.85
Stack Designation:	TBD

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	125.69

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors[a]	Units
NOx	0.50	g/bhp-hr
CO	0.19	g/bhp-hr
SO_2	5.88E-04	lb/MMBtu
PM_{10} (Filterable)	7.71E-05	lb/MMBtu
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu
PM Condensable	9.91E-03	lb/MMBtu
PM Total	9.99E-03	lb/MMBtu
NMNEHC (Excludes HCHO)	0.19	g/bhp-hr
VOC (includes HCHO)	0.24	g/bhp-hr
Formaldehyde (HCHO)	0.05	g/bhp-hr
CO_2	4.41E+02	g/bhp-hr
CH_4	4.90E+00	g/bhp-hr
N_2O	1.00E-04	kg/MMBtu

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	2.61	11.44
CO	1.01	4.41
SO_2	0.01	0.05
PM_{10} (Filterable)	0.001	0.01
$PM_{2.5}$ (Filterable)	0.001	0.01
PM Condensable	0.18	0.77
PM Total	0.18	0.78
NMNEHC(excl HCHO)	0.99	4.33
VOC (incl HCHO)	1.25	5.46
Formaldehyde (HCHO)	0.26	1.13
CO_2	2,304	10,092
CH_4	25.60	112.14
N_2O	0.00	0.02

Compressor Engine

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
Acenaphthene	1.25E-06	2.23E-05	9.77E-05
Acenaphthylene	5.53E-06	9.87E-05	4.32E-04
Acetaldehyde	8.36E-03	1.49E-01	6.54E-01
Acrolein	5.14E-03	9.18E-02	4.02E-01
Benzene	4.40E-04	7.86E-03	3.44E-02
Benzo(b)fluoranthene	1.66E-07	2.96E-06	1.30E-05
Benzo(e)pyrene	4.15E-07	7.41E-06	3.25E-05
Benzo(g,h,i)perlyene	4.14E-07	7.39E-06	3.24E-05
Biphenyl	2.12E-04	3.78E-03	1.66E-02
1,3-Butadiene	2.67E-04	4.77E-03	2.09E-02
Carbon Tetrachloride	3.67E-05	6.55E-04	2.87E-03
Chlorobenzene	3.04E-05	5.43E-04	2.38E-03
Chloroform	2.85E-05	5.09E-04	2.23E-03
Chrysene	6.93E-07	1.24E-05	5.42E-05
1,3-Dichloropropene	2.64E-05	4.71E-04	2.06E-03
Ethylbenzene	3.97E-05	7.09E-04	3.10E-03
Ethylene Dibromide	4.43E-05	7.91E-04	3.46E-03
Fluoranthene	1.11E-06	1.98E-05	8.68E-05
Fluorene	5.67E-06	1.01E-04	4.43E-04
Methanol	2.50E-03	4.46E-02	1.95E-01
Methylene Chloride	2.00E-05	3.57E-04	1.56E-03
n-Hexane	1.11E-03	1.98E-02	8.68E-02
Phenanthrene	1.04E-05	1.86E-04	8.13E-04
Phenol	2.40E-05	4.28E-04	1.88E-03
Pyrene	1.36E-06	2.43E-05	1.06E-04
Styrene	2.36E-05	4.21E-04	1.85E-03
Toluene	4.08E-04	7.28E-03	3.19E-02
1,1,2,2-Tetrachloroethane	4.00E-05	7.14E-04	3.13E-03
Tetrachloroethane	2.48E-06	4.43E-05	1.94E-04
1,1,2-Trichloroethane	3.18E-05	5.68E-04	2.49E-03
2,2,4-Trimethylpentane	2.50E-04	4.46E-03	1.95E-02
Vinyl Chloride	1.49E-05	2.66E-04	1.17E-03
Xylene	1.84E-04	3.28E-03	1.44E-02
Polycyclic Organic Matter:			
Naphthalene	7.44E-05	1.33E-03	5.82E-03
2-Methylnaphthalene	3.32E-05	5.93E-04	2.60E-03
PAH	2.69E-05	4.80E-04	2.10E-03
Total HAP		**0.60**	**2.65**

[a] SO_2, PM, and HAP emission factors from AP-42 Section 3.2, Table 3.2-2 "Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines," Supplement F, August 2000. NO_X, VOC, CO, CH4 (THC-NMHC), CO2, and formaldehyde emission factors are based on manufacturer's data. Greenhouse gas emission factors are based on 40 CFR Part 98, Subpart C, Table C-2 for natural gas combustion.

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or gr/bhp-hr).

[c] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

Generator

Source Designation:	Generator
Manufacturer:	Cummins
Model No.:	DQDAA
Year Installed:	2015
Type of Engine:	CI
Fuel Used:	Diesel
Higher Heating Value (HHV) (Btu/lb):[a]	19,300
Electrical Output (KW)	346
Rated Horsepower (bhp):	464
Heat Input (MMBtu/hr)	3.22
Fuel Consumption (gal/hr) per unit:	23.50
Annual Fuel Consumption at 100% Load (gal/yr) per unit:	11,750

Operational Details:

Potential Annual Hours of Operation (hr/yr):	500
Annual Heat Input (MMBtu/yr) per unit:	1,610

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors	Units
NO_x[b]	4.00	g/kW-hr
CO[b]	3.50	g/kW-hr
SO_2[a]	2.05E-03	lb/bhp-hr
Particulate Matter (TSP)[b]	0.20	g/kW-hr
PM_{10} (Filterable + Condensable)[b]	0.20	g/kW-hr
$PM_{2.5}$ (Filterable + Condensable)[b]	0.20	g/kW-hr
VOC[b]	4.00	g/kW-hr
CO_2[c]	73.96	kg/MMBtu
CH_4[c]	0.003	kg/MMBtu
N_2O[c]	0.0006	kg/MMBtu

Generator

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Potential Emissions (lb/hr)[d,e,f]	Potential Emissions (tons/yr)[g]
NO_x	3.05	0.76
CO	2.67	0.67
SO_2	0.95	0.24
Total Particulate Matter (TSP)	0.15	0.04
PM_{10} (Filterable + Condensable)	0.15	0.04
$PM_{2.5}$ (Filterable + Condensable)	0.15	0.04
VOC	3.05	0.76
CO_2	525	131
CH_4	0.02	0.01
N_2O	0.00	0.00
CO_2e	527	132

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[e]	Potential Emissions (tons/yr)[g]
HAPs:			
Acetaldehyde	7.67E-04	2.47E-03	6.17E-04
Acrolein	9.25E-05	2.98E-04	7.45E-05
Benzene	9.33E-04	3.00E-03	7.51E-04
Formaldehyde	1.18E-03	3.80E-03	9.50E-04
Toluene	4.09E-04	1.32E-03	3.29E-04
1,3-butadiene	3.91E-05	1.26E-04	3.15E-05
Xylene	2.85E-04	9.18E-04	2.29E-04
Polycyclic Organic Matter:			
Naphthalene	8.48E-05	2.73E-04	6.83E-05
Acenaphthylene	5.06E-06	1.63E-05	4.07E-06
Acenaphthene	1.42E-06	4.57E-06	1.14E-06
Fluorene	2.92E-05	9.40E-05	2.35E-05
Phenanthrene	2.94E-05	9.47E-05	2.37E-05
Anthracene	1.87E-06	6.02E-06	1.51E-06
Fluoranthene	7.61E-06	2.45E-05	6.13E-06
Pyrene	4.78E-06	1.54E-05	3.85E-06
Benz(a)anthracene	1.68E-06	5.41E-06	1.35E-06
Chrysene	3.53E-07	1.14E-06	2.84E-07
Benzo(b)fluoranthene	9.91E-08	3.19E-07	7.98E-08
Benzo(k)fluoranthene	1.55E-07	4.99E-07	1.25E-07
Benzo(a)pyrene	1.88E-07	6.05E-07	1.51E-07
Indeno(1,2,3-cd)pyrene	3.75E-07	1.21E-06	3.02E-07
Dibenz(a,h)anthracene	5.83E-07	1.88E-06	4.69E-07
Benzo(g,h,l)perylene	4.89E-07	1.57E-06	3.94E-07
Total HAP		**0.01**	**0.003**

[a] Emission factor from AP-42 Section 3.3, "Gasoline and Diesel Industrial Engines ," Tables 3.3-1 and 3.3-2, October 1996. HHV values from Table 3.3-1.

[b] Emission factor from Tier 3 limits under NSPS IIII. Assume HC = VOC. Assume $PM=PM_{10}=PM_{2.5}$.

[c] Greenhouse gas emission factors are taken from Table C-1 and C-2 of 40 CFR Part 98 for distillate oil combustion

[d] Emission Rate (lb/hr) = Rated power (kW) x Emission Factor (g/kW-hr) x 2.2046 (lb/kg) / 1000 (g/kg)

[e] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr) × Emission Factor (lb/MMBtu).

[f] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr) × Emission Factor (kg/MMBtu) x 2.2046 (lb/kg)

[g] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 500 hr/yr) × (1 ton/2000 lb).

Dehydration Unit & Combustor Emissions

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY

Controlled Regenerator Emissions

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon dioxide	1.27	30.5	5.56
Methane	2.9935	71.844	13.112
Ethane	1.2280	29.472	5.379
Propane	0.7472	17.933	3.273
Isobutane	0.1432	3.437	0.627
n-Butane	0.3300	7.920	1.445
Isopentane	0.0780	1.872	0.342
n-Pentane	0.0845	2.028	0.370
Cyclopentane	0.0121	0.290	0.053
n-Hexane*	0.0233	0.559	0.102
Cyclohexane	0.0082	0.197	0.036
Other Hexanes	0.0301	0.722	0.132
Heptanes	0.0199	0.478	0.087
Methylcyclohexane	0.0090	0.216	0.039
2,2,4-Trimethylpentane*	0.0000	0.000	0.000
Benzene*	0.0167	0.401	0.073
Toluene*	0.0000	0.000	0.000
Ethylbenzene*	0.0000	0.000	0.000
Xylenes*	0.0000	0.000	0.000
C8+ Heavier Hydrocarbons	0.0000	0.000	0.000
Total Emissions	5.7237	137.369	25.070
Total Hydrocarbon Emissions	5.7237	137.369	25.070
Total VOC Emissions	1.5022	36.053	6.580
Total HAP Emissions	0.0399	0.958	0.175

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY

Flash Gas Emissions

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon dioxide	0.583	14.0	2.55
Methane	0.5810	13.944	2.545
Ethane	0.5094	12.226	2.231
Propane	0.2868	6.883	1.256
Isobutane	0.0467	1.121	0.205
n-Butane	0.0964	2.314	0.422
Isopentane	0.0190	0.456	0.083
n-Pentane	0.0182	0.437	0.080
Cyclopentane	0.0010	0.024	0.004
n-Hexane*	0.0031	0.074	0.014
Cyclohexane	0.0004	0.010	0.002
Other Hexanes	0.0050	0.120	0.022
Heptanes	0.0014	0.034	0.006
Methylcyclohexane	0.0003	0.007	0.001
2,2,4-Trimethylpentane*	0.0000	0.000	0.000
Benzene*	0.0001	0.002	0.000
Toluene*	0.0000	0.000	0.000
Ethylbenzene*	0.0000	0.000	0.000
Xylenes*	0.0000	0.000	0.000
C8+ Heavier Hydrocarbons	0.0000	0.000	0.000
Total Emissions	1.5688	37.651	6.871
Total Hydrocarbon Emissions	1.5688	37.651	6.871
Total VOC Emissions	0.4784	11.482	2.095
Total HAP Emissions	0.0032	0.077	0.014

Dehydration Unit & Combustor Emissions

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY [1]

Combined Regenerator and Flash Gas Emissions [2]

Pollutant	(lbs/hr)	(lbs/day)	(tons/yr)
Carbon dioxide	1.85	44.5	8.1
Methane	3.5745	85.788	15.6563
Ethane	1.7374	41.698	7.6098
Propane	1.0340	24.816	4.5289
Isobutane	0.1899	4.558	0.8318
n-Butane	0.4264	10.234	1.8676
Isopentane	0.0970	2.328	0.4249
n-Pentane	0.1027	2.465	0.4498
Cyclopentane	0.0131	0.314	0.0574
n-Hexane*	0.0264	0.634	0.1156
Cyclohexane	0.0086	0.206	0.0377
Other Hexanes	0.0351	0.842	0.1537
Heptanes	0.0213	0.511	0.0933
Methylcyclohexane	0.0093	0.223	0.0407
2,2,4-Trimethylpentane*	0.0000	0.000	0.0000
Benzene*	0.0168	0.403	0.0736
Toluene*	0.0000	0.000	0.0000
Ethylbenzene*	0.0000	0.000	0.0000
Xylenes*	0.0000	0.000	0.0000
C8+ Heavier Hydrocarbons	0.0000	0.000	0.0000
Total Emissions	7.2925	175.020	31.9412
Total Hydrocarbon Emissions	7.2925	175.020	31.9412
Total VOC Emissions	1.9806	47.534	8.6750
Total HAP Emissions	0.0431	1.034	0.1888

Enclosed Ground Flare Emissions Calculations:

Combustor Rating	6.0	MMbtu/hr
Pilot Rating	0.35	MMbtu/hr
Higher Heating Value (HHV)	1,244	btu/scf

Pollutant	Emission Factors [a] (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.080	0.482	2.112	0.028	0.123
CO	0.068	0.405	1.774	0.024	0.103
PM/PM_{10}	0.006	0.037	0.161	0.0021	0.009
SO_2	0.000	0.003	0.013	1.69E-04	7.39E-04
CO_2 [b] (Natural Gas Firing)	116.997	701.984	3074.689	40.949	179.357
CH_4 [b] (Natural Gas Firing)	0.002	0.013	0.058	7.72E-04	3.38E-03
N_2O [b] (Natural Gas Firing)	0.000	0.001	0.006	7.72E-05	3.38E-04

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

*HAPs

[1] Based on GRI GLYCalc 4.0 run at dry gas flowrate of 200 MMSCFD and T and P of 100°F and 850 psig, respectively. Still emissions are controlled by the enclosed flare at a destruction efficiency of 98%. Lean Glycol Max Pump Rate is 25 gpm. Stripping gas is 75 scfm

[2] Flash tank emissions can be routed to the reboiler or flare if necessary. Flare control has a 98% destruction efficiency.

Produced Water Storage Tank

Overall Control Efficiency for Tanks [1] **98%**

Estimated Potential Throughput

Operational Hours 8,760 hrs/yr

Maximum Oil Throughput [1] 32 bbls/day

Description	Produced Water Annual Throughput [1] (gal/yr)	Maximum Throughput (gal/hr)
Produced Water	487,000	55.59

[1] Throughput (gal/yr) = bbl/day x 365 days/yr x 42 gal/bbl

Produced Water Storage Tank - Uncontrolled

Constituent	Working, Breathing, and Flashing Emissions tpy	Total Emissions [1] lb/hr	Total Emissions [1] tpy
Propane	0.217	0.049	0.217
Isobutane	0.008	0.002	0.008
n-Butane	0.030	0.007	0.030
Isopentane	0.005	0.001	0.005
n-Pentane	0.004	0.001	0.004
2,3-Dimethylbutane	0.006	0.001	0.006
2-Methylpentane	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000
Benzene	0.003	0.001	0.003
Cyclohexane	0.000	0.000	0.000
n-Heptane	0.001	0.000	0.001
Methylcyclohexane	0.000	0.000	0.000
2,2,4-Trimethylpentane	0.000	0.000	0.000
Toluene	0.001	0.000	0.001
n-Octane	0.000	0.000	0.000
2,4,4-Trimethylhexane	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000
m-Xylene	0.000	0.000	0.000
p-Xylene	0.000	0.000	0.000
o-Xylene	0.000	0.000	0.000
n-Nonane	0.000	0.000	0.000
n-Decane	0.000	0.000	0.000
n-Undecane	0.000	0.000	0.000
Dodecane	0.000	0.000	0.000
Tridecane	0.000	0.000	0.000
Neohexane	0.000	0.000	0.000
3-Methylpentane	0.000	0.000	0.000
Methylcyclopentane	0.000	0.000	0.000
2-Methylhexane	0.000	0.000	0.000
2,3-Dimethylpentane	0.000	0.000	0.000
3-Methylhexane	0.000	0.000	0.000
Total Emissions:	0.275	0.063	0.275
Total VOC Emissions:	0.275	0.063	0.275
Total HAP Emissions:	0.004	0.001	0.004

[1] ProMax software provides estimates for working, breathing, and flashing losses associated with total throughput (i.e., emissions represent total from all produced water tanks at the facility).Storage tank emissions will be primarily controlled by a vapor recovery unit (VRU). During periods of VRU downtime, all emissions will be routed to the backup VDU for control

Produced Water Storage Tank

Produced Water Storage Tank - Controlled

Constituent	Total Emissions [1] lb/hr	tpy
Propane	0.001	0.004
Isobutane	0.000	0.000
n-Butane	0.000	0.001
Isopentane	0.000	0.000
n-Pentane	0.000	0.000
2,3-Dimethylbutane	0.000	0.000
2-Methylpentane	0.000	0.000
n-Hexane	0.000	0.000
Benzene	0.000	0.000
Cyclohexane	0.000	0.000
n-Heptane	0.000	0.000
Methylcyclohexane	0.000	0.000
2,2,4-Trimethylpentane	0.000	0.000
Toluene	0.000	0.000
n-Octane	0.000	0.000
2,4,4-Trimethylhexane	0.000	0.000
Ethylbenzene	0.000	0.000
m-Xylene	0.000	0.000
p-Xylene	0.000	0.000
o-Xylene	0.000	0.000
n-Nonane	0.000	0.000
n-Decane	0.000	0.000
n-Undecane	0.000	0.000
Dodecane	0.000	0.000
Tridecane	0.000	0.000
Neohexane	0.000	0.000
3-Methylpentane	0.000	0.000
Methylcyclopentane	0.000	0.000
2-Methylhexane	0.000	0.000
2,3-Dimethylpentane	0.000	0.000
3-Methylhexane	0.000	0.000
Total Emissions:	0.001	0.005
Total VOC Emissions:	0.001	0.005
Total HAP Emissions:	0.000	0.000

Condensate Storage Tanks

Overall Control Efficiency for Tanks [1] **98%**

Estimated Potential Throughput

Operational Hours 8,760 hrs/yr

Maximum Oil Throughput [1] 3200 bbls/day

Description	Condensate Annual Throughput [1] (gal/yr)	Maximum Throughput (gal/hr)
Condensate	49,056,000	5600.00

[1] Throughput (gal/yr) = bbl/day x 365 days/yr x 42 gal/bbl

Condensate Storage Tanks - Uncontrolled

Constituent	Working, Breathing, and Flashing Emissions tpy	Total Emissions [1] lb/hr	Total Emissions [1] tpy
Propane	3.028	0.691	3.028
Isobutane	7.007	1.600	7.007
n-Butane	17.500	3.995	17.500
Isopentane	4.398	1.004	4.398
n-Pentane	3.908	0.892	3.908
2,3-Dimethylbutane	6.596	1.506	6.596
2-Methylpentane	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000
Benzene	0.055	0.013	0.055
Cyclohexane	0.000	0.000	0.000
n-Heptane	1.721	0.393	1.721
Methylcyclohexane	0.000	0.000	0.000
2,2,4-Trimethylpentane	0.647	0.148	0.647
Toluene	0.024	0.005	0.024
n-Octane	0.000	0.000	0.000
2,4,4-Trimethylhexane	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000
m-Xylene	0.004	0.001	0.004
p-Xylene	0.000	0.000	0.000
o-Xylene	0.001	0.000	0.001
n-Nonane	0.019	0.004	0.019
n-Decane	0.003	0.001	0.003
n-Undecane	0.000	0.000	0.000
Dodecane	0.000	0.000	0.000
Tridecane	0.000	0.000	0.000
Neohexane	0.000	0.000	0.000
3-Methylpentane	0.000	0.000	0.000
Methylcyclopentane	0.000	0.000	0.000
2-Methylhexane	0.000	0.000	0.000
2,3-Dimethylpentane	0.000	0.000	0.000
3-Methylhexane	0.000	0.000	0.000
Total Emissions:	44.91	10.25	44.91
Total VOC Emissions:	44.91	10.25	44.91
Total HAP Emissions:	0.73	0.17	0.73

[1] ProMax software provides estimates for working, breathing, and flashing losses associated with total throughput (i.e., emissions represent total from all condensate tanks at the facility).Storage tank emissions will be primarily controlled by a vapor recovery unit (VRU). During periods of VRU downtime, all emissions will be routed to a backup VDU for control

Condensate Storage Tanks

Condensate Storage Tanks - Controlled

Constituent	Total Emissions [1] lb/hr	tpy
Propane	0.014	0.061
Isobutane	0.032	0.140
n-Butane	0.080	0.350
Isopentane	0.020	0.088
n-Pentane	0.018	0.078
2,3-Dimethylbutane	0.030	0.132
2-Methylpentane	0.000	0.000
n-Hexane	0.000	0.000
Benzene	0.000	0.001
Cyclohexane	0.000	0.000
n-Heptane	0.008	0.034
Methylcyclohexane	0.000	0.000
2,2,4-Trimethylpentane	0.003	0.013
Toluene	0.000	0.000
n-Octane	0.000	0.000
2,4,4-Trimethylhexane	0.000	0.000
Ethylbenzene	0.000	0.000
m-Xylene	0.000	0.000
p-Xylene	0.000	0.000
o-Xylene	0.000	0.000
n-Nonane	0.000	0.000
n-Decane	0.000	0.000
n-Undecane	0.000	0.000
Dodecane	0.000	0.000
Tridecane	0.000	0.000
Neohexane	0.000	0.000
3-Methylpentane	0.000	0.000
Methylcyclopentane	0.000	0.000
2-Methylhexane	0.000	0.000
2,3-Dimethylpentane	0.000	0.000
3-Methylhexane	0.000	0.000
Total Emissions:	0.205	0.898
Total VOC Emissions:	0.205	0.898
Total HAP Emissions:	0.003	0.015

Reboiler

Source Designation:	
Manufacturer:	TBD
Year Installed:	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,244
Heat Input (MMBtu/hr)	2.86
Fuel Consumption (MMscf/hr):	2.30E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.23	1.01
CO	84	0.19	0.84
SO_2	0.6	0.001	0.006
PM Total	7.6	0.02	0.08
PM Condensable	5.7	0.01	0.06
PM_{10} (Filterable)	1.9	0.00	0.02
$PM_{2.5}$ (Filterable)	1.9	0.00	0.02
VOC	5.5	0.01	0.06
CO_2 [d] (Natural Gas Firing)	145,573	334.26	1464.06
CH_4 [d] (Natural Gas Firing)	2.7	0.01	0.03
N_2O [d] (Natural Gas Firing)	0.27	0.00	0.00

Reboiler

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
3-Methylchloranthrene	1.8E-06	4.13E-09	1.81E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	3.67E-08	1.61E-07
Acenaphthene	1.8E-06	4.13E-09	1.81E-08
Acenaphthylene	1.8E-06	4.13E-09	1.81E-08
Anthracene	2.4E-06	5.51E-09	2.41E-08
Benz(a)anthracene	1.8E-06	4.13E-09	1.81E-08
Benzene	2.1E-03	4.82E-06	2.11E-05
Benzo(a)pyrene	1.2E-06	2.76E-09	1.21E-08
Benzo(b)fluoranthene	1.8E-06	4.13E-09	1.81E-08
Benzo(g,h,i)perylene	1.2E-06	2.76E-09	1.21E-08
Benzo(k)fluoranthene	1.8E-06	4.13E-09	1.81E-08
Chrysene	1.8E-06	4.13E-09	1.81E-08
Dibenzo(a,h) anthracene	1.2E-06	2.76E-09	1.21E-08
Dichlorobenzene	1.2E-03	2.76E-06	1.21E-05
Fluoranthene	3.0E-06	6.89E-09	3.02E-08
Fluorene	2.8E-06	6.43E-09	2.82E-08
Formaldehyde	7.5E-02	1.72E-04	7.54E-04
Hexane	1.8E+00	4.13E-03	1.81E-02
Indo(1,2,3-cd)pyrene	1.8E-06	4.13E-09	1.81E-08
Phenanthrene	1.7E-05	3.90E-08	1.71E-07
Pyrene	5.0E-06	1.15E-08	5.03E-08
Toluene	3.4E-03	7.81E-06	3.42E-05
Arsenic	2.0E-04	4.59E-07	2.01E-06
Beryllium	1.2E-05	2.76E-08	1.21E-07
Cadmium	1.1E-03	2.53E-06	1.11E-05
Chromium	1.4E-03	3.21E-06	1.41E-05
Cobalt	8.4E-05	1.93E-07	8.45E-07
Lead	5.0E-04	1.15E-06	5.03E-06
Manganese	3.8E-04	8.73E-07	3.82E-06
Mercury	2.6E-04	5.97E-07	2.61E-06
Nickel	2.1E-03	4.82E-06	2.11E-05
Selenium	2.4E-05	5.51E-08	2.41E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.4E-05	5.51E-08	2.41E-07
Naphthalene	6.1E-04	1.40E-06	6.13E-06
Total HAP		**4.34E-03**	**1.90E-02**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(\text{tons/yr})_{\text{Potential}} = (\text{lb/hr})_{\text{Emissions}} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[d] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Microturbines
(S8)

Microturbine Unit Information:

Manufacturer:	Capstone
Model No.:	C1000
Projected Startup Date:	Upon Approval
Number of Units:	1

Notes:
1. C1000 is made of 5 identical C200 units.

Microturbine Fuel Information:

	Per C1000 Unit
Fuel Type:	Natural Gas
Rated Electrical Power Output (kW):	1,000
Rated Electrical Power Output (MW):	1.0
Higher Heating Value (Btu/Scf)	1,244.2
Rated Horsepower (bhp):	1,341.0
Fuel Consumption (MMscf/hr)	0.009
Heat Input (MMBtu/hr)	11.40
Potential Fuel Consumption (MMBtu/yr):	99,864
Max. Annual Hours of Operation (hr/yr):	8,760

Microturbine Emissions Data:

Pollutant	**Emission Factors**	**Units**	**Total Potential Emissions**		**Estimation Basis / Emission Factor Source**
			lbs/hr	**tpy**	
NO_X	0.40	lb/MWhe	0.40	1.75	Manufacturer's Specifications
VOC	0.10	lb/MWhe	0.10	0.44	Manufacturer's Specifications
CO	1.10	lb/MWhe	1.10	4.82	Manufacturer's Specifications
SO_X	0.0034	lb/MMBtu	0.04	0.17	AP-42, Table 3.1-2a (Apr-2000)
PM_{10}	0.0066	lb/MMBtu	0.08	0.33	AP-42, Table 3.1-2a (Apr-2000)
$PM_{2.5}$	0.0066	lb/MMBtu	0.08	0.33	AP-42, Table 3.1-2a (Apr-2000)
GHG (CO_2e)	See Table Below		1,331	5,831	Manufacturer's Specifications / 40 CFR 98, Table C-2
Other (Total HAP)	See Table Below		0.01	0.05	AP-42, Table 3.1-3 (Apr-2000)

Notes:
1. NMNEHC is non-methane, non-ethane hydrocarbon excluding formaldehyde (HCHO).
2. PM_{10} and $PM_{2.5}$ are total values (filterable + condensable).
3. GHG (CO_2e) is carbon dioxide equivalent, which is the summation of CO_2 (GWP = 1) + CH_4 (GWP = 25) + N_2O (GWP = 298).
4. Total HAP is the summation of all hazardous air pollutants for which there is a published emission factor for this engine type, including HCHO.

Microturbines
(S8)

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

Pollutant	Emission Factor	Units	Maximum Potential Emissions Per Unit		Estimation Basis / Emission Factor Source
			lbs/hr	tpy	
GHGs:					
CO_2	1330	lb/MWhe	1,330	5,825	Manufacturer's Specifications
CH_4	0.001	kg/MMBtu	0.03	0.11	40 CFR 98, Tables C-1 & C-2
N_2O	0.0001	kg/MMBtu	0.00	0.01	40 CFR 98, Tables C-1 & C-2
GHG (CO_2e)			**1,331**	**5,831**	
HAPs:					
1,3-Butadiene	4.3E-07	lb/MMBtu	4.90E-06	0.00	AP-42, Table 3.1-3 (Apr-2000)
Acetaldehyde	4.0E-05	lb/MMBtu	4.56E-04	0.00	AP-42, Table 3.1-3 (Apr-2000)
Acrolein	6.4E-06	lb/MMBtu	7.30E-05	0.00	AP-42, Table 3.1-3 (Apr-2000)
Benzene	1.2E-05	lb/MMBtu	1.37E-04	0.00	AP-42, Table 3.1-3 (Apr-2000)
Ethylbenzene	3.2E-05	lb/MMBtu	3.65E-04	0.00	AP-42, Table 3.1-3 (Apr-2000)
Formaldehyde	7.1E-04	lb/MMBtu	8.09E-03	0.04	AP-42, Table 3.1-3 (Apr-2000)
Naphthalene	1.3E-06	lb/MMBtu	1.48E-05	0.00	AP-42, Table 3.1-3 (Apr-2000)
PAH	2.2E-06	lb/MMBtu	2.51E-05	0.00	AP-42, Table 3.1-3 (Apr-2000)
Propylene oxide	2.9E-05	lb/MMBtu	3.31E-04	0.00	AP-42, Table 3.1-3 (Apr-2000)
Toluene	1.3E-04	lb/MMBtu	1.48E-03	0.01	AP-42, Table 3.1-3 (Apr-2000)
Xylene	6.4E-05	lb/MMBtu	7.30E-04	0.00	AP-42, Table 3.1-3 (Apr-2000)
Total HAP			**0.012**	**0.051**	

Hot Oil Heater

Source Designation:	
Manufacturer:	TBD
Year Installed:	TBD
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,244
Heat Input (MMBtu/hr)	8.0
Fuel Consumption (MMscf/hr):	6.43E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	100	0.64	2.82
CO	84	0.54	2.37
SO_2	0.6	0.00	0.02
PM Total	7.6	0.05	0.21
PM Condensable	5.7	0.04	0.16
PM_{10} (Filterable)	1.9	0.01	0.05
$PM_{2.5}$ (Filterable)	1.9	0.01	0.05
VOC	5.5	0.04	0.15
CO_2 [d] (Natural Gas Firing)	145,573	935.98	4099.59
CH_4 [d] (Natural Gas Firing)	2.7	0.02	0.08
N_2O [d] (Natural Gas Firing)	0.27	0.00	0.01

Hot Oil Heater

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
3-Methylchloranthrene	1.8E-06	1.16E-08	5.07E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.03E-07	4.51E-07
Acenaphthene	1.8E-06	1.16E-08	5.07E-08
Acenaphthylene	1.8E-06	1.16E-08	5.07E-08
Anthracene	2.4E-06	1.54E-08	6.76E-08
Benz(a)anthracene	1.8E-06	1.16E-08	5.07E-08
Benzene	2.1E-03	1.35E-05	5.91E-05
Benzo(a)pyrene	1.2E-06	7.72E-09	3.38E-08
Benzo(b)fluoranthene	1.8E-06	1.16E-08	5.07E-08
Benzo(g,h,i)perylene	1.2E-06	7.72E-09	3.38E-08
Benzo(k)fluoranthene	1.8E-06	1.16E-08	5.07E-08
Chrysene	1.8E-06	1.16E-08	5.07E-08
Dibenzo(a,h) anthracene	1.2E-06	7.72E-09	3.38E-08
Dichlorobenzene	1.2E-03	7.72E-06	3.38E-05
Fluoranthene	3.0E-06	1.93E-08	8.45E-08
Fluorene	2.8E-06	1.80E-08	7.89E-08
Formaldehyde	7.5E-02	4.82E-04	2.11E-03
Hexane	1.8E+00	1.16E-02	5.07E-02
Indo(1,2,3-cd)pyrene	1.8E-06	1.16E-08	5.07E-08
Phenanthrene	1.7E-05	1.09E-07	4.79E-07
Pyrene	5.0E-06	3.21E-08	1.41E-07
Toluene	3.4E-03	2.19E-05	9.58E-05
Arsenic	2.0E-04	1.29E-06	5.63E-06
Beryllium	1.2E-05	7.72E-08	3.38E-07
Cadmium	1.1E-03	7.07E-06	3.10E-05
Chromium	1.4E-03	9.00E-06	3.94E-05
Cobalt	8.4E-05	5.40E-07	2.37E-06
Lead	5.0E-04	3.21E-06	1.41E-05
Manganese	3.8E-04	2.44E-06	1.07E-05
Mercury	2.6E-04	1.67E-06	7.32E-06
Nickel	2.1E-03	1.35E-05	5.91E-05
Selenium	2.4E-05	1.54E-07	6.76E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.4E-05	1.54E-07	6.76E-07
Naphthalene	6.1E-04	3.92E-06	1.72E-05
Total HAP		**1.21E-02**	**5.32E-02**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(\text{tons/yr})_{\text{Potential}} = (\text{lb/hr})_{\text{Emissions}} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[d] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Cummins VRU Engine

Source Designation:	Compressor
Manufacturer:	Cummins
Model No.:	8.3/M302
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,244
Rated Horsepower (bhp):	118
Maximum Fuel Usage Rate (scf/hr):	762
Brake Specific Fuel Consumption (btu/hp-hr):	8,032
Heat Input (MMBtu/hr)	0.95
Control Device:	None

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	6.673

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors	Units
NO_x[b]	2.00	g/bhp-hr
CO[b]	4.00	g/bhp-hr
SO_2[a]	5.88E-04	lb/MMBtu
PM_{10}[a]	1.94E-02	lb/MMBtu
$PM_{2.5}$[a]	1.94E-02	lb/MMBtu
VOC[b]	1.00	g/bhp-hr
CO_2[b]	4.52E+02	g/bhp-hr
CH_4[c]	1.00E-03	kg/MMBtu
N_2O[c]	1.00E-04	kg/MMBtu

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Potential Emissions (lb/hr)[d,e]	Potential Emissions (tons/yr)[f]
NO_x	0.52	2.28
CO	1.04	4.56
SO_2	0.001	0.002
PM_{10}	0.02	0.08
$PM_{2.5}$	0.02	0.08
VOC (excludes HCHO)	0.26	1.14
VOC(including HCHO)	0.27	1.18
CO_2	117.58	515
CH_4	0.00	0.01
N_2O	0.00	0.00

Cummins VRU Engine

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[d]	Potential Emissions (tons/yr)[f]
HAPs:			
Acetaldehyde	2.79E-03	2.64E-03	1.16E-02
Acrolein	2.63E-03	2.49E-03	1.09E-02
Benzene	1.58E-03	1.50E-03	6.56E-03
1,3-Butadiene	6.63E-04	6.28E-04	2.75E-03
Carbon Tetrachloride	1.77E-05	1.68E-05	7.35E-05
Chlorobenzene	1.29E-05	1.22E-05	5.36E-05
Chloroform	1.37E-05	1.30E-05	5.69E-05
1,3-Dichloropropene	1.27E-05	1.20E-05	5.27E-05
Ethylbenzene	2.48E-05	2.35E-05	1.03E-04
Ethylene Dibromide	2.13E-05	2.02E-05	8.84E-05
Formaldehyde	1.03E-02	9.71E-03	4.26E-02
Methanol	3.06E-03	2.90E-03	1.27E-02
Methylene Chloride	4.12E-05	3.90E-05	1.71E-04
Styrene	1.19E-05	1.13E-05	4.94E-05
Toluene	5.58E-04	5.29E-04	2.32E-03
1,1,2,2-Tetrachloroethane	2.53E-05	2.40E-05	1.05E-04
1,1,2-Trichloroethane	1.53E-05	1.45E-05	6.35E-05
Vinyl Chloride	7.18E-06	6.81E-06	2.98E-05
Xylene	1.95E-04	1.85E-04	8.09E-04
Polycyclic Organic Matter:			
Naphthalene	9.71E-05	9.20E-05	4.03E-04
PAH	1.41E-04	1.34E-04	5.85E-04
Total HAP		**0.02**	**0.09**

[a] Emission factors from AP-42 Section 3.2, Table 3.2-3 "Uncontrolled Emission Factors for 4-stroke, Rich-burn Engines," Supplement F, August 2000.

[b] NO_X, VOC and CO emission factors from vendor spec sheet provided by USA Compression - Cummins G8.3 engine (dated 13-May-2011).

[c] Greenhouse gas emission factors are from 40 CFR Part 98 for natural gas combustion.

[d] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[e] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr) × Emission Factor (kg/MMBtu) x 2.2046 (lb/kg)

[f] Annual Emissions (tons/yr)Potential = (lb/hr)Emissions × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

Arrow VRU Engine

Source Designation:	Compressor
Manufacturer:	Arrow
Model No.:	VRG 330
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,244
Rated Horsepower (bhp):	68
Maximum Fuel Usage Rate (scf/hr):	492
Brake Specific Fuel Consumption (btu/hp-hr):	9,000
Heat Input (MMBtu/hr)	0.61
Control Device:	None

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	4.31

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors	Units
NO_X[a]	14.40	g/bhp-hr
CO[a]	16.30	g/bhp-hr
HCHO[b]	2.05E-02	lb/MMBtu
SO_2[b]	5.88E-04	lb/MMBtu
PM_{10}[b]	1.94E-02	lb/MMBtu
$PM_{2.5}$[b]	1.94E-02	lb/MMBtu
VOC[b]	2.96E-02	lb/MMBtu
CO_2[c]	5.31E+01	kg/MMBtu
CH_4[c]	1.00E-03	kg/MMBtu
N_2O[c]	1.00E-04	kg/MMBtu

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Potential Emissions (lb/hr)[d,e]	Potential Emissions (tons/yr)[f]
NO_x	2.16	9.46
CO	2.44	10.70
HCHO	0.01	0.05
SO_2	0.00	0.00
PM_{10}	0.01	0.05
$PM_{2.5}$	0.01	0.05
VOC	0.02	0.08
VOC (including HCHO)	0.03	0.13
CO_2	71.59	314
CH_4	0.00	5.9E-03
N_2O	0.00	5.9E-04

Arrow VRU Engine

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[d]	Potential Emissions (tons/yr)[f]
HAPs:			
Acetaldehyde	2.79E-03	1.71E-03	7.48E-03
Acrolein	2.63E-03	1.61E-03	7.05E-03
Benzene	1.58E-03	9.67E-04	4.24E-03
1,3-Butadiene	6.63E-04	4.06E-04	1.78E-03
Carbon Tetrachloride	1.77E-05	1.08E-05	4.74E-05
Chlorobenzene	1.29E-05	7.89E-06	3.46E-05
Chloroform	1.37E-05	8.38E-06	3.67E-05
1,3-Dichloropropene	1.27E-05	7.77E-06	3.40E-05
Ethylbenzene	2.48E-05	1.52E-05	6.65E-05
Ethylene Dibromide	2.13E-05	1.30E-05	5.71E-05
Methanol	3.06E-03	1.87E-03	8.20E-03
Methylene Chloride	4.12E-05	2.52E-05	1.10E-04
Styrene	1.19E-05	7.28E-06	3.19E-05
Toluene	5.58E-04	3.41E-04	1.50E-03
1,1,2,2-Tetrachloroethane	2.53E-05	1.55E-05	6.78E-05
1,1,2-Trichloroethane	1.53E-05	9.36E-06	4.10E-05
Vinyl Chloride	7.18E-06	4.39E-06	1.92E-05
Xylene	1.95E-04	1.19E-04	5.23E-04
Polycyclic Organic Matter:			
Naphthalene	9.71E-05	5.94E-05	2.60E-04
PAH	1.41E-04	8.63E-05	3.78E-04
Total HAP		**0.02**	**0.09**

[a] NO_X and CO emission factors are taken from USA Compression Engine vendor spec sheet.

[b] Emission factors from AP-42 Section 3.2, Table 3.2-3 "Uncontrolled Emission Factors for 4-stroke, Rich-burn Engines," Supplement F, August 2000.

[c] Greenhouse gas emission factors are from 40 CFR Part 98 for natural gas combustion.

[d] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[e] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr) × Emission Factor (kg/MMBtu) x 2.2046 (lb/kg)

[f] Annual Emissions (tons/yr)Potential = (lb/hr)Emissions × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

Backup Vapor Destruction Unit

Backup VDU Calculations:

Combustor Rating	18.4	MMbtu/hr
Hours Of Operation	500	hrs[C]
Pilot Rating	0.30	MMbtu/hr
Higher Heating Value (HHV)	1,244	btu/scf

Pollutant	Emission Factors [a] (lb/MMBtu)	Combustor Potential Emissions (lb/hr)	Combustor Potential Emissions (tpy)	Pilot Potential Emissions (lb/hr)	Pilot Potential Emissions (tpy)
NO_x	0.080	1.479	0.370	0.024	0.105
CO	0.068	1.242	0.311	0.020	0.088
PM/PM_{10}	0.006	0.112	0.028	0.0018	0.008
SO_2	0.000	0.009	0.002	1.44E-04	0.001
CO_2 [b] (Natural Gas Firing)	116.997	2152.750	538.188	34.937	153.026
CH_4 [b] (Natural Gas Firing)	0.002	0.041	0.010	6.58E-04	2.88E-03
N_2O [b] (Natural Gas Firing)	0.000	0.004	0.001	6.58E-05	2.88E-04

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.

[b] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

[c] Pilot will operate full time i.e 8760 hours

Blowdown Flare

Blowdown Flare (BDF-1) Emissions Calculations:

Total Volume of Blowdown Event	12,530,000	scf/yr
Mass Flow Rate	1,360	lb/hr
Blowdown Flare Rating	7660	MMBtu/hr
Pilot Rating	65	scfh (each 2 total)
Higher Heating Value (HHV)	1,244	btu/scf
Control Efficiency	98%	

Pollutant	Pilot Emission Factors [1] (lb/MMBtu)	Flare Emission Factors [2] (lb/MMBtu)	Pilot Combustion[5] Potential Emissions (lb/hr)	(tpy)	Flare Potential Emissions (lb/hr)	(tpy)
NO_x	0.080	0.068	0.01	0.06	520.88	0.53
CO	0.068	0.370	0.01	0.05	2834.20	2.88
PM/PM_{10}	0.006	0.000	0.00	0.00	0.00	0.00
SO_2	0.000	0.000	0.00	0.00	0.00	0.00
CO_2 [3] (Natural Gas Firing)	116.997		18.92	82.89	896,199	912.01
CH_4 [3] (Natural Gas Firing)	0.002		0.00	0.00	16.89	0.02
N_2O [3] (Natural Gas Firing)	0.000		0.00	0.00	1.69	0.00

1. Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, 1.4-3 & 1.4-4.
2. Emission factors from AP-42 Section 13.5 "Industrial Flares" - assumes smokeless and negligible sulfur content.
3. GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.
4. Note, VOC emissions from flare are calculated and reported in the blowdown section
5. Pilot will operate full time (i.e 8760 hours)

Blowdowns

VOC and HAP Vented Blowdown Emissions

Blowdown Emissions Sources	Number of Units	Vented Gas Volume Per Blowdown Event (scf)	Number of Blowdown Events per year [1]	Total Volume NG Emited (scf/yr)	Potential VOC Emissions [2] (tpy)	Potential HAP Emissions [2] (tpy)
Station ESD Vent	1	550,000	20	11,000,000	0.99	0.00
Compressors	5	5,100	60	1,530,000	0.14	0.00
Total					**1.13**	**0.00**

[1] Assumes 20 ESD event per year, and 5 blowdowns per compressor per month. Blowdowns Events (i.e Station ESD and Compressor Engine) are controlled by the blowdown flare

[2] Density of natural gas: 0.05 lb/ft^3 at STP (www.engineeringtoolbox.com)

[3] Assumes a control effieincy of 95% for the blowdown flare

GHG Vented Blowdown Emissions

Blowdown Emissions Sources	Number of Units	Vented Gas Volume Per Blowdown Event (scf)	Number of Blowdown Events per year [1]	Total Volume NG Emited (scf/yr)	Potential CH_4 Emissions [2] (tpy)	Potential CO_2 Emissions [2] (tpy)	Potential CO_2e Emissions (tpy)
Station ESD Vent	1	550,000	20	11,000,000	9.06	0.59	227
Compressors	5	5,100	60	1,530,000	1.26	0.08	32
Total					**10.32**	**0.67**	**259**

[1] Assumes 20 ESD event per year, and 5 blowdowns per compressor per month. Blowdowns Events (i.e Station ESD and Compressor Engine) are controlled by the blowdown flare

[2] Calculated utilizing methodology in Subpart W of 40 CFR 98 (Equations W-35, and W-36).

[3] Assumes a control effieincy of 95% for the blowdown flare

Fugitives

VOC Fugitive Emissions from Component Leaks

Equipment Type	Service	Emission Factors [1] (kg/hr/source)	Facility Equipment Count [2] (units)	Fraction VOC [3]	Fraction HAP [3]	Hourly Fugitive VOC Emissions (lb/hr)	Annual Fugitive VOC Emissions (tpy)	Annual Fugitive HAP Emissions (tpy)
Valves	Gas	0.00597	290	0.07	0.00	0.27	1.20	0.01
Pump Seals	Light Liquid	0.0199	2	1.00	0.10	0.09	0.38	0.04
Pressure Relief Valves	Gas	0.104	10	0.07	0.00	0.17	0.72	0.00
Connectors	All	0.00183	966	0.07	0.00	0.28	1.23	0.01
Open-Ended Lines	All	0.0017	16	0.07	0.00	0.00	0.02	0.00
Pneumatic Devices	Gas	6	10	0.07	0.00	0.18	0.80	0.00
					Emission Totals:	**1.00**	**4.36**	**0.06**

[1] U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates.* Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMI factors were used as it was representative of natural gas liquids extraction. Pneumatic devices are represented as scf/hr

[2] Assumes one pump per storage tank.

[3] Based on gas analysis sample. Liquid assumes 100% VOC and 10% HAP

Fugitives

GHG Fugitive Emissions from Component Leaks

Component	Component Count [1]	GHG Emission Factor [2] (scf/hr/component)	CH_4 Emissions[3,4] (tpy)	CO_2 Emissions[3,4] (tpy)	CO_2e Emissions[5] (tpy)
Valves	290	0.027	0.88	0.01	21.91
Pressure Relief Devices	10	0.040	0.04	0.00	1.12
Connectors	966	0.003	0.32	0.00	8.11
Open-Ended Lines	16	0.061	0.11	0.00	2.73
Pneumatic Devices	10	6	6.71	0.06	167.86
Total			**8.07**	**0.07**	**202**

[1] The component count for pneumatics is estimated based on component counts at similar facilities.

[2] Population emission factors for gas service in the Eastern U.S. from *Table W-1A of Subpart W - Default Whole Gas Emission Factors for Onshore Production* , 40 CFR 98, Subpart W, except for pneumatics, which are set at NSPS OOOO limits.

[3] Calculated in accordance with Equations W-35 and W-36 in Subpart W of 40 CFR 98.

[4] Weight fractions of CH_4 and CO_2 based on gas analysis:

CH_4: 0.603 CO_2: 0.002

[5] Carbon equivalent emissions (CO_2e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98:

Carbon Dioxide (CO_2): 1

Methane (CH_4): 25

Liquid Loading

Liquid Loading Emissions

Description	Maximum Throughput [1] (gal/yr)	Controlled VOC Emissions (tpy)
Liquids Hauling	49,543,000	14.18

[1] Includes Condensate and Produced water liquid throughput for the gacility

[2] Based on total annual liquid throughput at the station. Emission calculations are based on Promax Run for submerged vapor balanced service (NSPS tested tankers) and overall reduction efficiency of 96.73 percent.

Constituent	Total Emissions [1] lb/hr	tpy
Propane	0.219	0.958
Isobutane	0.505	2.212
n-Butane	1.261	5.524
Isopentane	0.317	1.388
n-Pentane	0.282	1.234
2,3-Dimethylbutane	0.475	2.082
2-Methylpentane	0.000	0.000
n-Hexane	0.000	0.000
Benzene	0.004	0.017
Cyclohexane	0.000	0.000
n-Heptane	0.124	0.543
Methylcyclohexane	0.000	0.000
2,2,4-Trimethylpentane	0.047	0.204
Toluene	0.002	0.008
n-Octane	0.000	0.000
2,4,4-Trimethylhexane	0.000	0.000
Ethylbenzene	0.000	0.000
m-Xylene	0.000	0.001
p-Xylene	0.000	0.000
o-Xylene	0.000	0.000
n-Nonane	0.001	0.006
n-Decane	0.000	0.001
n-Undecane	0.000	0.000
Dodecane	0.000	0.000
Tridecane	0.000	0.000
Neohexane	0.000	0.000
3-Methylpentane	0.000	0.000
Methylcyclopentane	0.000	0.000
2-Methylhexane	0.000	0.000
2,3-Dimethylpentane	0.000	0.000
3-Methylhexane	0.000	0.000
Total Emissions:	3.237	14.179
Total VOC Emissions:	3.237	14.179
Total HAP Emissions:	0.053	0.231

Gas Analysis

Higher Heating Value 1,244 btu/scf

Constituent	Concentration (Vol %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.0928%	44.01	0.04	0.00	0.20
Nitrogen	0.3993%	14.01	0.06	0.00	0.27
Methane	77.3952%	16.04	12.41	0.60	60.34
Ethane	14.9147%	30.07	4.48	0.22	21.80
Propane	4.9461%	44.10	2.18	0.11	10.60
Isobutane	0.5953%	58.12	0.35	0.02	1.68
n-Butane	1.1397%	58.12	0.66	0.03	3.22
Isopentane	0.2144%	72.15	0.15	0.01	0.75
n-Pentane	0.1937%	72.15	0.14	0.01	0.68
Cyclopentane	0.0080%	70.1	0.01	0.00	0.03
n-Hexane*	0.0307%	86.18	0.03	0.00	0.13
Cyclohexane	0.0028%	84.16	0.00	0.00	0.01
Other Hexanes	0.0494%	86.18	0.04	0.00	0.21
Heptanes	0.0137%	100.20	0.01	0.00	0.07
Methylcyclohexane	0.0025%	98.19	0.00	0.00	0.01
2,2,4-Trimethylpentane*	0.0000%	114.23	0.00	0.00	0.00
Benzene*	0.0007%	78.11	0.00	0.00	0.00
Toluene*	0.0000%	92.14	0.00	0.00	0.00
Ethylbenzene*	0.0000%	106.17	0.00	0.00	0.00
Xylenes*	0.0000%	106.16	0.00	0.00	0.00
C8+ Heavies	0.0000%	114.23	0.00	0.00	0.00
Totals	100%		20.57	1.00	100.00

*HAPs

TOC (Total)	99.51%		99.53
VOC (Total)	7.20%		17.39
HAP (Total)	0.03%		0.13

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Shirley Station - DEHY-001
File Name: Z:\Client\CONSOL\Corporate\Projects\143901.0035 Moundsville & Shirley\07 Shirley R13 Modification Application\Attachment N - Emission Calculations\GLYCalc\20150618 Shirley 200 MMSCFD DEHY-001 & DEH-002 - Stripping Gas - New Gas Analysis.ddf
Date: June 18, 2015

DESCRIPTION:

Description: 200 MMSCFD Dehy unit
Max Pump Rate - 25 GPM
Gas Analysis Date: 02/19/2015

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	2.9935	71.844	13.1115
Ethane	1.2280	29.473	5.3788
Propane	0.7472	17.932	3.2726
Isobutane	0.1432	3.437	0.6273
n-Butane	0.3300	7.920	1.4454
Isopentane	0.0780	1.871	0.3415
n-Pentane	0.0845	2.028	0.3701
Cyclopentane	0.0121	0.291	0.0531
n-Hexane	0.0233	0.558	0.1019
Cyclohexane	0.0082	0.197	0.0359
Other Hexanes	0.0301	0.723	0.1320
Heptanes	0.0199	0.478	0.0872
Methylcyclohexane	0.0090	0.217	0.0395
Benzene	0.0167	0.400	0.0730
Total Emissions	5.7237	137.370	25.0699
Total Hydrocarbon Emissions	5.7237	137.370	25.0699
Total VOC Emissions	1.5022	36.053	6.5797
Total HAP Emissions	0.0399	0.958	0.1749
Total BTEX Emissions	0.0167	0.400	0.0730

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	149.6747	3592.192	655.5750
Ethane	61.4017	1473.641	268.9395
Propane	37.3589	896.613	163.6319
Isobutane	7.1611	171.867	31.3658
n-Butane	16.5002	396.004	72.2707
Isopentane	3.8984	93.561	17.0749
n-Pentane	4.2249	101.397	18.5050
Cyclopentane	0.6059	14.542	2.6539
n-Hexane	1.1631	27.916	5.0946
Cyclohexane	0.4103	9.848	1.7972

Other Hexanes	1.5072	36.174	6.6017
Heptanes	0.9954	23.889	4.3597
Methylcyclohexane	0.4514	10.834	1.9772
Benzene	0.8333	20.000	3.6500
Total Emissions	286.1865	6868.477	1253.4971
Total Hydrocarbon Emissions	286.1865	6868.477	1253.4971
Total VOC Emissions	75.1102	1802.644	328.9826
Total HAP Emissions	1.9965	47.916	8.7446
Total BTEX Emissions	0.8333	20.000	3.6500

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.5810	13.944	2.5448
Ethane	0.5094	12.225	2.2311
Propane	0.2868	6.884	1.2563
Isobutane	0.0467	1.121	0.2046
n-Butane	0.0964	2.314	0.4223
Isopentane	0.0190	0.457	0.0834
n-Pentane	0.0182	0.437	0.0797
Cyclopentane	0.0010	0.025	0.0045
n-Hexane	0.0031	0.074	0.0135
Cyclohexane	0.0004	0.009	0.0016
Other Hexanes	0.0050	0.119	0.0218
Heptanes	0.0014	0.033	0.0060
Methylcyclohexane	0.0003	0.007	0.0013
Benzene	0.0001	0.002	0.0004
Total Emissions	1.5688	37.650	6.8712
Total Hydrocarbon Emissions	1.5688	37.650	6.8712
Total VOC Emissions	0.4784	11.481	2.0953
Total HAP Emissions	0.0032	0.076	0.0139
Total BTEX Emissions	0.0001	0.002	0.0004

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	29.0504	697.209	127.2406
Ethane	25.4688	611.250	111.5531
Propane	14.3413	344.191	62.8148
Isobutane	2.3358	56.058	10.2306
n-Butane	4.8211	115.706	21.1163
Isopentane	0.9519	22.845	4.1693
n-Pentane	0.9102	21.844	3.9866
Cyclopentane	0.0512	1.229	0.2244
n-Hexane	0.1543	3.702	0.6757
Cyclohexane	0.0179	0.430	0.0785
Other Hexanes	0.2489	5.974	1.0903
Heptanes	0.0681	1.635	0.2984
Methylcyclohexane	0.0144	0.345	0.0630
Benzene	0.0041	0.098	0.0180
Total Emissions	78.4383	1882.518	343.5596
Total Hydrocarbon Emissions	78.4383	1882.518	343.5596
Total VOC Emissions	23.9191	574.059	104.7658
Total HAP Emissions	0.1584	3.801	0.6936

Total BTEX Emissions	0.0041	0.098	0.0180

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	3.5745	85.788	15.6563
Ethane	1.7374	41.698	7.6099
Propane	1.0340	24.816	4.5289
Isobutane	0.1899	4.559	0.8319
n-Butane	0.4264	10.234	1.8677
Isopentane	0.0970	2.328	0.4249
n-Pentane	0.1027	2.465	0.4498
Cyclopentane	0.0131	0.315	0.0576
n-Hexane	0.0263	0.632	0.1154
Cyclohexane	0.0086	0.206	0.0375
Other Hexanes	0.0351	0.843	0.1538
Heptanes	0.0213	0.510	0.0932
Methylcyclohexane	0.0093	0.224	0.0408
Benzene	0.0167	0.402	0.0734
Total Emissions	7.2925	175.020	31.9411
Total Hydrocarbon Emissions	7.2925	175.020	31.9411
Total VOC Emissions	1.9806	47.534	8.6750
Total HAP Emissions	0.0431	1.034	0.1888
Total BTEX Emissions	0.0167	0.402	0.0734

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	782.8156	15.6563	98.00
Ethane	380.4926	7.6099	98.00
Propane	226.4467	4.5289	98.00
Isobutane	41.5964	0.8319	98.00
n-Butane	93.3870	1.8677	98.00
Isopentane	21.2442	0.4249	98.00
n-Pentane	22.4915	0.4498	98.00
Cyclopentane	2.8783	0.0576	98.00
n-Hexane	5.7702	0.1154	98.00
Cyclohexane	1.8757	0.0375	98.00
Other Hexanes	7.6921	0.1538	98.00
Heptanes	4.6581	0.0932	98.00
Methylcyclohexane	2.0402	0.0408	98.00
Benzene	3.6680	0.0734	98.00
Total Emissions	1597.0566	31.9411	98.00
Total Hydrocarbon Emissions	1597.0566	31.9411	98.00
Total VOC Emissions	433.7484	8.6750	98.00
Total HAP Emissions	9.4382	0.1888	98.00
Total BTEX Emissions	3.6680	0.0734	98.00

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature:	70.00 deg. F
Excess Oxygen:	2.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	1.46e+000 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%
Cyclopentane	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	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:	4.91 lbs. H2O/MMSCF
Temperature:	100.0 deg. F
Pressure:	850.0 psig
Dry Gas Flow Rate:	200.0000 MMSCF/day
Glycol Losses with Dry Gas:	3.3115 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	65.91 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	2.95 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.43%	92.57%
Carbon Dioxide	99.85%	0.15%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.97%	0.03%
Propane	99.95%	0.05%
Isobutane	99.93%	0.07%
n-Butane	99.91%	0.09%
Isopentane	99.91%	0.09%
n-Pentane	99.89%	0.11%
Cyclopentane	99.52%	0.48%
n-Hexane	99.83%	0.17%
Cyclohexane	99.23%	0.77%
Other Hexanes	99.87%	0.13%

Heptanes	99.70%	0.30%
Methylcyclohexane	99.19%	0.81%
Benzene	93.08%	6.92%

FLASH TANK

Flash Control: Combustion device
Flash Control Efficiency: 98.00 %
Flash Temperature: 90.0 deg. F
Flash Pressure: 70.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.99%	0.01%
Carbon Dioxide	57.55%	42.45%
Nitrogen	7.38%	92.62%
Methane	7.78%	92.22%
Ethane	24.41%	75.59%
Propane	44.51%	55.49%
Isobutane	56.71%	43.29%
n-Butane	64.21%	35.79%
Isopentane	68.61%	31.39%
n-Pentane	73.97%	26.03%
Cyclopentane	91.37%	8.63%
n-Hexane	84.71%	15.29%
Cyclohexane	95.67%	4.33%
Other Hexanes	80.31%	19.69%
Heptanes	92.48%	7.52%
Methylcyclohexane	96.84%	3.16%
Benzene	99.53%	0.47%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 75.0000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	29.31%	70.69%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.73%	99.27%
n-Pentane	0.68%	99.32%
Cyclopentane	0.55%	99.45%
n-Hexane	0.59%	99.41%
Cyclohexane	3.34%	96.66%
Other Hexanes	1.25%	98.75%
Heptanes	0.54%	99.46%
Methylcyclohexane	4.12%	95.88%

Benzene	5.01%	94.99%

STREAM REPORTS:

WET GAS STREAM

Temperature: 100.00 deg. F
Pressure: 864.70 psia
Flow Rate: 8.35e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.39e-001	5.50e+002
Carbon Dioxide	9.27e-002	8.97e+002
Nitrogen	3.99e-001	2.46e+003
Methane	7.73e+001	2.73e+005
Ethane	1.49e+001	9.85e+004
Propane	4.94e+000	4.79e+004
Isobutane	5.94e-001	7.60e+003
n-Butane	1.14e+000	1.46e+004
Isopentane	2.14e-001	3.40e+003
n-Pentane	1.93e-001	3.07e+003
Cyclopentane	7.99e-003	1.23e+002
n-Hexane	3.07e-002	5.81e+002
Cyclohexane	2.80e-003	5.18e+001
Other Hexanes	4.93e-002	9.35e+002
Heptanes	1.37e-002	3.02e+002
Methylcyclohexane	2.50e-003	5.39e+001
Benzene	6.99e-004	1.20e+001
Total Components	100.00	4.54e+005

DRY GAS STREAM

Temperature: 100.00 deg. F
Pressure: 864.70 psia
Flow Rate: 8.33e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.03e-002	4.09e+001
Carbon Dioxide	9.27e-002	8.96e+002
Nitrogen	3.99e-001	2.46e+003
Methane	7.74e+001	2.73e+005
Ethane	1.49e+001	9.85e+004
Propane	4.94e+000	4.79e+004
Isobutane	5.95e-001	7.59e+003
n-Butane	1.14e+000	1.45e+004
Isopentane	2.14e-001	3.39e+003
n-Pentane	1.93e-001	3.07e+003
Cyclopentane	7.96e-003	1.23e+002
n-Hexane	3.06e-002	5.80e+002
Cyclohexane	2.78e-003	5.14e+001
Other Hexanes	4.93e-002	9.34e+002
Heptanes	1.37e-002	3.01e+002

Methylcyclohexane	2.48e-003	5.35e+001
Benzene	6.52e-004	1.12e+001
Total Components	100.00	4.53e+005

LEAN GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 2.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	1.39e+004
Water	1.50e+000	2.11e+002
Carbon Dioxide	9.77e-013	1.38e-010
Nitrogen	2.29e-013	3.22e-011
Methane	7.53e-018	1.06e-015
Ethane	1.13e-007	1.59e-005
Propane	7.48e-009	1.05e-006
Isobutane	1.15e-009	1.62e-007
n-Butane	2.38e-009	3.35e-007
Isopentane	1.08e-004	1.52e-002
n-Pentane	1.24e-004	1.75e-002
Cyclopentane	2.11e-005	2.97e-003
n-Hexane	3.59e-005	5.05e-003
Cyclohexane	9.40e-005	1.32e-002
Other Hexanes	8.99e-005	1.27e-002
Heptanes	3.22e-005	4.53e-003
Methylcyclohexane	1.29e-004	1.82e-002
Benzene	3.10e-004	4.36e-002
Total Components	100.00	1.41e+004

RICH GLYCOL STREAM

Temperature: 100.00 deg. F
Pressure: 864.70 psia
Flow Rate: 2.63e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.43e+001	1.39e+004
Water	4.90e+000	7.20e+002
Carbon Dioxide	9.35e-003	1.37e+000
Nitrogen	2.19e-003	3.22e-001
Methane	2.14e-001	3.15e+001
Ethane	2.29e-001	3.37e+001
Propane	1.76e-001	2.58e+001
Isobutane	3.67e-002	5.40e+000
n-Butane	9.16e-002	1.35e+001
Isopentane	2.06e-002	3.03e+000
n-Pentane	2.38e-002	3.50e+000
Cyclopentane	4.04e-003	5.94e-001
n-Hexane	6.86e-003	1.01e+000
Cyclohexane	2.81e-003	4.14e-001
Other Hexanes	8.60e-003	1.26e+000

Heptanes	6.16e-003	9.06e-001
Methylcyclohexane	3.10e-003	4.55e-001
Benzene	5.95e-003	8.75e-001
Total Components	100.00	1.47e+004

FLASH TANK OFF GAS STREAM

Temperature: 90.00 deg. F
Pressure: 84.70 psia
Flow Rate: 1.20e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.44e-002	5.38e-002
Carbon Dioxide	4.19e-001	5.83e-001
Nitrogen	3.36e-001	2.98e-001
Methane	5.72e+001	2.91e+001
Ethane	2.68e+001	2.55e+001
Propane	1.03e+001	1.43e+001
Isobutane	1.27e+000	2.34e+000
n-Butane	2.62e+000	4.82e+000
Isopentane	4.17e-001	9.52e-001
n-Pentane	3.99e-001	9.10e-001
Cyclopentane	2.31e-002	5.12e-002
n-Hexane	5.65e-002	1.54e-001
Cyclohexane	6.73e-003	1.79e-002
Other Hexanes	9.12e-002	2.49e-001
Heptanes	2.15e-002	6.81e-002
Methylcyclohexane	4.63e-003	1.44e-002
Benzene	1.66e-003	4.10e-003
Total Components	100.00	7.94e+001

FLASH TANK GLYCOL STREAM

Temperature: 90.00 deg. F
Flow Rate: 2.61e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.48e+001	1.39e+004
Water	4.93e+000	7.20e+002
Carbon Dioxide	5.41e-003	7.91e-001
Nitrogen	1.62e-004	2.37e-002
Methane	1.68e-002	2.45e+000
Ethane	5.63e-002	8.23e+000
Propane	7.87e-002	1.15e+001
Isobutane	2.09e-002	3.06e+000
n-Butane	5.92e-002	8.65e+000
Isopentane	1.42e-002	2.08e+000
n-Pentane	1.77e-002	2.59e+000
Cyclopentane	3.71e-003	5.43e-001
n-Hexane	5.85e-003	8.55e-001
Cyclohexane	2.71e-003	3.96e-001
Other Hexanes	6.95e-003	1.02e+000
Heptanes	5.73e-003	8.38e-001
Methylcyclohexane	3.01e-003	4.41e-001

Benzene	5.96e-003	8.71e-001
Total Components	100.00	1.46e+004

FLASH GAS EMISSIONS

Flow Rate: 5.02e+003 scfh
Control Method: Combustion Device
Control Efficiency: 98.00

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.13e+001	1.46e+002
Carbon Dioxide	3.82e+001	2.22e+002
Nitrogen	8.03e-002	2.98e-001
Methane	2.74e-001	5.81e-001
Ethane	1.28e-001	5.09e-001
Propane	4.91e-002	2.87e-001
Isobutane	6.07e-003	4.67e-002
n-Butane	1.25e-002	9.64e-002
Isopentane	1.99e-003	1.90e-002
n-Pentane	1.91e-003	1.82e-002
Cyclopentane	1.10e-004	1.02e-003
n-Hexane	2.70e-004	3.09e-003
Cyclohexane	3.22e-005	3.59e-004
Other Hexanes	4.36e-004	4.98e-003
Heptanes	1.03e-004	1.36e-003
Methylcyclohexane	2.21e-005	2.88e-004
Benzene	7.93e-006	8.20e-005
Total Components	100.00	3.70e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.56e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	6.87e+001	5.09e+002
Carbon Dioxide	7.04e-002	1.27e+000
Nitrogen	1.17e-001	1.35e+000
Methane	2.27e+001	1.50e+002
Ethane	4.96e+000	6.14e+001
Propane	2.06e+000	3.74e+001
Isobutane	2.99e-001	7.16e+000
n-Butane	6.90e-001	1.65e+001
Isopentane	1.31e-001	3.90e+000
n-Pentane	1.42e-001	4.22e+000
Cyclopentane	2.10e-002	6.06e-001
n-Hexane	3.28e-002	1.16e+000
Cyclohexane	1.18e-002	4.10e-001
Other Hexanes	4.25e-002	1.51e+000
Heptanes	2.41e-002	9.95e-001
Methylcyclohexane	1.12e-002	4.51e-001
Benzene	2.59e-002	8.33e-001

Total Components	100.00	7.98e+002

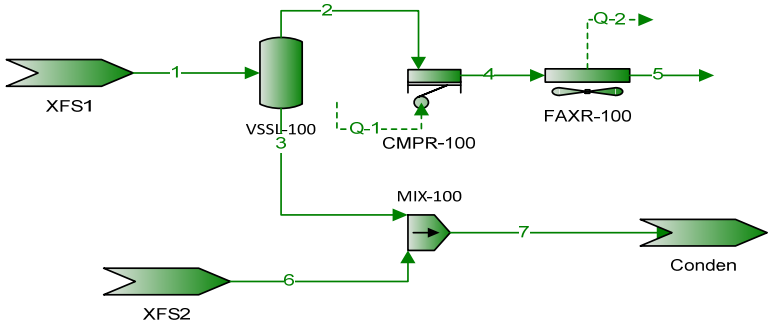
COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 9.72e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	7.28e+001	2.99e+000
Ethane	1.59e+001	1.23e+000
Propane	6.61e+000	7.47e-001
Isobutane	9.62e-001	1.43e-001
n-Butane	2.22e+000	3.30e-001
Isopentane	4.22e-001	7.80e-002
n-Pentane	4.57e-001	8.45e-002
Cyclopentane	6.74e-002	1.21e-002
n-Hexane	1.05e-001	2.33e-002
Cyclohexane	3.81e-002	8.21e-003
Other Hexanes	1.37e-001	3.01e-002
Heptanes	7.75e-002	1.99e-002
Methylcyclohexane	3.59e-002	9.03e-003
Benzene	8.33e-002	1.67e-002
Total Components	100.00	5.72e+000

Compression
Plant Schematic

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	



Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Connections

	1	2	3	4	5
From Block	XFS1	VSSL-100	VSSL-100	CMPR-100	FAXR-100
To Block	VSSL-100	CMPR-100	MIX-100	FAXR-100	--

Stream Composition

Mole Fraction	1	2	3	4	5
Nitrogen	0.00397336	0.00397336		0.00397336	0.00397336
Methane	0.770464	0.770464		0.770464	0.770464
CO2	0.000933126	0.000933126		0.000933126	0.000933126
Ethane	0.149781	0.149781		0.149781	0.149781
Propane	0.0514398	0.0514398		0.0514398	0.0514398
Isobutane	0.0062575	0.0062575		0.0062575	0.0062575
n-Butane	0.0118033	0.0118033		0.0118033	0.0118033
Isopentane	0.00220192	0.00220192		0.00220192	0.00220192
n-Pentane	0.00198609	0.00198609		0.00198609	0.00198609
2,3-Dimethylbutane	0.000141935	0.000141935		0.000141935	0.000141935
2-Methylpentane	0.000244788	0.000244788		0.000244788	0.000244788
n-Hexane	0.000305488	0.000305488		0.000305488	0.000305488
Benzene	7.88717E-06	7.88717E-06		7.88717E-06	7.88717E-06
Cyclohexane	2.78621E-05	2.78621E-05		2.78621E-05	2.78621E-05
n-Heptane	4.7542E-05	4.7542E-05		4.7542E-05	4.7542E-05
Methylcyclohexane	2.48768E-05	2.48768E-05		2.48768E-05	2.48768E-05
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06		3.16537E-06	3.16537E-06
Toluene	2.05283E-07	2.05283E-07		2.05283E-07	2.05283E-07
n-Octane	0	0		0	0
2,4,4-Trimethylhexane	0	0		0	0
Ethylbenzene	2.83413E-10	2.83413E-10		2.83413E-10	2.83413E-10
m-Xylene	1.4427E-08	1.4427E-08		1.4427E-08	1.4427E-08
p-Xylene	0	0		0	0
o-Xylene	2.15893E-09	2.15893E-09		2.15893E-09	2.15893E-09
n-Nonane	2.16019E-08	2.16019E-08		2.16019E-08	2.16019E-08
n-Decane	1.62974E-09	1.62974E-09		1.62974E-09	1.62974E-09
n-Undecane	8.31479E-11	8.31479E-11		8.31479E-11	8.31479E-11
Dodecane	1.52334E-11	1.52334E-11		1.52334E-11	1.52334E-11
Tridecane	2.83856E-14	2.83856E-14		2.83856E-14	2.83856E-14
Water	1.29811E-06	1.29811E-06		1.29811E-06	1.29811E-06
Neohexane	4.77636E-05	4.77636E-05		4.77636E-05	4.77636E-05
3-Methylpentane	0.000165182	0.000165182		0.000165182	0.000165182
Methylcyclopentane	3.38325E-05	3.38325E-05		3.38325E-05	3.38325E-05
Oxygen	9.95074E-06	9.95074E-06		9.95074E-06	9.95074E-06
2-Methylhexane	5.27389E-05	5.27389E-05		5.27389E-05	5.27389E-05
2,3-Dimethylpentane	9.95074E-06	9.95074E-06		9.95074E-06	9.95074E-06
3-Methylhexane	3.58227E-05	3.58227E-05		3.58227E-05	3.58227E-05

Molar Flow	1 lbmol/h	2 lbmol/h	3 lbmol/h	4 lbmol/h	5 lbmol/h
Nitrogen	87.6854	87.6854	0	87.6854	87.6854
Methane	17002.8	17002.8	0	17002.8	17002.8
CO2	20.5925	20.5925	0	20.5925	20.5925
Ethane	3305.42	3305.42	0	3305.42	3305.42
Propane	1135.19	1135.19	0	1135.19	1135.19
Isobutane	138.093	138.093	0	138.093	138.093
n-Butane	260.478	260.478	0	260.478	260.478
Isopentane	48.5927	48.5927	0	48.5927	48.5927
n-Pentane	43.8297	43.8297	0	43.8297	43.8297
2,3-Dimethylbutane	3.13227	3.13227	0	3.13227	3.13227
2-Methylpentane	5.40206	5.40206	0	5.40206	5.40206
n-Hexane	6.7416	6.7416	0	6.7416	6.7416
Benzene	0.174057	0.174057	0	0.174057	0.174057
Cyclohexane	0.614869	0.614869	0	0.614869	0.614869

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Molar Flow	1 lbmol/h	2 lbmol/h	3 lbmol/h	4 lbmol/h	5 lbmol/h
n-Heptane	1.04917	1.04917	0	1.04917	1.04917
Methylcyclohexane	0.54899	0.54899	0	0.54899	0.54899
2,2,4-Trimethylpentane	0.0698544	0.0698544	0	0.0698544	0.0698544
Toluene	0.00453025	0.00453025	0	0.00453025	0.00453025
n-Octane	0	0	0	0	0
2,4,4-Trimethylhexane	0	0	0	0	0
Ethylbenzene	6.25445E-06	6.25445E-06	0	6.25445E-06	6.25445E-06
m-Xylene	0.000318381	0.000318381	0	0.000318381	0.000318381
p-Xylene	0	0	0	0	0
o-Xylene	4.76439E-05	4.76439E-05	0	4.76439E-05	4.76439E-05
n-Nonane	0.000476717	0.000476717	0	0.000476717	0.000476717
n-Decane	3.59655E-05	3.59655E-05	0	3.59655E-05	3.59655E-05
n-Undecane	1.83493E-06	1.83493E-06	0	1.83493E-06	1.83493E-06
Dodecane	3.36176E-07	3.36176E-07	0	3.36176E-07	3.36176E-07
Tridecane	6.26423E-10	6.26423E-10	0	6.26423E-10	6.26423E-10
Water	0.0286472	0.0286472	0	0.0286472	0.0286472
Neohexane	1.05406	1.05406	0	1.05406	1.05406
3-Methylpentane	3.6453	3.6453	0	3.6453	3.6453
Methylcyclopentane	0.746627	0.746627	0	0.746627	0.746627
Oxygen	0.219596	0.219596	0	0.219596	0.219596
2-Methylhexane	1.16386	1.16386	0	1.16386	1.16386
2,3-Dimethylpentane	0.219596	0.219596	0	0.219596	0.219596
3-Methylhexane	0.790546	0.790546	0	0.790546	0.790546

Mass Fraction	1	2	3	4	5
Nitrogen	0.0053673	0.0053673		0.0053673	0.0053673
Methane	0.596012	0.596012		0.596012	0.596012
CO2	0.00198024	0.00198024		0.00198024	0.00198024
Ethane	0.217174	0.217174		0.217174	0.217174
Propane	0.109377	0.109377		0.109377	0.109377
Isobutane	0.0175378	0.0175378		0.0175378	0.0175378
n-Butane	0.0330808	0.0330808		0.0330808	0.0330808
Isopentane	0.0076606	0.0076606		0.0076606	0.0076606
n-Pentane	0.00690972	0.00690972		0.00690972	0.00690972
2,3-Dimethylbutane	0.0005898	0.0005898		0.0005898	0.0005898
2-Methylpentane	0.0010172	0.0010172		0.0010172	0.0010172
n-Hexane	0.00126943	0.00126943		0.00126943	0.00126943
Benzene	2.97078E-05	2.97078E-05		2.97078E-05	2.97078E-05
Cyclohexane	0.00011307	0.00011307		0.00011307	0.00011307
n-Heptane	0.000229713	0.000229713		0.000229713	0.000229713
Methylcyclohexane	0.000117782	0.000117782		0.000117782	0.000117782
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05		1.74354E-05	1.74354E-05
Toluene	9.12064E-07	9.12064E-07		9.12064E-07	9.12064E-07
n-Octane	0	0		0	0
2,4,4-Trimethylhexane	0	0		0	0
Ethylbenzene	1.45089E-09	1.45089E-09		1.45089E-09	1.45089E-09
m-Xylene	7.38569E-08	7.38569E-08		7.38569E-08	7.38569E-08
p-Xylene	0	0		0	0
o-Xylene	1.10523E-08	1.10523E-08		1.10523E-08	1.10523E-08
n-Nonane	1.33597E-07	1.33597E-07		1.33597E-07	1.33597E-07
n-Decane	1.11815E-08	1.11815E-08		1.11815E-08	1.11815E-08
n-Undecane	6.26708E-10	6.26708E-10		6.26708E-10	6.26708E-10
Dodecane	1.25122E-10	1.25122E-10		1.25122E-10	1.25122E-10
Tridecane	2.52348E-13	2.52348E-13		2.52348E-13	2.52348E-13
Water	1.12768E-06	1.12768E-06		1.12768E-06	1.12768E-06
Neohexane	0.000198478	0.000198478		0.000198478	0.000198478
3-Methylpentane	0.000686402	0.000686402		0.000686402	0.000686402
Methylcyclopentane	0.0001373	0.0001373		0.0001373	0.0001373
Oxygen	1.5354E-05	1.5354E-05		1.5354E-05	1.5354E-05
2-Methylhexane	0.000254823	0.000254823		0.000254823	0.000254823

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Mass Fraction	1	2	3	4	5
2,3-Dimethylpentane	4.80799E-05	4.80799E-05		4.80799E-05	4.80799E-05
3-Methylhexane	0.000173088	0.000173088		0.000173088	0.000173088

Mass Flow	1 lb/h	2 lb/h	3 lb/h	4 lb/h	5 lb/h
Nitrogen	2456.37	2456.37	0	2456.37	2456.37
Methane	272767	272767	0	272767	272767
CO2	906.267	906.267	0	906.267	906.267
Ethane	99390.7	99390.7	0	99390.7	99390.7
Propane	50056.9	50056.9	0	50056.9	50056.9
Isobutane	8026.25	8026.25	0	8026.25	8026.25
n-Butane	15139.6	15139.6	0	15139.6	15139.6
Isopentane	3505.9	3505.9	0	3505.9	3505.9
n-Pentane	3162.26	3162.26	0	3162.26	3162.26
2,3-Dimethylbutane	269.925	269.925	0	269.925	269.925
2-Methylpentane	465.525	465.525	0	465.525	465.525
n-Hexane	580.96	580.96	0	580.96	580.96
Benzene	13.5959	13.5959	0	13.5959	13.5959
Cyclohexane	51.7471	51.7471	0	51.7471	51.7471
n-Heptane	105.129	105.129	0	105.129	105.129
Methylcyclohexane	53.9032	53.9032	0	53.9032	53.9032
2,2,4-Trimethylpentane	7.97936	7.97936	0	7.97936	7.97936
Toluene	0.41741	0.41741	0	0.41741	0.41741
n-Octane	0	0	0	0	0
2,4,4-Trimethylhexane	0	0	0	0	0
Ethylbenzene	0.000664004	0.000664004	0	0.000664004	0.000664004
m-Xylene	0.0338009	0.0338009	0	0.0338009	0.0338009
p-Xylene	0	0	0	0	0
o-Xylene	0.00505812	0.00505812	0	0.00505812	0.00505812
n-Nonane	0.0611414	0.0611414	0	0.0611414	0.0611414
n-Decane	0.00511724	0.00511724	0	0.00511724	0.00511724
n-Undecane	0.000286815	0.000286815	0	0.000286815	0.000286815
Dodecane	5.72625E-05	5.72625E-05	0	5.72625E-05	5.72625E-05
Tridecane	1.15488E-07	1.15488E-07	0	1.15488E-07	1.15488E-07
Water	0.516087	0.516087	0	0.516087	0.516087
Neohexane	90.8341	90.8341	0	90.8341	90.8341
3-Methylpentane	314.135	314.135	0	314.135	314.135
Methylcyclopentane	62.8357	62.8357	0	62.8357	62.8357
Oxygen	7.02681	7.02681	0	7.02681	7.02681
2-Methylhexane	116.621	116.621	0	116.621	116.621
2,3-Dimethylpentane	22.004	22.004	0	22.004	22.004
3-Methylhexane	79.2143	79.2143	0	79.2143	79.2143

Volumetric Flow	1 ft^3/h	2 ft^3/h	3 ft^3/h	4 ft^3/h	5 ft^3/h
Nitrogen	1234.91	1242.73		637.985	566.912
Methane	212878	214397		107462	83311
CO2	233.866	235.705		116.442	76.7523
Ethane	32349.9	32642.1		16093.9	7867.99
Propane	8658.86	8757.72		4350.61	570.619
Isobutane	798.287	810.125		412.021	-145.361
n-Butane	1411.88	1434.21		723.183	-369.199
Isopentane	152.991	157.094		81.6191	-165.739
n-Pentane	141.396	145.087		77.2491	-144.128
2,3-Dimethylbutane	6.36423	6.62493		3.78069	-13.3489
2-Methylpentane	9.53325	9.98078		6.10991	-24.0791
n-Hexane	7.97416	8.53106		5.69161	-33.6635
Benzene	0.463876	0.478855		0.194925	-0.732704
Cyclohexane	0.975593	1.02773		0.427992	-3.08936
n-Heptane	-1.0279	-0.942989		-0.131239	-7.13858

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Volumetric Flow	1 ft^3/h	2 ft^3/h	3 ft^3/h	4 ft^3/h	5 ft^3/h
Methylcyclohexane	0.0405347	0.0861438		0.055641	-3.39377
2,2,4-Trimethylpentane	-0.064307	-0.0586996		-0.0019941	-0.460033
Toluene	0.00260317	0.00298507		0.00086638	-0.0268447
n-Octane	0	0		0	0
2,4,4-Trimethylhexane	0	0		0	0
Ethylbenzene	-1.14936E-05	-1.09751E-05		-6.01667E-06	-5.03133E-05
m-Xylene	-0.000682571	-0.000656257		-0.000346085	-0.00264393
p-Xylene	0	0		0	0
o-Xylene	-0.000100763	-9.6806E-05		-5.44847E-05	-0.000397948
n-Nonane	-0.00251877	-0.00248191		-0.000959349	-0.00493531
n-Decane	-0.000284373	-0.000281665		-0.000114488	-0.000451497
n-Undecane	-1.7421E-05	-1.72866E-05		-6.92881E-06	-2.51608E-05
Dodecane	-3.91821E-06	-3.89426E-06		-1.5809E-06	-5.19305E-06
Tridecane	-8.5054E-09	-8.46185E-09		-3.45122E-09	-1.06614E-08
Water	0.341745	0.344334		0.165462	0.117882
Neohexane	2.56934	2.65719		1.49458	-4.08618
3-Methylpentane	6.25804	6.56074		3.90152	-16.5625
Methylcyclopentane	1.53789	1.60091		0.774708	-3.3413
Oxygen	2.96717	2.98688		1.50193	1.27023
2-Methylhexane	-0.566487	-0.472377		0.212526	-7.35498
2,3-Dimethylpentane	-0.0248885	-0.00696142		0.0543387	-1.33669
3-Methylhexane	-0.33705	-0.272859		0.121605	-4.99585

Stream Properties

Property	Units	1	2	3	4	5
Temperature	°F	46.5285	46.2445	46.2445	196.868	80 *
Pressure	psig	393	390	390	1055	1050 *
Mole Fraction Vapor		1	1		1	1
Mole Fraction Light Liquid		0	0		0	0
Mole Fraction Heavy Liquid		0	0		0	0
Molecular Weight	lb/lbmol	20.7381	20.7381		20.7381	20.7381
Mass Density	lb/ft^3	1.77456	1.76115		3.52097	5.0046
Molar Flow	lbmol/h	22068.3	22068.3	0	22068.3	22068.3
Mass Flow	lb/h	457654	457654	0	457654	457654
Vapor Volumetric Flow	ft^3/h	257897	259861		129979	91446.6
Liquid Volumetric Flow	gpm	32153.4	32398.2		16205.2	11401.1
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99	0	200.99	200.99
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89	0	2689.89	2689.89
Compressibility		0.877058	0.877726		0.894214	0.761784
Specific Gravity		0.716029	0.716029		0.716029	0.716029
API Gravity						
Enthalpy	Btu/h	-7.64695E+08	-7.64695E+08	0	-7.35601E+08	-7.70327E+08
Mass Enthalpy	Btu/lb	-1670.9	-1670.9		-1607.33	-1683.21
Mass Cp	Btu/(lb*°F)	0.540522	0.539842		0.633701	0.699156
Ideal Gas CpCv Ratio		1.2571	1.25718		1.21768	1.24817
Dynamic Viscosity	cP	0.0107567	0.010745		0.0142865	0.0134261
Kinematic Viscosity	cSt	0.378414	0.380881		0.253304	0.167479
Thermal Conductivity	Btu/(h*ft*°F)	0.0177283	0.0177036		0.0261451	0.0226092
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21		1137.21	1137.21
Net Liquid Heating Value	Btu/lb	20748.1	20748.1		20748.1	20748.1
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85		1253.85	1253.85
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5		22882.5	22882.5

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Connections

	6	7			
From Block	XFS2	MIX-100			
To Block	MIX-100	Conden			

Stream Composition

Mole Fraction	6	7			
Nitrogen	1.16248E-07	1.16248E-07			
Methane	0.00361151	0.00361151			
CO2	0.000231447	0.000231447			
Ethane	0.0702112	0.0702112			
Propane	0.31384	0.31384			
Isobutane	0.100144	0.100144			
n-Butane	0.184965	0.184965			
Isopentane	0.0556461	0.0556461			
n-Pentane	0.0579419	0.0579419			
2,3-Dimethylbutane	0.125651	0.125651			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00228543	0.00228543			
Cyclohexane	0	0			
n-Heptane	0.0623572	0.0623572			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0202054	0.0202054			
Toluene	0.00142806	0.00142806			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	4.6966E-06	4.6966E-06			
m-Xylene	0.000272466	0.000272466			
p-Xylene	0	0			
o-Xylene	4.44568E-05	4.44568E-05			
n-Nonane	0.000948427	0.000948427			
n-Decane	0.000151272	0.000151272			
n-Undecane	2.0607E-05	2.0607E-05			
Dodecane	8.0006E-06	8.0006E-06			
Tridecane	3.75771E-08	3.75771E-08			
Water	3.06761E-05	3.06761E-05			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Molar Flow	6 lbmol/h	7 lbmol/h			
Nitrogen	6.40567E-07	6.40567E-07			
Methane	0.0199006	0.0199006			
CO2	0.00127535	0.00127535			
Ethane	0.386888	0.386888			
Propane	1.72937	1.72937			
Isobutane	0.55183	0.55183			
n-Butane	1.01922	1.01922			
Isopentane	0.306629	0.306629			
n-Pentane	0.319279	0.319279			
2,3-Dimethylbutane	0.692381	0.692381			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.0125935	0.0125935			
Cyclohexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Molar Flow	6 lbmol/h	7 lbmol/h			
n-Heptane	0.343609	0.343609			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.111339	0.111339			
Toluene	0.00786912	0.00786912			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.58799E-05	2.58799E-05			
m-Xylene	0.00150138	0.00150138			
p-Xylene	0	0			
o-Xylene	0.000244972	0.000244972			
n-Nonane	0.00522616	0.00522616			
n-Decane	0.000833559	0.000833559			
n-Undecane	0.000113552	0.000113552			
Dodecane	4.40861E-05	4.40861E-05			
Tridecane	2.07063E-07	2.07063E-07			
Water	0.000169036	0.000169036			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Fraction	6	7			
Nitrogen	5.36831E-08	5.36831E-08			
Methane	0.000955092	0.000955092			
CO2	0.000167913	0.000167913			
Ethane	0.0348026	0.0348026			
Propane	0.228134	0.228134			
Isobutane	0.0959521	0.0959521			
n-Butane	0.177222	0.177222			
Isopentane	0.0661835	0.0661835			
n-Pentane	0.068914	0.068914			
2,3-Dimethylbutane	0.178499	0.178499			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00294287	0.00294287			
Cyclohexane	0	0			
n-Heptane	0.103003	0.103003			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0380476	0.0380476			
Toluene	0.00216907	0.00216907			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	8.2196E-06	8.2196E-06			
m-Xylene	0.000476847	0.000476847			
p-Xylene	0	0			
o-Xylene	7.78047E-05	7.78047E-05			
n-Nonane	0.00200523	0.00200523			
n-Decane	0.000354807	0.000354807			
n-Undecane	5.30985E-05	5.30985E-05			
Dodecane	2.24653E-05	2.24653E-05			
Tridecane	1.14203E-07	1.14203E-07			
Water	9.11018E-06	9.11018E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Mass Fraction	6	7			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Flow	6 lb/h	7 lb/h			
Nitrogen	1.79445E-05	1.79445E-05			
Methane	0.319255	0.319255			
CO2	0.0561276	0.0561276			
Ethane	11.6333	11.6333			
Propane	76.2575	76.2575			
Isobutane	32.0736	32.0736			
n-Butane	59.2394	59.2394			
Isopentane	22.1229	22.1229			
n-Pentane	23.0356	23.0356			
2,3-Dimethylbutane	59.6662	59.6662			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.983702	0.983702			
Cyclohexane	0	0			
n-Heptane	34.4303	34.4303			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	12.718	12.718			
Toluene	0.725048	0.725048			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.00274754	0.00274754			
m-Xylene	0.159394	0.159394			
p-Xylene	0	0			
o-Xylene	0.0260075	0.0260075			
n-Nonane	0.670281	0.670281			
n-Decane	0.1186	0.1186			
n-Undecane	0.017749	0.017749			
Dodecane	0.00750939	0.00750939			
Tridecane	3.81744E-05	3.81744E-05			
Water	0.00304523	0.00304523			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Volumetric Flow	6 gpm	7 gpm			
Nitrogen	1.01118E-07	1.01118E-07			
Methane	0.00293999	0.00293999			
CO2	0.000120293	0.000120293			
Ethane	0.062063	0.062063			
Propane	0.326273	0.326273			
Isobutane	0.122581	0.122581			
n-Butane	0.216975	0.216975			
Isopentane	0.0734928	0.0734928			
n-Pentane	0.0754983	0.0754983			
2,3-Dimethylbutane	0.181792	0.181792			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00206263	0.00206263			
Cyclohexane	0	0			
n-Heptane	0.0994936	0.0994936			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Volumetric Flow	6 gpm	7 gpm			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0359775	0.0359775			
Toluene	0.00150994	0.00150994			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	5.66326E-06	5.66326E-06			
m-Xylene	0.000329999	0.000329999			
p-Xylene	0	0			
o-Xylene	5.18147E-05	5.18147E-05			
n-Nonane	0.00178293	0.00178293			
n-Decane	0.000308189	0.000308189			
n-Undecane	4.52019E-05	4.52019E-05			
Dodecane	1.88543E-05	1.88543E-05			
Tridecane	9.53313E-08	9.53313E-08			
Water	-2.85297E-06	-2.85297E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Stream Properties

Property	Units	6	7			
Temperature	°F	118.305	118.305			
Pressure	psig	139	139			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	60.6617	60.6617			
Mass Density	lb/ft^3	34.6332	34.6332			
Molar Flow	lbmol/h	5.51034	5.51034			
Mass Flow	lb/h	334.266	334.266			
Vapor Volumetric Flow	ft^3/h	9.65162	9.65162			
Liquid Volumetric Flow	gpm	1.20332	1.20332			
Std Vapor Volumetric Flow	MMSCFD	0.0501861	0.0501861			
Std Liquid Volumetric Flow	sgpm	1.15067	1.15067			
Compressibility		0.0434022	0.0434022			
Specific Gravity		0.555295	0.555295			
API Gravity		106.185	106.185			
Enthalpy	Btu/h	-354176	-354176			
Mass Enthalpy	Btu/lb	-1059.56	-1059.56			
Mass Cp	Btu/(lb*°F)	0.603577	0.603577			
Ideal Gas CpCv Ratio		1.08419	1.08419			
Dynamic Viscosity	cP	0.142094	0.142094			
Kinematic Viscosity	cSt	0.256132	0.256132			
Thermal Conductivity	Btu/(h*ft*°F)	0.0545262	0.0545262			
Surface Tension	lbf/ft	0.000619955 ?	0.000619955 ?			
Net Ideal Gas Heating Value	Btu/ft^3	3131.6	3131.6			
Net Liquid Heating Value	Btu/lb	19434.1	19434.1			
Gross Ideal Gas Heating Value	Btu/ft^3	3391.45	3391.45			
Gross Liquid Heating Value	Btu/lb	21059.7	21059.7			

Remarks

* User Specified Values
? Extrapolated or Approximate Values

ProMax 3.2.13116.0
Copyright © 2002-2012 BRE Group, Ltd.

Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 1
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: XFS1 To: VSSL-100

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 1
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 1
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	1234.91	1234.91			
Methane	212878	212878			
CO2	233.866	233.866			
Ethane	32349.9	32349.9			
Propane	8658.86	8658.86			
Isobutane	798.287	798.287			
n-Butane	1411.88	1411.88			
Isopentane	152.991	152.991			
n-Pentane	141.396	141.396			
2,3-Dimethylbutane	6.36423	6.36423			
2-Methylpentane	9.53325	9.53325			
n-Hexane	7.97416	7.97416			
Benzene	0.463876	0.463876			
Cyclohexane	0.975593	0.975593			
n-Heptane	-1.0279	-1.0279			
Methylcyclohexane	0.0405347	0.0405347			
2,2,4-Trimethylpentane	-0.064307	-0.064307			
Toluene	0.00260317	0.00260317			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 1
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Ethylbenzene	-1.14936E-05	-1.14936E-05			
m-Xylene	-0.000682571	-0.000682571			
p-Xylene	0	0			
o-Xylene	-0.000100763	-0.000100763			
n-Nonane	-0.00251877	-0.00251877			
n-Decane	-0.000284373	-0.000284373			
n-Undecane	-1.7421E-05	-1.7421E-05			
Dodecane	-3.91821E-06	-3.91821E-06			
Tridecane	-8.5054E-09	-8.5054E-09			
Water	0.341745	0.341745			
Neohexane	2.56934	2.56934			
3-Methylpentane	6.25804	6.25804			
Methylcyclopentane	1.53789	1.53789			
Oxygen	2.96717	2.96717			
2-Methylhexane	-0.566487	-0.566487			
2,3-Dimethylpentane	-0.0248885	-0.0248885			
3-Methylhexane	-0.33705	-0.33705			

Properties

Property	Units	Total	Vapor			
Temperature	°F	46.5285	46.5285			
Pressure	psig	393	393			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	1.77456	1.77456			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	257897	257897			
Liquid Volumetric Flow	gpm	32153.4	32153.4			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.877058	0.877058			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.64695E+08	-7.64695E+08			
Mass Enthalpy	Btu/lb	-1670.9	-1670.9			
Mass Cp	Btu/(lb*°F)	0.540522	0.540522			
Ideal Gas CpCv Ratio		1.2571	1.2571			
Dynamic Viscosity	cP	0.0107567	0.0107567			
Kinematic Viscosity	cSt	0.378414	0.378414			
Thermal Conductivity	Btu/(h*ft*°F)	0.0177283	0.0177283			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 2
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: VSSL-100 To: CMPR-100

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 2
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 2
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	1242.73	1242.73			
Methane	214397	214397			
CO2	235.705	235.705			
Ethane	32642.1	32642.1			
Propane	8757.72	8757.72			
Isobutane	810.125	810.125			
n-Butane	1434.21	1434.21			
Isopentane	157.094	157.094			
n-Pentane	145.087	145.087			
2,3-Dimethylbutane	6.62493	6.62493			
2-Methylpentane	9.98078	9.98078			
n-Hexane	8.53106	8.53106			
Benzene	0.478855	0.478855			
Cyclohexane	1.02773	1.02773			
n-Heptane	-0.942989	-0.942989			
Methylcyclohexane	0.0861438	0.0861438			
2,2,4-Trimethylpentane	-0.0586996	-0.0586996			
Toluene	0.00298507	0.00298507			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 2
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Ethylbenzene	-1.09751E-05	-1.09751E-05			
m-Xylene	-0.000656257	-0.000656257			
p-Xylene	0	0			
o-Xylene	-9.6806E-05	-9.6806E-05			
n-Nonane	-0.00248191	-0.00248191			
n-Decane	-0.000281665	-0.000281665			
n-Undecane	-1.72866E-05	-1.72866E-05			
Dodecane	-3.89426E-06	-3.89426E-06			
Tridecane	-8.46185E-09	-8.46185E-09			
Water	0.344334	0.344334			
Neohexane	2.65719	2.65719			
3-Methylpentane	6.56074	6.56074			
Methylcyclopentane	1.60091	1.60091			
Oxygen	2.98688	2.98688			
2-Methylhexane	-0.472377	-0.472377			
2,3-Dimethylpentane	-0.00696142	-0.00696142			
3-Methylhexane	-0.272859	-0.272859			

Properties

Property	Units	Total	Vapor			
Temperature	°F	46.2445	46.2445			
Pressure	psig	390	390			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	1.76115	1.76115			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	259861	259861			
Liquid Volumetric Flow	gpm	32398.2	32398.2			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.877726	0.877726			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.64695E+08	-7.64695E+08			
Mass Enthalpy	Btu/lb	-1670.9	-1670.9			
Mass Cp	Btu/(lb*°F)	0.539842	0.539842			
Ideal Gas CpCv Ratio		1.25718	1.25718			
Dynamic Viscosity	cP	0.010745	0.010745			
Kinematic Viscosity	cSt	0.380881	0.380881			
Thermal Conductivity	Btu/(h*ft*°F)	0.0177036	0.0177036			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 3
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: VSSL-100 To: MIX-100

Composition

Mole Fraction	Total				
Nitrogen					
Methane					
CO2					
Ethane					
Propane					
Isobutane					
n-Butane					
Isopentane					
n-Pentane					
2,3-Dimethylbutane					
2-Methylpentane					
n-Hexane					
Benzene					
Cyclohexane					
n-Heptane					
Methylcyclohexane					
2,2,4-Trimethylpentane					
Toluene					
n-Octane					
2,4,4-Trimethylhexane					
Ethylbenzene					
m-Xylene					
p-Xylene					
o-Xylene					
n-Nonane					
n-Decane					
n-Undecane					
Dodecane					
Tridecane					
Water					
Neohexane					
3-Methylpentane					
Methylcyclopentane					
Oxygen					
2-Methylhexane					
2,3-Dimethylpentane					
3-Methylhexane					

Molar Flow	Total lbmol/h				
Nitrogen	0				
Methane	0				
CO2	0				
Ethane	0				
Propane	0				
Isobutane	0				
n-Butane	0				
Isopentane	0				
n-Pentane	0				
2,3-Dimethylbutane	0				
2-Methylpentane	0				
n-Hexane	0				
Benzene	0				
Cyclohexane	0				
n-Heptane	0				
Methylcyclohexane	0				

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 3
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h				
2,2,4-Trimethylpentane	0				
Toluene	0				
n-Octane	0				
2,4,4-Trimethylhexane	0				
Ethylbenzene	0				
m-Xylene	0				
p-Xylene	0				
o-Xylene	0				
n-Nonane	0				
n-Decane	0				
n-Undecane	0				
Dodecane	0				
Tridecane	0				
Water	0				
Neohexane	0				
3-Methylpentane	0				
Methylcyclopentane	0				
Oxygen	0				
2-Methylhexane	0				
2,3-Dimethylpentane	0				
3-Methylhexane	0				

Mass Fraction	Total				
Nitrogen					
Methane					
CO2					
Ethane					
Propane					
Isobutane					
n-Butane					
Isopentane					
n-Pentane					
2,3-Dimethylbutane					
2-Methylpentane					
n-Hexane					
Benzene					
Cyclohexane					
n-Heptane					
Methylcyclohexane					
2,2,4-Trimethylpentane					
Toluene					
n-Octane					
2,4,4-Trimethylhexane					
Ethylbenzene					
m-Xylene					
p-Xylene					
o-Xylene					
n-Nonane					
n-Decane					
n-Undecane					
Dodecane					
Tridecane					
Water					
Neohexane					
3-Methylpentane					
Methylcyclopentane					
Oxygen					
2-Methylhexane					
2,3-Dimethylpentane					
3-Methylhexane					

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 3
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015

Mass Flow	Total lb/h				
Nitrogen	0				
Methane	0				
CO2	0				
Ethane	0				
Propane	0				
Isobutane	0				
n-Butane	0				
Isopentane	0				
n-Pentane	0				
2,3-Dimethylbutane	0				
2-Methylpentane	0				
n-Hexane	0				
Benzene	0				
Cyclohexane	0				
n-Heptane	0				
Methylcyclohexane	0				
2,2,4-Trimethylpentane	0				
Toluene	0				
n-Octane	0				
2,4,4-Trimethylhexane	0				
Ethylbenzene	0				
m-Xylene	0				
p-Xylene	0				
o-Xylene	0				
n-Nonane	0				
n-Decane	0				
n-Undecane	0				
Dodecane	0				
Tridecane	0				
Water	0				
Neohexane	0				
3-Methylpentane	0				
Methylcyclopentane	0				
Oxygen	0				
2-Methylhexane	0				
2,3-Dimethylpentane	0				
3-Methylhexane	0				

Volumetric Flow	Total ft^3/h				
Nitrogen					
Methane					
CO2					
Ethane					
Propane					
Isobutane					
n-Butane					
Isopentane					
n-Pentane					
2,3-Dimethylbutane					
2-Methylpentane					
n-Hexane					
Benzene					
Cyclohexane					
n-Heptane					
Methylcyclohexane					
2,2,4-Trimethylpentane					
Toluene					
n-Octane					
2,4,4-Trimethylhexane					

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 3
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h				
Ethylbenzene					
m-Xylene					
p-Xylene					
o-Xylene					
n-Nonane					
n-Decane					
n-Undecane					
Dodecane					
Tridecane					
Water					
Neohexane					
3-Methylpentane					
Methylcyclopentane					
Oxygen					
2-Methylhexane					
2,3-Dimethylpentane					
3-Methylhexane					

Properties

Property	Units	Total				
Temperature	°F	46.2445				
Pressure	psig	390				
Mole Fraction Vapor						
Mole Fraction Light Liquid						
Mole Fraction Heavy Liquid						
Molecular Weight	lb/lbmol					
Mass Density	lb/ft^3					
Molar Flow	lbmol/h	0				
Mass Flow	lb/h	0				
Vapor Volumetric Flow	ft^3/h					
Liquid Volumetric Flow	gpm					
Std Vapor Volumetric Flow	MMSCFD	0				
Std Liquid Volumetric Flow	sgpm	0				
Compressibility						
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	0				
Mass Enthalpy	Btu/lb					
Mass Cp	Btu/(lb*°F)					
Ideal Gas CpCv Ratio						
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3					
Net Liquid Heating Value	Btu/lb					
Gross Ideal Gas Heating Value	Btu/ft^3					
Gross Liquid Heating Value	Btu/lb					

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 4
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:30 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: CMPR-100 To: FAXR-100

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 4
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:30 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 4
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:30 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	637.985	637.985			
Methane	107462	107462			
CO2	116.442	116.442			
Ethane	16093.9	16093.9			
Propane	4350.61	4350.61			
Isobutane	412.021	412.021			
n-Butane	723.183	723.183			
Isopentane	81.6191	81.6191			
n-Pentane	77.2491	77.2491			
2,3-Dimethylbutane	3.78069	3.78069			
2-Methylpentane	6.10991	6.10991			
n-Hexane	5.69161	5.69161			
Benzene	0.194925	0.194925			
Cyclohexane	0.427992	0.427992			
n-Heptane	-0.131239	-0.131239			
Methylcyclohexane	0.055641	0.055641			
2,2,4-Trimethylpentane	-0.0019941	-0.0019941			
Toluene	0.00086638	0.00086638			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 4
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:30 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Ethylbenzene	-6.01667E-06	-6.01667E-06			
m-Xylene	-0.000346085	-0.000346085			
p-Xylene	0	0			
o-Xylene	-5.44847E-05	-5.44847E-05			
n-Nonane	-0.000959349	-0.000959349			
n-Decane	-0.000114488	-0.000114488			
n-Undecane	-6.92881E-06	-6.92881E-06			
Dodecane	-1.5809E-06	-1.5809E-06			
Tridecane	-3.45122E-09	-3.45122E-09			
Water	0.165462	0.165462			
Neohexane	1.49458	1.49458			
3-Methylpentane	3.90152	3.90152			
Methylcyclopentane	0.774708	0.774708			
Oxygen	1.50193	1.50193			
2-Methylhexane	0.212526	0.212526			
2,3-Dimethylpentane	0.0543387	0.0543387			
3-Methylhexane	0.121605	0.121605			

Properties

Property	Units	Total	Vapor			
Temperature	°F	196.868	196.868			
Pressure	psig	1055	1055			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	3.52097	3.52097			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	129979	129979			
Liquid Volumetric Flow	gpm	16205.2	16205.2			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.894214	0.894214			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.35601E+08	-7.35601E+08			
Mass Enthalpy	Btu/lb	-1607.33	-1607.33			
Mass Cp	Btu/(lb*°F)	0.633701	0.633701			
Ideal Gas CpCv Ratio		1.21768	1.21768			
Dynamic Viscosity	cP	0.0142865	0.0142865			
Kinematic Viscosity	cSt	0.253304	0.253304			
Thermal Conductivity	Btu/(h*ft*°F)	0.0261451	0.0261451			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 5
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:40 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: FAXR-100 To: --

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 5
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:40 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 5
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:40 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	566.912	566.912			
Methane	83311	83311			
CO2	76.7523	76.7523			
Ethane	7867.99	7867.99			
Propane	570.619	570.619			
Isobutane	-145.361	-145.361			
n-Butane	-369.199	-369.199			
Isopentane	-165.739	-165.739			
n-Pentane	-144.128	-144.128			
2,3-Dimethylbutane	-13.3489	-13.3489			
2-Methylpentane	-24.0791	-24.0791			
n-Hexane	-33.6635	-33.6635			
Benzene	-0.732704	-0.732704			
Cyclohexane	-3.08936	-3.08936			
n-Heptane	-7.13858	-7.13858			
Methylcyclohexane	-3.39377	-3.39377			
2,2,4-Trimethylpentane	-0.460033	-0.460033			
Toluene	-0.0268447	-0.0268447			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 5
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:40 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Ethylbenzene	-5.03133E-05	-5.03133E-05			
m-Xylene	-0.00264393	-0.00264393			
p-Xylene	0	0			
o-Xylene	-0.000397948	-0.000397948			
n-Nonane	-0.00493531	-0.00493531			
n-Decane	-0.000451497	-0.000451497			
n-Undecane	-2.51608E-05	-2.51608E-05			
Dodecane	-5.19305E-06	-5.19305E-06			
Tridecane	-1.06614E-08	-1.06614E-08			
Water	0.117882	0.117882			
Neohexane	-4.08618	-4.08618			
3-Methylpentane	-16.5625	-16.5625			
Methylcyclopentane	-3.3413	-3.3413			
Oxygen	1.27023	1.27023			
2-Methylhexane	-7.35498	-7.35498			
2,3-Dimethylpentane	-1.33669	-1.33669			
3-Methylhexane	-4.99585	-4.99585			

Properties

Property	Units	Total	Vapor			
Temperature	°F	80 *	80			
Pressure	psig	1050 *	1050			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	5.0046	5.0046			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	91446.6	91446.6			
Liquid Volumetric Flow	gpm	11401.1	11401.1			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.761784	0.761784			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.70327E+08	-7.70327E+08			
Mass Enthalpy	Btu/lb	-1683.21	-1683.21			
Mass Cp	Btu/(lb*°F)	0.699156	0.699156			
Ideal Gas CpCv Ratio		1.24817	1.24817			
Dynamic Viscosity	cP	0.0134261	0.0134261			
Kinematic Viscosity	cSt	0.167479	0.167479			
Thermal Conductivity	Btu/(h*ft*°F)	0.0226092	0.0226092			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 6
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: XFS2 To: MIX-100

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	1.16248E-07	1.16248E-07			
Methane	0.00361151	0.00361151			
CO2	0.000231447	0.000231447			
Ethane	0.0702112	0.0702112			
Propane	0.31384	0.31384			
Isobutane	0.100144	0.100144			
n-Butane	0.184965	0.184965			
Isopentane	0.0556461	0.0556461			
n-Pentane	0.0579419	0.0579419			
2,3-Dimethylbutane	0.125651	0.125651			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00228543	0.00228543			
Cyclohexane	0	0			
n-Heptane	0.0623572	0.0623572			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0202054	0.0202054			
Toluene	0.00142806	0.00142806			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	4.6966E-06	4.6966E-06			
m-Xylene	0.000272466	0.000272466			
p-Xylene	0	0			
o-Xylene	4.44568E-05	4.44568E-05			
n-Nonane	0.000948427	0.000948427			
n-Decane	0.000151272	0.000151272			
n-Undecane	2.0607E-05	2.0607E-05			
Dodecane	8.0006E-06	8.0006E-06			
Tridecane	3.75771E-08	3.75771E-08			
Water	3.06761E-05	3.06761E-05			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	6.40567E-07	6.40567E-07			
Methane	0.0199006	0.0199006			
CO2	0.00127535	0.00127535			
Ethane	0.386888	0.386888			
Propane	1.72937	1.72937			
Isobutane	0.55183	0.55183			
n-Butane	1.01922	1.01922			
Isopentane	0.306629	0.306629			
n-Pentane	0.319279	0.319279			
2,3-Dimethylbutane	0.692381	0.692381			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.0125935	0.0125935			
Cyclohexane	0	0			
n-Heptane	0.343609	0.343609			
Methylcyclohexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 6
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
2,2,4-Trimethylpentane	0.111339	0.111339			
Toluene	0.00786912	0.00786912			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.58799E-05	2.58799E-05			
m-Xylene	0.00150138	0.00150138			
p-Xylene	0	0			
o-Xylene	0.000244972	0.000244972			
n-Nonane	0.00522616	0.00522616			
n-Decane	0.000833559	0.000833559			
n-Undecane	0.000113552	0.000113552			
Dodecane	4.40861E-05	4.40861E-05			
Tridecane	2.07063E-07	2.07063E-07			
Water	0.000169036	0.000169036			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Fraction	Total	Light Liquid			
Nitrogen	5.36831E-08	5.36831E-08			
Methane	0.000955092	0.000955092			
CO2	0.000167913	0.000167913			
Ethane	0.0348026	0.0348026			
Propane	0.228134	0.228134			
Isobutane	0.0959521	0.0959521			
n-Butane	0.177222	0.177222			
Isopentane	0.0661835	0.0661835			
n-Pentane	0.068914	0.068914			
2,3-Dimethylbutane	0.178499	0.178499			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00294287	0.00294287			
Cyclohexane	0	0			
n-Heptane	0.103003	0.103003			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0380476	0.0380476			
Toluene	0.00216907	0.00216907			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	8.2196E-06	8.2196E-06			
m-Xylene	0.000476847	0.000476847			
p-Xylene	0	0			
o-Xylene	7.78047E-05	7.78047E-05			
n-Nonane	0.00200523	0.00200523			
n-Decane	0.000354807	0.000354807			
n-Undecane	5.30985E-05	5.30985E-05			
Dodecane	2.24653E-05	2.24653E-05			
Tridecane	1.14203E-07	1.14203E-07			
Water	9.11018E-06	9.11018E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 6
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Flow	Total lb/h	Light Liquid lb/h			
Nitrogen	1.79445E-05	1.79445E-05			
Methane	0.319255	0.319255			
CO2	0.0561276	0.0561276			
Ethane	11.6333	11.6333			
Propane	76.2575	76.2575			
Isobutane	32.0736	32.0736			
n-Butane	59.2394	59.2394			
Isopentane	22.1229	22.1229			
n-Pentane	23.0356	23.0356			
2,3-Dimethylbutane	59.6662	59.6662			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.983702	0.983702			
Cyclohexane	0	0			
n-Heptane	34.4303	34.4303			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	12.718	12.718			
Toluene	0.725048	0.725048			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.00274754	0.00274754			
m-Xylene	0.159394	0.159394			
p-Xylene	0	0			
o-Xylene	0.0260075	0.0260075			
n-Nonane	0.670281	0.670281			
n-Decane	0.1186	0.1186			
n-Undecane	0.017749	0.017749			
Dodecane	0.00750939	0.00750939			
Tridecane	3.81744E-05	3.81744E-05			
Water	0.00304523	0.00304523			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	1.01118E-07	1.01118E-07			
Methane	0.00293999	0.00293999			
CO2	0.000120293	0.000120293			
Ethane	0.062063	0.062063			
Propane	0.326273	0.326273			
Isobutane	0.122581	0.122581			
n-Butane	0.216975	0.216975			
Isopentane	0.0734928	0.0734928			
n-Pentane	0.0754983	0.0754983			
2,3-Dimethylbutane	0.181792	0.181792			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00206263	0.00206263			
Cyclohexane	0	0			
n-Heptane	0.0994936	0.0994936			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0359775	0.0359775			
Toluene	0.00150994	0.00150994			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 6
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:33 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total gpm	Light Liquid gpm			
Ethylbenzene	5.66326E-06	5.66326E-06			
m-Xylene	0.000329999	0.000329999			
p-Xylene	0	0			
o-Xylene	5.18147E-05	5.18147E-05			
n-Nonane	0.00178293	0.00178293			
n-Decane	0.000308189	0.000308189			
n-Undecane	4.52019E-05	4.52019E-05			
Dodecane	1.88543E-05	1.88543E-05			
Tridecane	9.53313E-08	9.53313E-08			
Water	-2.85297E-06	-2.85297E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	118.305	118.305			
Pressure	psig	139	139			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	60.6617	60.6617			
Mass Density	lb/ft^3	34.6332	34.6332			
Molar Flow	lbmol/h	5.51034	5.51034			
Mass Flow	lb/h	334.266	334.266			
Vapor Volumetric Flow	ft^3/h	9.65162	9.65162			
Liquid Volumetric Flow	gpm	1.20332	1.20332			
Std Vapor Volumetric Flow	MMSCFD	0.0501861	0.0501861			
Std Liquid Volumetric Flow	sgpm	1.15067	1.15067			
Compressibility		0.0434022	0.0434022			
Specific Gravity		0.555295	0.555295			
API Gravity		106.185	106.185			
Enthalpy	Btu/h	-354176	-354176			
Mass Enthalpy	Btu/lb	-1059.56	-1059.56			
Mass Cp	Btu/(lb*°F)	0.603577	0.603577			
Ideal Gas CpCv Ratio		1.08419	1.08419			
Dynamic Viscosity	cP	0.142094	0.142094			
Kinematic Viscosity	cSt	0.256132	0.256132			
Thermal Conductivity	Btu/(h*ft*°F)	0.0545262	0.0545262			
Surface Tension	lbf/ft	0.000619955 ?	0.000619955 ?			
Net Ideal Gas Heating Value	Btu/ft^3	3131.6	3131.6			
Net Liquid Heating Value	Btu/lb	19434.1	19434.1			
Gross Ideal Gas Heating Value	Btu/ft^3	3391.45	3391.45			
Gross Liquid Heating Value	Btu/lb	21059.7	21059.7			

Remarks

* User Specified Values
? Extrapolated or Approximate Values

ProMax 3.2.13116.0
Copyright © 2002-2012 BRE Group, Ltd.

Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 7
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

From: MIX-100 To: Conden

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	1.16248E-07	1.16248E-07			
Methane	0.00361151	0.00361151			
CO2	0.000231447	0.000231447			
Ethane	0.0702112	0.0702112			
Propane	0.31384	0.31384			
Isobutane	0.100144	0.100144			
n-Butane	0.184965	0.184965			
Isopentane	0.0556461	0.0556461			
n-Pentane	0.0579419	0.0579419			
2,3-Dimethylbutane	0.125651	0.125651			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00228543	0.00228543			
Cyclohexane	0	0			
n-Heptane	0.0623572	0.0623572			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0202054	0.0202054			
Toluene	0.00142806	0.00142806			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	4.6966E-06	4.6966E-06			
m-Xylene	0.000272466	0.000272466			
p-Xylene	0	0			
o-Xylene	4.44568E-05	4.44568E-05			
n-Nonane	0.000948427	0.000948427			
n-Decane	0.000151272	0.000151272			
n-Undecane	2.0607E-05	2.0607E-05			
Dodecane	8.0006E-06	8.0006E-06			
Tridecane	3.75771E-08	3.75771E-08			
Water	3.06761E-05	3.06761E-05			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	6.40567E-07	6.40567E-07			
Methane	0.0199006	0.0199006			
CO2	0.00127535	0.00127535			
Ethane	0.386888	0.386888			
Propane	1.72937	1.72937			
Isobutane	0.55183	0.55183			
n-Butane	1.01922	1.01922			
Isopentane	0.306629	0.306629			
n-Pentane	0.319279	0.319279			
2,3-Dimethylbutane	0.692381	0.692381			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.0125935	0.0125935			
Cyclohexane	0	0			
n-Heptane	0.343609	0.343609			
Methylcyclohexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 7
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
2,2,4-Trimethylpentane	0.111339	0.111339			
Toluene	0.00786912	0.00786912			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.58799E-05	2.58799E-05			
m-Xylene	0.00150138	0.00150138			
p-Xylene	0	0			
o-Xylene	0.000244972	0.000244972			
n-Nonane	0.00522616	0.00522616			
n-Decane	0.000833559	0.000833559			
n-Undecane	0.000113552	0.000113552			
Dodecane	4.40861E-05	4.40861E-05			
Tridecane	2.07063E-07	2.07063E-07			
Water	0.000169036	0.000169036			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Fraction	Total	Light Liquid			
Nitrogen	5.36831E-08	5.36831E-08			
Methane	0.000955092	0.000955092			
CO2	0.000167913	0.000167913			
Ethane	0.0348026	0.0348026			
Propane	0.228134	0.228134			
Isobutane	0.0959521	0.0959521			
n-Butane	0.177222	0.177222			
Isopentane	0.0661835	0.0661835			
n-Pentane	0.068914	0.068914			
2,3-Dimethylbutane	0.178499	0.178499			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00294287	0.00294287			
Cyclohexane	0	0			
n-Heptane	0.103003	0.103003			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0380476	0.0380476			
Toluene	0.00216907	0.00216907			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	8.2196E-06	8.2196E-06			
m-Xylene	0.000476847	0.000476847			
p-Xylene	0	0			
o-Xylene	7.78047E-05	7.78047E-05			
n-Nonane	0.00200523	0.00200523			
n-Decane	0.000354807	0.000354807			
n-Undecane	5.30985E-05	5.30985E-05			
Dodecane	2.24653E-05	2.24653E-05			
Tridecane	1.14203E-07	1.14203E-07			
Water	9.11018E-06	9.11018E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 7
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Flow	Total lb/h	Light Liquid lb/h			
Nitrogen	1.79445E-05	1.79445E-05			
Methane	0.319255	0.319255			
CO2	0.0561276	0.0561276			
Ethane	11.6333	11.6333			
Propane	76.2575	76.2575			
Isobutane	32.0736	32.0736			
n-Butane	59.2394	59.2394			
Isopentane	22.1229	22.1229			
n-Pentane	23.0356	23.0356			
2,3-Dimethylbutane	59.6662	59.6662			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.983702	0.983702			
Cyclohexane	0	0			
n-Heptane	34.4303	34.4303			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	12.718	12.718			
Toluene	0.725048	0.725048			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.00274754	0.00274754			
m-Xylene	0.159394	0.159394			
p-Xylene	0	0			
o-Xylene	0.0260075	0.0260075			
n-Nonane	0.670281	0.670281			
n-Decane	0.1186	0.1186			
n-Undecane	0.017749	0.017749			
Dodecane	0.00750939	0.00750939			
Tridecane	3.81744E-05	3.81744E-05			
Water	0.00304523	0.00304523			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	1.01118E-07	1.01118E-07			
Methane	0.00293999	0.00293999			
CO2	0.000120293	0.000120293			
Ethane	0.062063	0.062063			
Propane	0.326273	0.326273			
Isobutane	0.122581	0.122581			
n-Butane	0.216975	0.216975			
Isopentane	0.0734928	0.0734928			
n-Pentane	0.0754983	0.0754983			
2,3-Dimethylbutane	0.181792	0.181792			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00206263	0.00206263			
Cyclohexane	0	0			
n-Heptane	0.0994936	0.0994936			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0359775	0.0359775			
Toluene	0.00150994	0.00150994			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Process Streams Report
Stream: 7
Phases Grouped by Columns

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total gpm	Light Liquid gpm			
Ethylbenzene	5.66326E-06	5.66326E-06			
m-Xylene	0.000329999	0.000329999			
p-Xylene	0	0			
o-Xylene	5.18147E-05	5.18147E-05			
n-Nonane	0.00178293	0.00178293			
n-Decane	0.000308189	0.000308189			
n-Undecane	4.52019E-05	4.52019E-05			
Dodecane	1.88543E-05	1.88543E-05			
Tridecane	9.53313E-08	9.53313E-08			
Water	-2.85297E-06	-2.85297E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	118.305	118.305			
Pressure	psig	139	139			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	60.6617	60.6617			
Mass Density	lb/ft^3	34.6332	34.6332			
Molar Flow	lbmol/h	5.51034	5.51034			
Mass Flow	lb/h	334.266	334.266			
Vapor Volumetric Flow	ft^3/h	9.65162	9.65162			
Liquid Volumetric Flow	gpm	1.20332	1.20332			
Std Vapor Volumetric Flow	MMSCFD	0.0501861	0.0501861			
Std Liquid Volumetric Flow	sgpm	1.15067	1.15067			
Compressibility		0.0434022	0.0434022			
Specific Gravity		0.555295	0.555295			
API Gravity		106.185	106.185			
Enthalpy	Btu/h	-354176	-354176			
Mass Enthalpy	Btu/lb	-1059.56	-1059.56			
Mass Cp	Btu/(lb*°F)	0.603577	0.603577			
Ideal Gas CpCv Ratio		1.08419	1.08419			
Dynamic Viscosity	cP	0.142094	0.142094			
Kinematic Viscosity	cSt	0.256132	0.256132			
Thermal Conductivity	Btu/(h*ft*°F)	0.0545262	0.0545262			
Surface Tension	lbf/ft	0.000619955 ?	0.000619955 ?			
Net Ideal Gas Heating Value	Btu/ft^3	3131.6	3131.6			
Net Liquid Heating Value	Btu/lb	19434.1	19434.1			
Gross Ideal Gas Heating Value	Btu/ft^3	3391.45	3391.45			
Gross Liquid Heating Value	Btu/lb	21059.7	21059.7			

Remarks

* User Specified Values
? Extrapolated or Approximate Values

ProMax 3.2.13116.0
Copyright © 2002-2012 BRE Group, Ltd.

Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
Conden
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
7 [Compression]	Inlet	MIX-100 [Compression]	3 [Tank Emissions]	Outlet	MIX-100 [Tank Emissions]

Block Parameters

Mole Fraction Transfer Threshold	0		Outlet Mass Enthalpy	-1059.56	Btu/lb
Transfer Property	Pressure		Temperature Difference	0	°F
Transfer Property	Mass Enthalpy		Pressure Difference	0	psi
Inlet Temperature	118.305	°F	Fraction Vapor Difference	0	
Inlet Pressure	139	psig	Mass Enthalpy Difference	0	Btu/lb
Inlet Fraction Vapor	0		Temperature Tolerance	1	°F
Inlet Mass Enthalpy	-1059.56	Btu/lb	Pressure Tolerance	1	psi
Outlet Temperature	118.305	°F	Fraction Vapor Tolerance	0.01	
Outlet Pressure	139	psig	Mass Enthalpy Tolerance	1	Btu/lb
Outlet Fraction Vapor	0				

Process Streams

Stream:7

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	1.16248E-07	1.16248E-07			
Methane	0.00361151	0.00361151			
CO2	0.000231447	0.000231447			
Ethane	0.0702112	0.0702112			
Propane	0.31384	0.31384			
Isobutane	0.100144	0.100144			
n-Butane	0.184965	0.184965			
Isopentane	0.0556461	0.0556461			
n-Pentane	0.0579419	0.0579419			
2,3-Dimethylbutane	0.125651	0.125651			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00228543	0.00228543			
Cyclohexane	0	0			
n-Heptane	0.0623572	0.0623572			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0202054	0.0202054			
Toluene	0.00142806	0.00142806			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	4.6966E-06	4.6966E-06			
m-Xylene	0.000272466	0.000272466			
p-Xylene	0	0			
o-Xylene	4.44568E-05	4.44568E-05			
n-Nonane	0.000948427	0.000948427			
n-Decane	0.000151272	0.000151272			
n-Undecane	2.0607E-05	2.0607E-05			
Dodecane	8.0006E-06	8.0006E-06			
Tridecane	3.75771E-08	3.75771E-08			
Water	3.06761E-05	3.06761E-05			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
Conden
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	6.40567E-07	6.40567E-07			
Methane	0.0199006	0.0199006			
CO2	0.00127535	0.00127535			
Ethane	0.386888	0.386888			
Propane	1.72937	1.72937			
Isobutane	0.55183	0.55183			
n-Butane	1.01922	1.01922			
Isopentane	0.306629	0.306629			
n-Pentane	0.319279	0.319279			
2,3-Dimethylbutane	0.692381	0.692381			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.0125935	0.0125935			
Cyclohexane	0	0			
n-Heptane	0.343609	0.343609			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.111339	0.111339			
Toluene	0.00786912	0.00786912			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.58799E-05	2.58799E-05			
m-Xylene	0.00150138	0.00150138			
p-Xylene	0	0			
o-Xylene	0.000244972	0.000244972			
n-Nonane	0.00522616	0.00522616			
n-Decane	0.000833559	0.000833559			
n-Undecane	0.000113552	0.000113552			
Dodecane	4.40861E-05	4.40861E-05			
Tridecane	2.07063E-07	2.07063E-07			
Water	0.000169036	0.000169036			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Fraction	Total	Light Liquid			
Nitrogen	5.36831E-08	5.36831E-08			
Methane	0.000955092	0.000955092			
CO2	0.000167913	0.000167913			
Ethane	0.0348026	0.0348026			
Propane	0.228134	0.228134			
Isobutane	0.0959521	0.0959521			
n-Butane	0.177222	0.177222			
Isopentane	0.0661835	0.0661835			
n-Pentane	0.068914	0.068914			
2,3-Dimethylbutane	0.178499	0.178499			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00294287	0.00294287			
Cyclohexane	0	0			
n-Heptane	0.103003	0.103003			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0380476	0.0380476			
Toluene	0.00216907	0.00216907			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	8.2196E-06	8.2196E-06			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
Conden
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Fraction	Total	Light Liquid			
m-Xylene	0.000476847	0.000476847			
p-Xylene	0	0			
o-Xylene	7.78047E-05	7.78047E-05			
n-Nonane	0.00200523	0.00200523			
n-Decane	0.000354807	0.000354807			
n-Undecane	5.30985E-05	5.30985E-05			
Dodecane	2.24653E-05	2.24653E-05			
Tridecane	1.14203E-07	1.14203E-07			
Water	9.11018E-06	9.11018E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Flow	Total lb/h	Light Liquid lb/h			
Nitrogen	1.79445E-05	1.79445E-05			
Methane	0.319255	0.319255			
CO2	0.0561276	0.0561276			
Ethane	11.6333	11.6333			
Propane	76.2575	76.2575			
Isobutane	32.0736	32.0736			
n-Butane	59.2394	59.2394			
Isopentane	22.1229	22.1229			
n-Pentane	23.0356	23.0356			
2,3-Dimethylbutane	59.6662	59.6662			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.983702	0.983702			
Cyclohexane	0	0			
n-Heptane	34.4303	34.4303			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	12.718	12.718			
Toluene	0.725048	0.725048			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.00274754	0.00274754			
m-Xylene	0.159394	0.159394			
p-Xylene	0	0			
o-Xylene	0.0260075	0.0260075			
n-Nonane	0.670281	0.670281			
n-Decane	0.1186	0.1186			
n-Undecane	0.017749	0.017749			
Dodecane	0.00750939	0.00750939			
Tridecane	3.81744E-05	3.81744E-05			
Water	0.00304523	0.00304523			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	1.01118E-07	1.01118E-07			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
Conden
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total gpm	Light Liquid gpm			
Methane	0.00293999	0.00293999			
CO2	0.000120293	0.000120293			
Ethane	0.062063	0.062063			
Propane	0.326273	0.326273			
Isobutane	0.122581	0.122581			
n-Butane	0.216975	0.216975			
Isopentane	0.0734928	0.0734928			
n-Pentane	0.0754983	0.0754983			
2,3-Dimethylbutane	0.181792	0.181792			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00206263	0.00206263			
Cyclohexane	0	0			
n-Heptane	0.0994936	0.0994936			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0359775	0.0359775			
Toluene	0.00150994	0.00150994			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	5.66326E-06	5.66326E-06			
m-Xylene	0.000329999	0.000329999			
p-Xylene	0	0			
o-Xylene	5.18147E-05	5.18147E-05			
n-Nonane	0.00178293	0.00178293			
n-Decane	0.000308189	0.000308189			
n-Undecane	4.52019E-05	4.52019E-05			
Dodecane	1.88543E-05	1.88543E-05			
Tridecane	9.53313E-08	9.53313E-08			
Water	-2.85297E-06	-2.85297E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	118.305	118.305			
Pressure	psig	139	139			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	60.6617	60.6617			
Mass Density	lb/ft^3	34.6332	34.6332			
Molar Flow	lbmol/h	5.51034	5.51034			
Mass Flow	lb/h	334.266	334.266			
Vapor Volumetric Flow	ft^3/h	9.65162	9.65162			
Liquid Volumetric Flow	gpm	1.20332	1.20332			
Std Vapor Volumetric Flow	MMSCFD	0.0501861	0.0501861			
Std Liquid Volumetric Flow	sgpm	1.15067	1.15067			
Compressibility		0.0434022	0.0434022			
Specific Gravity		0.555295	0.555295			
API Gravity		106.185	106.185			
Enthalpy	Btu/h	-354176	-354176			
Mass Enthalpy	Btu/lb	-1059.56	-1059.56			
Mass Cp	Btu/(lb*°F)	0.603577	0.603577			
Ideal Gas CpCv Ratio		1.08419	1.08419			
Dynamic Viscosity	cP	0.142094	0.142094			

* User Specified Values
? Extrapolated or Approximate Values

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
Conden
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 12:16 PM, 7/10/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Properties

Property	Units	Total	Light Liquid			
Kinematic Viscosity	cSt	0.256132	0.256132			
Thermal Conductivity	Btu/(h*ft*°F)	0.0545262	0.0545262			
Surface Tension	lbf/ft	0.000619955 ?	0.000619955 ?			
Net Ideal Gas Heating Value	Btu/ft^3	3131.6	3131.6			
Net Liquid Heating Value	Btu/lb	19434.1	19434.1			
Gross Ideal Gas Heating Value	Btu/ft^3	3391.45	3391.45			
Gross Liquid Heating Value	Btu/lb	21059.7	21059.7			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
1	Inlet	XFS1	2	Vapor Outlet	CMPR-100
3	Light Liquid Outlet	MIX-100			

Block Parameters

* Pressure Drop	3	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	1		Heat Duty	0	Btu/h
Mole Fraction Light Liquid	0		Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	0		Heat Release Curve Increments	5	

Process Streams

Stream:1

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015

Mass Fraction	Total	Vapor			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	1234.91	1234.91			
Methane	212878	212878			
CO2	233.866	233.866			
Ethane	32349.9	32349.9			
Propane	8658.86	8658.86			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Isobutane	798.287	798.287			
n-Butane	1411.88	1411.88			
Isopentane	152.991	152.991			
n-Pentane	141.396	141.396			
2,3-Dimethylbutane	6.36423	6.36423			
2-Methylpentane	9.53325	9.53325			
n-Hexane	7.97416	7.97416			
Benzene	0.463876	0.463876			
Cyclohexane	0.975593	0.975593			
n-Heptane	-1.0279	-1.0279			
Methylcyclohexane	0.0405347	0.0405347			
2,2,4-Trimethylpentane	-0.064307	-0.064307			
Toluene	0.00260317	0.00260317			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	-1.14936E-05	-1.14936E-05			
m-Xylene	-0.000682571	-0.000682571			
p-Xylene	0	0			
o-Xylene	-0.000100763	-0.000100763			
n-Nonane	-0.00251877	-0.00251877			
n-Decane	-0.000284373	-0.000284373			
n-Undecane	-1.7421E-05	-1.7421E-05			
Dodecane	-3.91821E-06	-3.91821E-06			
Tridecane	-8.5054E-09	-8.5054E-09			
Water	0.341745	0.341745			
Neohexane	2.56934	2.56934			
3-Methylpentane	6.25804	6.25804			
Methylcyclopentane	1.53789	1.53789			
Oxygen	2.96717	2.96717			
2-Methylhexane	-0.566487	-0.566487			
2,3-Dimethylpentane	-0.0248885	-0.0248885			
3-Methylhexane	-0.33705	-0.33705			

Properties

Property	Units	Total	Vapor			
Temperature	°F	46.5285	46.5285			
Pressure	psig	393	393			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	1.77456	1.77456			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	257897	257897			
Liquid Volumetric Flow	gpm	32153.4	32153.4			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.877058	0.877058			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.64695E+08	-7.64695E+08			
Mass Enthalpy	Btu/lb	-1670.9	-1670.9			
Mass Cp	Btu/(lb*°F)	0.540522	0.540522			
Ideal Gas CpCv Ratio		1.2571	1.2571			
Dynamic Viscosity	cP	0.0107567	0.0107567			
Kinematic Viscosity	cSt	0.378414	0.378414			
Thermal Conductivity	Btu/(h*ft*°F)	0.0177283	0.0177283			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			

* User Specified Values
? Extrapolated or Approximate Values

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Properties

Property	Units	Total	Vapor			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Stream:2

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Fraction	Total	Vapor			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	1242.73	1242.73			
Methane	214397	214397			
CO2	235.705	235.705			
Ethane	32642.1	32642.1			
Propane	8757.72	8757.72			
Isobutane	810.125	810.125			
n-Butane	1434.21	1434.21			
Isopentane	157.094	157.094			
n-Pentane	145.087	145.087			
2,3-Dimethylbutane	6.62493	6.62493			
2-Methylpentane	9.98078	9.98078			
n-Hexane	8.53106	8.53106			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Benzene	0.478855	0.478855			
Cyclohexane	1.02773	1.02773			
n-Heptane	-0.942989	-0.942989			
Methylcyclohexane	0.0861438	0.0861438			
2,2,4-Trimethylpentane	-0.0586996	-0.0586996			
Toluene	0.00298507	0.00298507			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	-1.09751E-05	-1.09751E-05			
m-Xylene	-0.000656257	-0.000656257			
p-Xylene	0	0			
o-Xylene	-9.6806E-05	-9.6806E-05			
n-Nonane	-0.00248191	-0.00248191			
n-Decane	-0.000281665	-0.000281665			
n-Undecane	-1.72866E-05	-1.72866E-05			
Dodecane	-3.89426E-06	-3.89426E-06			
Tridecane	-8.46185E-09	-8.46185E-09			
Water	0.344334	0.344334			
Neohexane	2.65719	2.65719			
3-Methylpentane	6.56074	6.56074			
Methylcyclopentane	1.60091	1.60091			
Oxygen	2.98688	2.98688			
2-Methylhexane	-0.472377	-0.472377			
2,3-Dimethylpentane	-0.00696142	-0.00696142			
3-Methylhexane	-0.272859	-0.272859			

Properties

Property	Units	Total	Vapor			
Temperature	°F	46.2445	46.2445			
Pressure	psig	390	390			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	1.76115	1.76115			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	259861	259861			
Liquid Volumetric Flow	gpm	32398.2	32398.2			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.877726	0.877726			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.64695E+08	-7.64695E+08			
Mass Enthalpy	Btu/lb	-1670.9	-1670.9			
Mass Cp	Btu/(lb*°F)	0.539842	0.539842			
Ideal Gas CpCv Ratio		1.25718	1.25718			
Dynamic Viscosity	cP	0.010745	0.010745			
Kinematic Viscosity	cSt	0.380881	0.380881			
Thermal Conductivity	Btu/(h*ft*°F)	0.0177036	0.0177036			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Stream:3

Composition

Mole Fraction	Total				
Nitrogen					
Methane					
CO2					
Ethane					
Propane					
Isobutane					
n-Butane					
Isopentane					
n-Pentane					
2,3-Dimethylbutane					
2-Methylpentane					
n-Hexane					
Benzene					
Cyclohexane					
n-Heptane					
Methylcyclohexane					
2,2,4-Trimethylpentane					
Toluene					
n-Octane					
2,4,4-Trimethylhexane					
Ethylbenzene					
m-Xylene					
p-Xylene					
o-Xylene					
n-Nonane					
n-Decane					
n-Undecane					
Dodecane					
Tridecane					
Water					
Neohexane					
3-Methylpentane					
Methylcyclopentane					
Oxygen					
2-Methylhexane					
2,3-Dimethylpentane					
3-Methylhexane					

Molar Flow	Total lbmol/h				
Nitrogen	0				
Methane	0				
CO2	0				
Ethane	0				
Propane	0				
Isobutane	0				
n-Butane	0				
Isopentane	0				
n-Pentane	0				
2,3-Dimethylbutane	0				
2-Methylpentane	0				
n-Hexane	0				
Benzene	0				
Cyclohexane	0				
n-Heptane	0				
Methylcyclohexane	0				
2,2,4-Trimethylpentane	0				
Toluene	0				

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h				
n-Octane	0				
2,4,4-Trimethylhexane	0				
Ethylbenzene	0				
m-Xylene	0				
p-Xylene	0				
o-Xylene	0				
n-Nonane	0				
n-Decane	0				
n-Undecane	0				
Dodecane	0				
Tridecane	0				
Water	0				
Neohexane	0				
3-Methylpentane	0				
Methylcyclopentane	0				
Oxygen	0				
2-Methylhexane	0				
2,3-Dimethylpentane	0				
3-Methylhexane	0				

Mass Fraction	Total				
Nitrogen					
Methane					
CO2					
Ethane					
Propane					
Isobutane					
n-Butane					
Isopentane					
n-Pentane					
2,3-Dimethylbutane					
2-Methylpentane					
n-Hexane					
Benzene					
Cyclohexane					
n-Heptane					
Methylcyclohexane					
2,2,4-Trimethylpentane					
Toluene					
n-Octane					
2,4,4-Trimethylhexane					
Ethylbenzene					
m-Xylene					
p-Xylene					
o-Xylene					
n-Nonane					
n-Decane					
n-Undecane					
Dodecane					
Tridecane					
Water					
Neohexane					
3-Methylpentane					
Methylcyclopentane					
Oxygen					
2-Methylhexane					
2,3-Dimethylpentane					
3-Methylhexane					

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015

Mass Flow	Total lb/h				
Nitrogen	0				
Methane	0				
CO2	0				
Ethane	0				
Propane	0				
Isobutane	0				
n-Butane	0				
Isopentane	0				
n-Pentane	0				
2,3-Dimethylbutane	0				
2-Methylpentane	0				
n-Hexane	0				
Benzene	0				
Cyclohexane	0				
n-Heptane	0				
Methylcyclohexane	0				
2,2,4-Trimethylpentane	0				
Toluene	0				
n-Octane	0				
2,4,4-Trimethylhexane	0				
Ethylbenzene	0				
m-Xylene	0				
p-Xylene	0				
o-Xylene	0				
n-Nonane	0				
n-Decane	0				
n-Undecane	0				
Dodecane	0				
Tridecane	0				
Water	0				
Neohexane	0				
3-Methylpentane	0				
Methylcyclopentane	0				
Oxygen	0				
2-Methylhexane	0				
2,3-Dimethylpentane	0				
3-Methylhexane	0				

Volumetric Flow	Total ft^3/h				
Nitrogen					
Methane					
CO2					
Ethane					
Propane					
Isobutane					
n-Butane					
Isopentane					
n-Pentane					
2,3-Dimethylbutane					
2-Methylpentane					
n-Hexane					
Benzene					
Cyclohexane					
n-Heptane					
Methylcyclohexane					
2,2,4-Trimethylpentane					
Toluene					
n-Octane					
2,4,4-Trimethylhexane					
Ethylbenzene					

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
VSSL-100
Separator Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h				
m-Xylene					
p-Xylene					
o-Xylene					
n-Nonane					
n-Decane					
n-Undecane					
Dodecane					
Tridecane					
Water					
Neohexane					
3-Methylpentane					
Methylcyclopentane					
Oxygen					
2-Methylhexane					
2,3-Dimethylpentane					
3-Methylhexane					

Properties

Property	Units	Total				
Temperature	°F	46.2445				
Pressure	psig	390				
Mole Fraction Vapor						
Mole Fraction Light Liquid						
Mole Fraction Heavy Liquid						
Molecular Weight	lb/lbmol					
Mass Density	lb/ft^3					
Molar Flow	lbmol/h	0				
Mass Flow	lb/h	0				
Vapor Volumetric Flow	ft^3/h					
Liquid Volumetric Flow	gpm					
Std Vapor Volumetric Flow	MMSCFD	0				
Std Liquid Volumetric Flow	sgpm	0				
Compressibility						
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	0				
Mass Enthalpy	Btu/lb					
Mass Cp	Btu/(lb*°F)					
Ideal Gas CpCv Ratio						
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3					
Net Liquid Heating Value	Btu/lb					
Gross Ideal Gas Heating Value	Btu/ft^3					
Gross Liquid Heating Value	Btu/lb					

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS1
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
19 [Stabilization]	Inlet	MIX-101 [Stabilization]	1 [Compression]	Outlet	VSSL-100 [Compression]

Block Parameters

Mole Fraction Transfer Threshold	0		Outlet Mass Enthalpy	-1670.9	Btu/lb
Transfer Property	Pressure		Temperature Difference	0	°F
Transfer Property	Mass Enthalpy		Pressure Difference	0	psi
Inlet Temperature	46.5285	°F	Fraction Vapor Difference	0	
Inlet Pressure	393	psig	Mass Enthalpy Difference	0	Btu/lb
Inlet Fraction Vapor	1		Temperature Tolerance	1	°F
Inlet Mass Enthalpy	-1670.9	Btu/lb	Pressure Tolerance	1	psi
Outlet Temperature	46.5285	°F	Fraction Vapor Tolerance	0.01	
Outlet Pressure	393	psig	Mass Enthalpy Tolerance	1	Btu/lb
Outlet Fraction Vapor	1				

Process Streams

Stream:1

Composition

Mole Fraction	Total	Vapor			
Nitrogen	0.00397336	0.00397336			
Methane	0.770464	0.770464			
CO2	0.000933126	0.000933126			
Ethane	0.149781	0.149781			
Propane	0.0514398	0.0514398			
Isobutane	0.0062575	0.0062575			
n-Butane	0.0118033	0.0118033			
Isopentane	0.00220192	0.00220192			
n-Pentane	0.00198609	0.00198609			
2,3-Dimethylbutane	0.000141935	0.000141935			
2-Methylpentane	0.000244788	0.000244788			
n-Hexane	0.000305488	0.000305488			
Benzene	7.88717E-06	7.88717E-06			
Cyclohexane	2.78621E-05	2.78621E-05			
n-Heptane	4.7542E-05	4.7542E-05			
Methylcyclohexane	2.48768E-05	2.48768E-05			
2,2,4-Trimethylpentane	3.16537E-06	3.16537E-06			
Toluene	2.05283E-07	2.05283E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.83413E-10	2.83413E-10			
m-Xylene	1.4427E-08	1.4427E-08			
p-Xylene	0	0			
o-Xylene	2.15893E-09	2.15893E-09			
n-Nonane	2.16019E-08	2.16019E-08			
n-Decane	1.62974E-09	1.62974E-09			
n-Undecane	8.31479E-11	8.31479E-11			
Dodecane	1.52334E-11	1.52334E-11			
Tridecane	2.83856E-14	2.83856E-14			
Water	1.29811E-06	1.29811E-06			
Neohexane	4.77636E-05	4.77636E-05			
3-Methylpentane	0.000165182	0.000165182			
Methylcyclopentane	3.38325E-05	3.38325E-05			
Oxygen	9.95074E-06	9.95074E-06			
2-Methylhexane	5.27389E-05	5.27389E-05			
2,3-Dimethylpentane	9.95074E-06	9.95074E-06			
3-Methylhexane	3.58227E-05	3.58227E-05			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS1
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Vapor lbmol/h			
Nitrogen	87.6854	87.6854			
Methane	17002.8	17002.8			
CO2	20.5925	20.5925			
Ethane	3305.42	3305.42			
Propane	1135.19	1135.19			
Isobutane	138.093	138.093			
n-Butane	260.478	260.478			
Isopentane	48.5927	48.5927			
n-Pentane	43.8297	43.8297			
2,3-Dimethylbutane	3.13227	3.13227			
2-Methylpentane	5.40206	5.40206			
n-Hexane	6.7416	6.7416			
Benzene	0.174057	0.174057			
Cyclohexane	0.614869	0.614869			
n-Heptane	1.04917	1.04917			
Methylcyclohexane	0.54899	0.54899			
2,2,4-Trimethylpentane	0.0698544	0.0698544			
Toluene	0.00453025	0.00453025			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	6.25445E-06	6.25445E-06			
m-Xylene	0.000318381	0.000318381			
p-Xylene	0	0			
o-Xylene	4.76439E-05	4.76439E-05			
n-Nonane	0.000476717	0.000476717			
n-Decane	3.59655E-05	3.59655E-05			
n-Undecane	1.83493E-06	1.83493E-06			
Dodecane	3.36176E-07	3.36176E-07			
Tridecane	6.26423E-10	6.26423E-10			
Water	0.0286472	0.0286472			
Neohexane	1.05406	1.05406			
3-Methylpentane	3.6453	3.6453			
Methylcyclopentane	0.746627	0.746627			
Oxygen	0.219596	0.219596			
2-Methylhexane	1.16386	1.16386			
2,3-Dimethylpentane	0.219596	0.219596			
3-Methylhexane	0.790546	0.790546			

Mass Fraction	Total	Vapor			
Nitrogen	0.0053673	0.0053673			
Methane	0.596012	0.596012			
CO2	0.00198024	0.00198024			
Ethane	0.217174	0.217174			
Propane	0.109377	0.109377			
Isobutane	0.0175378	0.0175378			
n-Butane	0.0330808	0.0330808			
Isopentane	0.0076606	0.0076606			
n-Pentane	0.00690972	0.00690972			
2,3-Dimethylbutane	0.0005898	0.0005898			
2-Methylpentane	0.0010172	0.0010172			
n-Hexane	0.00126943	0.00126943			
Benzene	2.97078E-05	2.97078E-05			
Cyclohexane	0.00011307	0.00011307			
n-Heptane	0.000229713	0.000229713			
Methylcyclohexane	0.000117782	0.000117782			
2,2,4-Trimethylpentane	1.74354E-05	1.74354E-05			
Toluene	9.12064E-07	9.12064E-07			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	1.45089E-09	1.45089E-09			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS1
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Fraction	Total	Vapor			
m-Xylene	7.38569E-08	7.38569E-08			
p-Xylene	0	0			
o-Xylene	1.10523E-08	1.10523E-08			
n-Nonane	1.33597E-07	1.33597E-07			
n-Decane	1.11815E-08	1.11815E-08			
n-Undecane	6.26708E-10	6.26708E-10			
Dodecane	1.25122E-10	1.25122E-10			
Tridecane	2.52348E-13	2.52348E-13			
Water	1.12768E-06	1.12768E-06			
Neohexane	0.000198478	0.000198478			
3-Methylpentane	0.000686402	0.000686402			
Methylcyclopentane	0.0001373	0.0001373			
Oxygen	1.5354E-05	1.5354E-05			
2-Methylhexane	0.000254823	0.000254823			
2,3-Dimethylpentane	4.80799E-05	4.80799E-05			
3-Methylhexane	0.000173088	0.000173088			

Mass Flow	Total lb/h	Vapor lb/h			
Nitrogen	2456.37	2456.37			
Methane	272767	272767			
CO2	906.267	906.267			
Ethane	99390.7	99390.7			
Propane	50056.9	50056.9			
Isobutane	8026.25	8026.25			
n-Butane	15139.6	15139.6			
Isopentane	3505.9	3505.9			
n-Pentane	3162.26	3162.26			
2,3-Dimethylbutane	269.925	269.925			
2-Methylpentane	465.525	465.525			
n-Hexane	580.96	580.96			
Benzene	13.5959	13.5959			
Cyclohexane	51.7471	51.7471			
n-Heptane	105.129	105.129			
Methylcyclohexane	53.9032	53.9032			
2,2,4-Trimethylpentane	7.97936	7.97936			
Toluene	0.41741	0.41741			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.000664004	0.000664004			
m-Xylene	0.0338009	0.0338009			
p-Xylene	0	0			
o-Xylene	0.00505812	0.00505812			
n-Nonane	0.0611414	0.0611414			
n-Decane	0.00511724	0.00511724			
n-Undecane	0.000286815	0.000286815			
Dodecane	5.72625E-05	5.72625E-05			
Tridecane	1.15488E-07	1.15488E-07			
Water	0.516087	0.516087			
Neohexane	90.8341	90.8341			
3-Methylpentane	314.135	314.135			
Methylcyclopentane	62.8357	62.8357			
Oxygen	7.02681	7.02681			
2-Methylhexane	116.621	116.621			
2,3-Dimethylpentane	22.004	22.004			
3-Methylhexane	79.2143	79.2143			

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Nitrogen	1234.91	1234.91			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS1
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total ft^3/h	Vapor ft^3/h			
Methane	212878	212878			
CO2	233.866	233.866			
Ethane	32349.9	32349.9			
Propane	8658.86	8658.86			
Isobutane	798.287	798.287			
n-Butane	1411.88	1411.88			
Isopentane	152.991	152.991			
n-Pentane	141.396	141.396			
2,3-Dimethylbutane	6.36423	6.36423			
2-Methylpentane	9.53325	9.53325			
n-Hexane	7.97416	7.97416			
Benzene	0.463876	0.463876			
Cyclohexane	0.975593	0.975593			
n-Heptane	-1.0279	-1.0279			
Methylcyclohexane	0.0405347	0.0405347			
2,2,4-Trimethylpentane	-0.064307	-0.064307			
Toluene	0.00260317	0.00260317			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	-1.14936E-05	-1.14936E-05			
m-Xylene	-0.000682571	-0.000682571			
p-Xylene	0	0			
o-Xylene	-0.000100763	-0.000100763			
n-Nonane	-0.00251877	-0.00251877			
n-Decane	-0.000284373	-0.000284373			
n-Undecane	-1.7421E-05	-1.7421E-05			
Dodecane	-3.91821E-06	-3.91821E-06			
Tridecane	-8.5054E-09	-8.5054E-09			
Water	0.341745	0.341745			
Neohexane	2.56934	2.56934			
3-Methylpentane	6.25804	6.25804			
Methylcyclopentane	1.53789	1.53789			
Oxygen	2.96717	2.96717			
2-Methylhexane	-0.566487	-0.566487			
2,3-Dimethylpentane	-0.0248885	-0.0248885			
3-Methylhexane	-0.33705	-0.33705			

Properties

Property	Units	Total	Vapor			
Temperature	°F	46.5285	46.5285			
Pressure	psig	393	393			
Mole Fraction Vapor		1	1			
Mole Fraction Light Liquid		0	0			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	20.7381	20.7381			
Mass Density	lb/ft^3	1.77456	1.77456			
Molar Flow	lbmol/h	22068.3	22068.3			
Mass Flow	lb/h	457654	457654			
Vapor Volumetric Flow	ft^3/h	257897	257897			
Liquid Volumetric Flow	gpm	32153.4	32153.4			
Std Vapor Volumetric Flow	MMSCFD	200.99	200.99			
Std Liquid Volumetric Flow	sgpm	2689.89	2689.89			
Compressibility		0.877058	0.877058			
Specific Gravity		0.716029	0.716029			
API Gravity						
Enthalpy	Btu/h	-7.64695E+08	-7.64695E+08			
Mass Enthalpy	Btu/lb	-1670.9	-1670.9			
Mass Cp	Btu/(lb*°F)	0.540522	0.540522			
Ideal Gas CpCv Ratio		1.2571	1.2571			
Dynamic Viscosity	cP	0.0107567	0.0107567			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS1
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:29 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Properties

Property	Units	Total	Vapor			
Kinematic Viscosity	cSt	0.378414	0.378414			
Thermal Conductivity	Btu/(h*ft*°F)	0.0177283	0.0177283			
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1137.21	1137.21			
Net Liquid Heating Value	Btu/lb	20748.1	20748.1			
Gross Ideal Gas Heating Value	Btu/ft^3	1253.85	1253.85			
Gross Liquid Heating Value	Btu/lb	22882.5	22882.5			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS2
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:32 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
27 [Stabilization]	Inlet	VSSL-102 [Stabilization]	6 [Compression]	Outlet	MIX-100 [Compression]

Block Parameters

Mole Fraction Transfer Threshold	0		Outlet Mass Enthalpy	-1059.56	Btu/lb
Transfer Property	Pressure		Temperature Difference	-0.000299509	°F
Transfer Property	Mass Enthalpy		Pressure Difference	0	psi
Inlet Temperature	118.305	°F	Fraction Vapor Difference	0	
Inlet Pressure	139	psig	Mass Enthalpy Difference	0	Btu/lb
Inlet Fraction Vapor	0		Temperature Tolerance	1	°F
Inlet Mass Enthalpy	-1059.56	Btu/lb	Pressure Tolerance	1	psi
Outlet Temperature	118.305	°F	Fraction Vapor Tolerance	0.01	
Outlet Pressure	139	psig	Mass Enthalpy Tolerance	1	Btu/lb
Outlet Fraction Vapor	0				

Process Streams

Stream:6

Composition

Mole Fraction	Total	Light Liquid			
Nitrogen	1.16248E-07	1.16248E-07			
Methane	0.00361151	0.00361151			
CO2	0.000231447	0.000231447			
Ethane	0.0702112	0.0702112			
Propane	0.31384	0.31384			
Isobutane	0.100144	0.100144			
n-Butane	0.184965	0.184965			
Isopentane	0.0556461	0.0556461			
n-Pentane	0.0579419	0.0579419			
2,3-Dimethylbutane	0.125651	0.125651			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00228543	0.00228543			
Cyclohexane	0	0			
n-Heptane	0.0623572	0.0623572			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0202054	0.0202054			
Toluene	0.00142806	0.00142806			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	4.6966E-06	4.6966E-06			
m-Xylene	0.000272466	0.000272466			
p-Xylene	0	0			
o-Xylene	4.44568E-05	4.44568E-05			
n-Nonane	0.000948427	0.000948427			
n-Decane	0.000151272	0.000151272			
n-Undecane	2.0607E-05	2.0607E-05			
Dodecane	8.0006E-06	8.0006E-06			
Tridecane	3.75771E-08	3.75771E-08			
Water	3.06761E-05	3.06761E-05			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS2
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:32 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Molar Flow	Total lbmol/h	Light Liquid lbmol/h			
Nitrogen	6.40567E-07	6.40567E-07			
Methane	0.0199006	0.0199006			
CO2	0.00127535	0.00127535			
Ethane	0.386888	0.386888			
Propane	1.72937	1.72937			
Isobutane	0.55183	0.55183			
n-Butane	1.01922	1.01922			
Isopentane	0.306629	0.306629			
n-Pentane	0.319279	0.319279			
2,3-Dimethylbutane	0.692381	0.692381			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.0125935	0.0125935			
Cyclohexane	0	0			
n-Heptane	0.343609	0.343609			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.111339	0.111339			
Toluene	0.00786912	0.00786912			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	2.58799E-05	2.58799E-05			
m-Xylene	0.00150138	0.00150138			
p-Xylene	0	0			
o-Xylene	0.000244972	0.000244972			
n-Nonane	0.00522616	0.00522616			
n-Decane	0.000833559	0.000833559			
n-Undecane	0.000113552	0.000113552			
Dodecane	4.40861E-05	4.40861E-05			
Tridecane	2.07063E-07	2.07063E-07			
Water	0.000169036	0.000169036			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Fraction	Total	Light Liquid			
Nitrogen	5.36831E-08	5.36831E-08			
Methane	0.000955092	0.000955092			
CO2	0.000167913	0.000167913			
Ethane	0.0348026	0.0348026			
Propane	0.228134	0.228134			
Isobutane	0.0959521	0.0959521			
n-Butane	0.177222	0.177222			
Isopentane	0.0661835	0.0661835			
n-Pentane	0.068914	0.068914			
2,3-Dimethylbutane	0.178499	0.178499			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00294287	0.00294287			
Cyclohexane	0	0			
n-Heptane	0.103003	0.103003			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0380476	0.0380476			
Toluene	0.00216907	0.00216907			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	8.2196E-06	8.2196E-06			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS2
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:32 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Mass Fraction	Total	Light Liquid			
m-Xylene	0.000476847	0.000476847			
p-Xylene	0	0			
o-Xylene	7.78047E-05	7.78047E-05			
n-Nonane	0.00200523	0.00200523			
n-Decane	0.000354807	0.000354807			
n-Undecane	5.30985E-05	5.30985E-05			
Dodecane	2.24653E-05	2.24653E-05			
Tridecane	1.14203E-07	1.14203E-07			
Water	9.11018E-06	9.11018E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Mass Flow	Total lb/h	Light Liquid lb/h			
Nitrogen	1.79445E-05	1.79445E-05			
Methane	0.319255	0.319255			
CO2	0.0561276	0.0561276			
Ethane	11.6333	11.6333			
Propane	76.2575	76.2575			
Isobutane	32.0736	32.0736			
n-Butane	59.2394	59.2394			
Isopentane	22.1229	22.1229			
n-Pentane	23.0356	23.0356			
2,3-Dimethylbutane	59.6662	59.6662			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.983702	0.983702			
Cyclohexane	0	0			
n-Heptane	34.4303	34.4303			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	12.718	12.718			
Toluene	0.725048	0.725048			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	0.00274754	0.00274754			
m-Xylene	0.159394	0.159394			
p-Xylene	0	0			
o-Xylene	0.0260075	0.0260075			
n-Nonane	0.670281	0.670281			
n-Decane	0.1186	0.1186			
n-Undecane	0.017749	0.017749			
Dodecane	0.00750939	0.00750939			
Tridecane	3.81744E-05	3.81744E-05			
Water	0.00304523	0.00304523			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Volumetric Flow	Total gpm	Light Liquid gpm			
Nitrogen	1.01118E-07	1.01118E-07			

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS2
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:32 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Volumetric Flow	Total gpm	Light Liquid gpm			
Methane	0.00293999	0.00293999			
CO2	0.000120293	0.000120293			
Ethane	0.062063	0.062063			
Propane	0.326273	0.326273			
Isobutane	0.122581	0.122581			
n-Butane	0.216975	0.216975			
Isopentane	0.0734928	0.0734928			
n-Pentane	0.0754983	0.0754983			
2,3-Dimethylbutane	0.181792	0.181792			
2-Methylpentane	0	0			
n-Hexane	0	0			
Benzene	0.00206263	0.00206263			
Cyclohexane	0	0			
n-Heptane	0.0994936	0.0994936			
Methylcyclohexane	0	0			
2,2,4-Trimethylpentane	0.0359775	0.0359775			
Toluene	0.00150994	0.00150994			
n-Octane	0	0			
2,4,4-Trimethylhexane	0	0			
Ethylbenzene	5.66326E-06	5.66326E-06			
m-Xylene	0.000329999	0.000329999			
p-Xylene	0	0			
o-Xylene	5.18147E-05	5.18147E-05			
n-Nonane	0.00178293	0.00178293			
n-Decane	0.000308189	0.000308189			
n-Undecane	4.52019E-05	4.52019E-05			
Dodecane	1.88543E-05	1.88543E-05			
Tridecane	9.53313E-08	9.53313E-08			
Water	-2.85297E-06	-2.85297E-06			
Neohexane	0	0			
3-Methylpentane	0	0			
Methylcyclopentane	0	0			
Oxygen	0	0			
2-Methylhexane	0	0			
2,3-Dimethylpentane	0	0			
3-Methylhexane	0	0			

Properties

Property	Units	Total	Light Liquid			
Temperature	°F	118.305	118.305			
Pressure	psig	139	139			
Mole Fraction Vapor		0	0			
Mole Fraction Light Liquid		1	1			
Mole Fraction Heavy Liquid		0	0			
Molecular Weight	lb/lbmol	60.6617	60.6617			
Mass Density	lb/ft^3	34.6332	34.6332			
Molar Flow	lbmol/h	5.51034	5.51034			
Mass Flow	lb/h	334.266	334.266			
Vapor Volumetric Flow	ft^3/h	9.65162	9.65162			
Liquid Volumetric Flow	gpm	1.20332	1.20332			
Std Vapor Volumetric Flow	MMSCFD	0.0501861	0.0501861			
Std Liquid Volumetric Flow	sgpm	1.15067	1.15067			
Compressibility		0.0434022	0.0434022			
Specific Gravity		0.555295	0.555295			
API Gravity		106.185	106.185			
Enthalpy	Btu/h	-354176	-354176			
Mass Enthalpy	Btu/lb	-1059.56	-1059.56			
Mass Cp	Btu/(lb*°F)	0.603577	0.603577			
Ideal Gas CpCv Ratio		1.08419	1.08419			
Dynamic Viscosity	cP	0.142094	0.142094			

* User Specified Values
? Extrapolated or Approximate Values

ProMax 3.2.13116.0
Copyright © 2002-2012 BRE Group, Ltd.

Licensed to Trinity Consultants, Inc. and Affiliates

Blocks
XFS2
Flowsheet Connector Report

Client Name:	CONE	Job: V1.0	
Location:	Shirley Station	Modified: 9:32 AM, 3/24/2015	
Flowsheet:	Compression	Status: Solved 12:29 PM, 7/10/2015	

Properties

Property	Units	Total	Light Liquid			
Kinematic Viscosity	cSt	0.256132	0.256132			
Thermal Conductivity	Btu/(h*ft*°F)	0.0545262	0.0545262			
Surface Tension	lbf/ft	0.000619955 ?	0.000619955 ?			
Net Ideal Gas Heating Value	Btu/ft^3	3131.6	3131.6			
Net Liquid Heating Value	Btu/lb	19434.1	19434.1			
Gross Ideal Gas Heating Value	Btu/ft^3	3391.45	3391.45			
Gross Liquid Heating Value	Btu/lb	21059.7	21059.7			

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Flowsheet Environment
SRK Environment

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	
Flowsheet:	Compression	

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	0.01

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	2,4,4-Trimethylhexane	False	False
Methane	False	False	Ethylbenzene	False	False
CO2	False	False	m-Xylene	False	False
Ethane	False	False	p-Xylene	False	False
Propane	False	False	o-Xylene	False	False
Isobutane	False	False	n-Nonane	False	False
n-Butane	False	False	n-Decane	False	False
Isopentane	False	False	n-Undecane	False	False
n-Pentane	False	False	Dodecane	False	False
2,3-Dimethylbutane	False	False	Tridecane	False	False
2-Methylpentane	False	False	Water	False	True
n-Hexane	False	False	Neohexane	False	False
Benzene	False	False	3-Methylpentane	False	False
Cyclohexane	False	False	Methylcyclopentane	False	False
n-Heptane	False	False	Oxygen	False	False
Methylcyclohexane	False	False	2-Methylhexane	False	False
2,2,4-Trimethylpentane	False	False	2,3-Dimethylpentane	False	False
Toluene	False	False	3-Methylhexane	False	False
n-Octane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Environments Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	IG Ref Pressure	14.6959 psia
IG Ref Temperature	60 °F	IG Ref Volume	379.485 ft^3/lbmol
Liq Ref Temperature	60 °F		

Environment [SRK Environment]

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	0.01

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	2,4,4-Trimethylhexane	False	False
Methane	False	False	Ethylbenzene	False	False
CO2	False	False	m-Xylene	False	False
Ethane	False	False	p-Xylene	False	False
Propane	False	False	o-Xylene	False	False
Isobutane	False	False	n-Nonane	False	False
n-Butane	False	False	n-Decane	False	False
Isopentane	False	False	n-Undecane	False	False
n-Pentane	False	False	Dodecane	False	False
2,3-Dimethylbutane	False	False	Tridecane	False	False
2-Methylpentane	False	False	Water	False	True
n-Hexane	False	False	Neohexane	False	False
Benzene	False	False	3-Methylpentane	False	False
Cyclohexane	False	False	Methylcyclopentane	False	False
n-Heptane	False	False	Oxygen	False	False
Methylcyclohexane	False	False	2-Methylhexane	False	False
2,2,4-Trimethylpentane	False	False	2,3-Dimethylpentane	False	False
Toluene	False	False	3-Methylhexane	False	False
n-Octane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

20150709 Shirley Condensate Stabilizer - Emissions.pmx
Project Warnings Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

ProMax:ProMax!Project!Flowsheets!Stabilization!PStreams!2
Warning: The temperature of 35 °F is below hydrate formation.
Warning: The temperature of 35 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Stabilization!PStreams!CNDST1
Warning: The temperature of 35.0273 °F is below hydrate formation.
Warning: The temperature of 35.0273 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Stabilization!PStreams!SLOP1
Warning: The temperature of 35.0273 °F is below hydrate formation.
Warning: The temperature of 35.0273 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Stabilization!PStreams!6
Warning: The temperature of 35.055 °F is below hydrate formation.
Warning: The temperature of 35.055 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Stabilization!PStreams!CNDST2
Warning: The temperature of 35.055 °F is below hydrate formation.
Warning: The temperature of 35.055 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Tank Emissions!PStreams!6
Warning: The temperature of 35.9979 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Tank Emissions!PStreams!PW Outlet
Warning: The temperature of 35.9979 °F is within 10 °F of ice formation.

User Value Sets Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

Cn+ Flow/Frac.

User Value [CnPlusSum]

* Parameter	0	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds		False

Remarks
This User Value Set was programmatically generated. GUID={BCE285BC-B29E-41AE-A00A-CCC45231F7BC}

Tank Losses.58

User Value [ShellLength]

* Parameter	20	ft	Upper Bound		ft
* Lower Bound	0	ft	* Enforce Bounds		False

User Value [ShellDiam]

* Parameter	12	ft	Upper Bound		ft
* Lower Bound	0	ft	* Enforce Bounds		False

User Value [BreatherVP]

* Parameter	0.3	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds		False

User Value [BreatherVacP]

* Parameter	-0.7	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds		False

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

User Value Sets Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

User Value [DomeRadius]

Parameter		ft	Upper Bound	ft
Lower Bound		ft	* Enforce Bounds	False

User Value [OpPress]

* Parameter	0	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [MaxPercentLiq]

* Parameter	90	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AnnNetTP]

* Parameter	2605.84	bbl/day	Upper Bound	bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

* Parameter	96.73	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	98774.3	Pa	Upper Bound	Pa
Lower Bound		Pa	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	61.794	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	44.9124	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	8.72354	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0.258947	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	14.1766	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

User Value Sets Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

User Value [DeckFittingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0636143	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={9370EFB6-46A0-43E7-BD6A-D54C94A63864}

Cn+ Flow/Frac.1

User Value [CnPlusSum]

* Parameter	3015.65	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={3AC8D3A8-130D-475F-A2FF-AE4F1F97A15C}

Cn+ Flow/Frac.2

User Value [CnPlusSum]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={7568F2E9-083F-401E-8B6E-22C7FBBB0F6B}

Cn+ Flow/Frac.40

User Value [CnPlusSum]

* Parameter	0.220955	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

Remarks
This User Value Set was programmatically generated. GUID={A0ADB81B-B0D6-4DE3-A112-4682274EF88E}

Tank Losses.41

User Value [ShellLength]

* Parameter	20	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

User Value Sets Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

User Value [ShellDiam]

* Parameter	12	ft	Upper Bound	ft
* Lower Bound	0	ft	* Enforce Bounds	False

User Value [BreatherVP]

* Parameter	0.3	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [BreatherVacP]

* Parameter	-0.7	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [DomeRadius]

Parameter		ft	Upper Bound	ft
Lower Bound		ft	* Enforce Bounds	False

User Value [OpPress]

* Parameter	0	psig	Upper Bound	psig
Lower Bound		psig	* Enforce Bounds	False

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [MaxPercentLiq]

* Parameter	90	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AnnNetTP]

* Parameter	32.0492	bbl/day	Upper Bound	bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False

User Value [OREff]

* Parameter	96.73	%	Upper Bound	%
Lower Bound		%	* Enforce Bounds	False

User Value [AtmPressure]

* Parameter	98774.3	Pa	Upper Bound	Pa
Lower Bound		Pa	* Enforce Bounds	False

User Value [MaxLiqSurfaceT]

* Parameter	61.794	°F	Upper Bound	°F
Lower Bound		°F	* Enforce Bounds	False

User Value [TotalLosses]

* Parameter	0.0420112	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.0420112	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

User Value Sets Report

Client Name:	CONE	Job: V1.0
Location:	Shirley Station	

User Value [StandingLosses]

Lower Bound	ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	0.0025719 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	0.232882 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0448333 kg/mol	Upper Bound	kg/mol
Lower Bound	kg/mol	* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={37B3D36A-7A59-4386-8B63-350D28C9D5BC}

Copyright © 2002-2012 BRE Group, Ltd.
Licensed to Trinity Consultants, Inc. and Affiliates

Legacy Measurement Solutions

Shreveport, LA

318-226-7237

Good

LELAP Certification #

04049

Customer	: 2325 - CNX GAS COMPANY LLC	**Date Sampled**	: 02/19/2015
Station ID	: 6101	**Date Analyzed**	: 02/26/2015
Cylinder ID	: 4999	**Effective Date**	: 03/01/2015
Producer	:	**Cyl Pressure**	: 340
Lease	: SHIRLEY STATION INLET	**Temp**	: 30
Area	: 941 - WEST VIRGINIA	**Cylinder Type**	: Spot
State	: WV	**Sample By**	: ML

COMPONENT	MOL%	GPM@14.73(PSIA)
Methane	77.3952	0.000
Ethane	14.9147	4.002
Propane	4.9461	1.367
Iso-Butane	0.5953	0.195
Normal-Butane	1.1397	0.360
Iso-Pentane	0.2144	0.079
Normal-Pentane	0.1937	0.070
Nitrogen	0.3993	0.000
Carbon-Dioxide	0.0928	0.000
Oxygen	0.0010	0.000
BENZENE	0.0007	0.000
TOLUENE	0.0000	0.000
ETHYLBENZENE	0.0000	0.000
2,2-Dimethylbutane	0.0048	0.002
2,3-Dimethylbutane/CycloC5	0.0080	0.003
2-methylpentane	0.0246	0.010
3-methylpentane	0.0166	0.007
Normal-Hexane	0.0307	0.013
2,2-Dimethylpentane	0.0000	0.000
Methylcyclopentane	0.0034	0.001
3,3-Dimethylpentane	0.0000	0.000
CYCLOHEXANE	0.0028	0.001
2-Methylhexane	0.0053	0.002
2,3-Dimethylpentane	0.0010	0.000
3-Methylhexane	0.0036	0.002
1,t3-Dimethylcyclopentane	0.0000	0.000
1,t2-DMCYC5 / 2,2,4-TMC5	0.0000	0.000
N-Heptane	0.0038	0.002
METHYLCYCLOHEXANE	0.0025	0.001
2,5-Dimethylhexane	0.0000	0.000
2,3-Dimethylhexane	0.0000	0.000
2-Methylheptane	0.0000	0.000
4-Methylheptane	0.0000	0.000
3-Methylheptane	0.0000	0.000
1,t4-Dimethylcyclohexane	0.0000	0.000
N-OCTANE / 1,T2-DMCYC6	0.0000	0.000
1,t3-DMCYC6/1,C4-DMCYC6/1,C2,C3-TMCYC5	0.0000	0.000
2,4,4 TMC6	0.0000	0.000

2,6-Dimethylheptane / 1,C2-DMCYC6	0.0000	0.000
Ethylcyclohexane	0.0000	0.000
M-XYLENE	0.0000	0.000
P-XYLENE	0.0000	0.000
O-XYLENE	0.0000	0.000
NONANE	0.0000	0.000
N-DECANE	0.0000	0.000
N-UNDECANE	0.0000	0.000
TOTAL	**100.0000**	**6.117**

Compressibility Factor (Z) @ 14.73 @ 60 Deg. F = 0.9965 **C5+ GPM** : 0.19300

Ideal Gravity: 0.7124 **Real Gravity:** 0.7146 **C5+ Mole %** : 0.5159

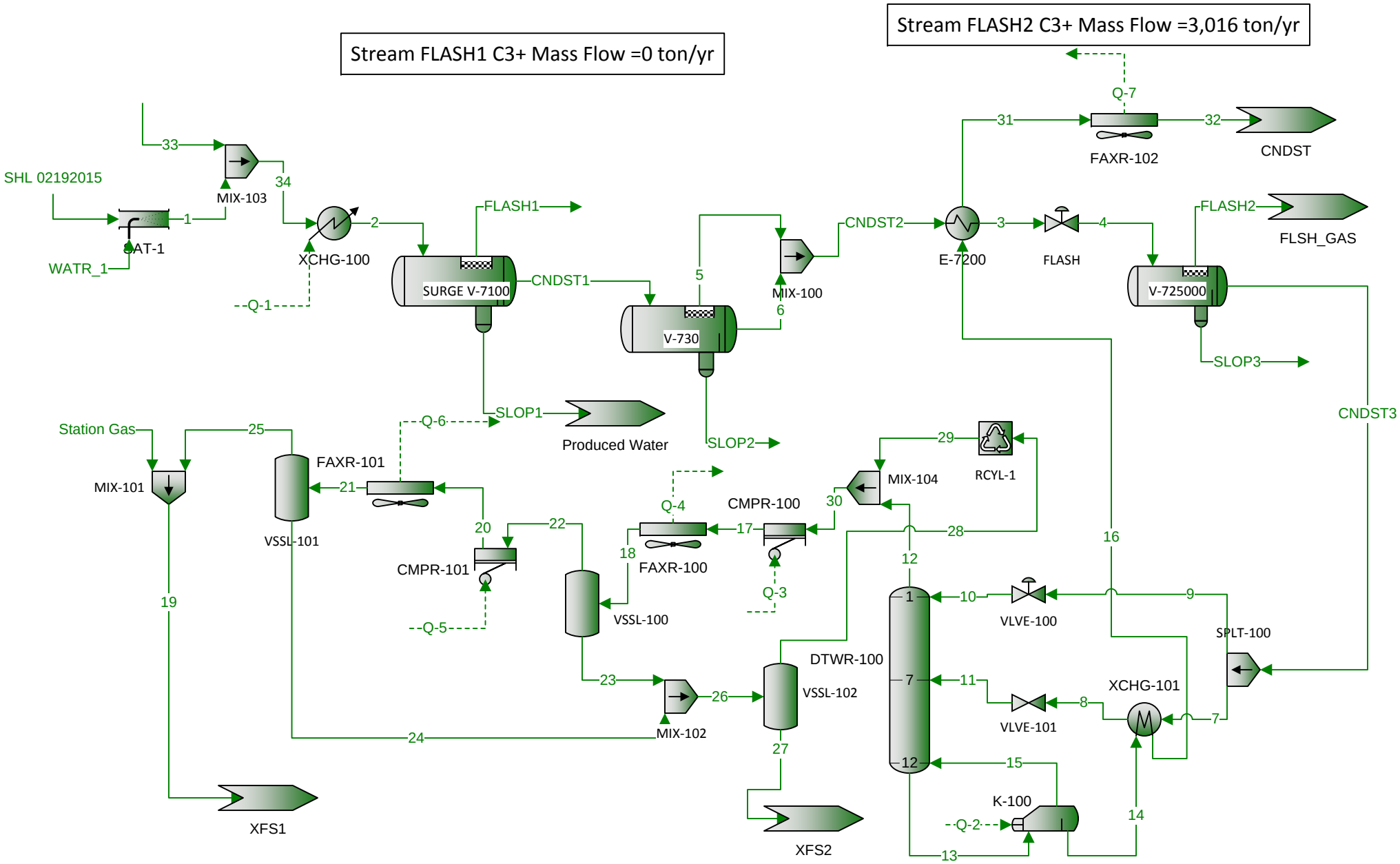
BTU @ (PSIA)	**@14.65**	**@14.696**	**@14.73**	**@15.025**
Ideal GPM	6.064	6.083	6.097	6.219
Ideal BTU Dry	1,244.24	1,248.15	1,251.04	1,276.09
Ideal BTU Sat	1,222.47	1,226.37	1,229.26	1,254.31
Real GPM	6.085	6.104	6.118	6.241
Real BTU Dry	1,248.59	1,252.52	1,255.43	1,280.66
Real BTU Sat	1,227.23	1,231.17	1,234.08	1,259.32

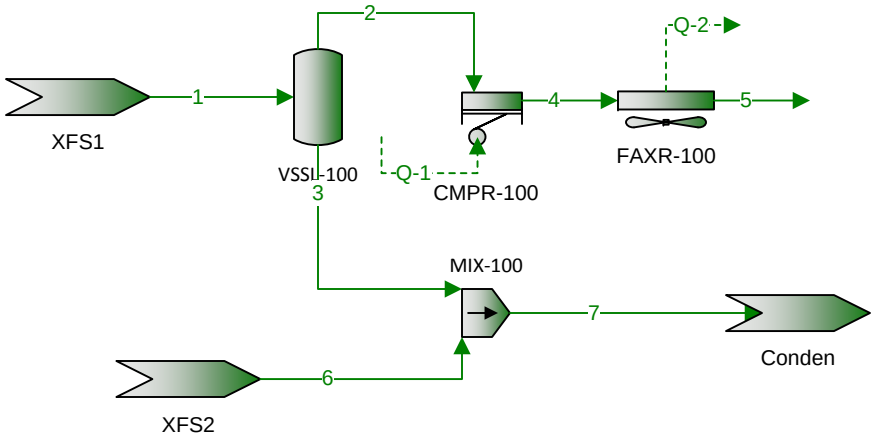
Comments:

Gas Analysis performed in accordance with GPA 2286 **Sample Count** : 210000010

Analytical Calculations performed in accordance with GPA 2172 **COC** :

Measurement Analyst: _____ **DEBORAH J MURPHY**


Stream FLASH1 C3+ Mass Flow =0 ton/yr
Stream FLASH2 C3+ Mass Flow =3,016 ton/yr
SHL 02192015
WATR_1
SAT-1
MIX-103
XCHG-100
Q-1
SURGE V-7100
FLASH1
CNDST1
V-730
MIX-100
CNDST2
E-7200
FLASH
FAXR-102
Q-7
CNDST
FLASH2
FLSH_GAS
V-725000
SLOP3
CNDST3
SLOP1
Produced Water
SLOP2
Station Gas
MIX-101
FAXR-101
Q-6
VSSL-101
CMPR-101
Q-5
VSSL-100
FAXR-100
Q-4
CMPR-100
Q-3
MIX-104
RCYL-1
DTWR-100
VLVE-100
VLVE-101
SPLT-100
XCHG-101
VSSL-102
MIX-102
K-100
Q-2
XFS1
XFS2

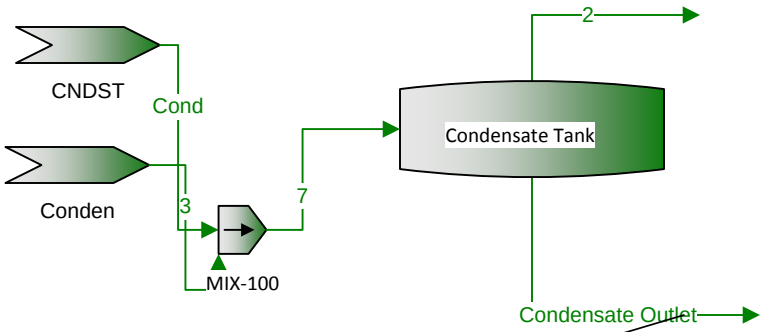

2
Q-2
1
4
5
XFS1
VSSI-100
Q-1
CMPR-100
FAXR-100
3
MIX-100
7
Conden
6
XFS2

Tank loss calculations for "7".
Total working and breathing losses from the Vertical Cylinder are 44.91 ton/yr.
Flashing losses are 0 ton/yr.
Loading losses are 14.18 ton/yr of loaded liquid.

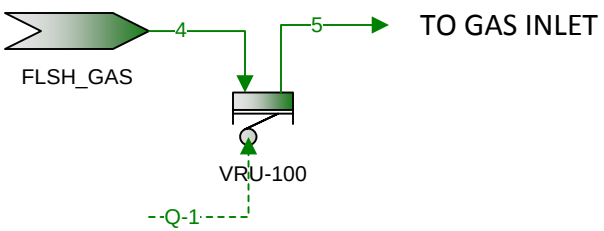
Stream 2 C3+ Mass Flow =0 ton/yr

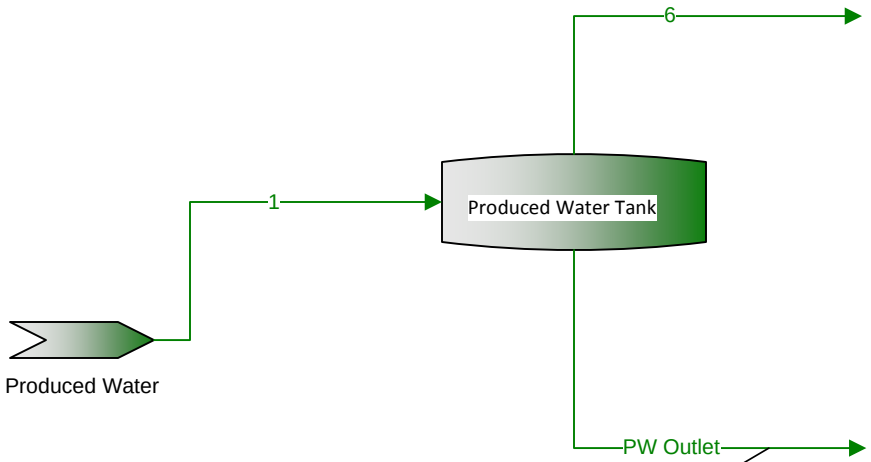
Tank loss calculations for "1".
Total working and breathing losses from the Vertical Cylinder are 0.04201 ton/yr.
Flashing losses are 0.2329 ton/yr.
Loading losses are 0.002572 ton/yr of loaded liquid.
Warning, expansion coefficient is negative. Verify vapor pressure of stored fluid

Stream 6 C3+ Mass Flow =0.221 ton/yr



Properties	Condensate Outlet	
Liquid Volumetric Flow(Total)	3.17e+003	bbl/d





Properties	PW Outlet	
Liquid Volumetric Flow(Total)	32	bbl/d

C200 MicroTurbine
High-pressure Natural Gas

World's largest air-bearing microturbine produces 200kW of clean, green, and reliable power.

- Ultra-low emissions
- One moving part – minimal maintenance and downtime
- Patented air bearing – no lubricating oil or coolant
- 5 and 9 year Factory Protection Plans available
- Remote monitoring and diagnostic capabilities
- Integrated utility synchronization and protection
- Small, modular design allows for easy, low-cost installation
- Proven technology with tens of millions of run hours and counting
- Internal fuel gas compressor available for low fuel pressure natural gas applications

C200 MicroTurbine

Electrical Performance[1]

Electrical Power Output	200kW
Voltage	400–480 VAC
Electrical Service	3-Phase, 4 wire
Frequency	50/60 Hz, grid connect operation
	10–60 Hz, stand alone operation
Maximum Output Current	290A RMS @ 400V, grid connect operation
	240A RMS @ 480V, grid connect operation
	310A RMS, stand alone operation[2]
Electrical Efficiency LHV	33%

Fuel/Engine Characteristics[1]

Natural Gas HHV	30.7–47.5 MJ/m^3 (825–1,275 BTU/scf)
Inlet Pressure[3]	517–552 kPa gauge (75–80 psig)
Fuel Flow HHV	2,400 MJ/hr (2,280,000 BTU/hr)
Net Heat Rate LHV	10.9 MJ/kWh (10,300 BTU/kWh)

Exhaust Characteristics[1]

NOx Emissions @ 15% O_2[4]	< 9 ppmvd (18 mg/m^3)
NOx / Electrical Output[4]	0.14 g/bhp-hr (0.4 lb/MWhe)
Exhaust Gas Flow	1.3 kg/s (2.9 lbm/s)
Exhaust Gas Temperature	280°C (535°F)
Exhaust Energy	1,420 MJ/hr (1,350,000 BTU/hr)

Reliable power when and where you need it. Clean and simple.

Dimensions & Weight[5]

Width x Depth x Height[6]	1.7 x 3.8 x 2.5 m (67 x 150 x 98 in)
Weight – Grid Connect Model	2776 kg (6,120 lb)
Weight – Dual Mode Model	3413 kg (7,525 lb)

Minimum Clearance Requirements[7]

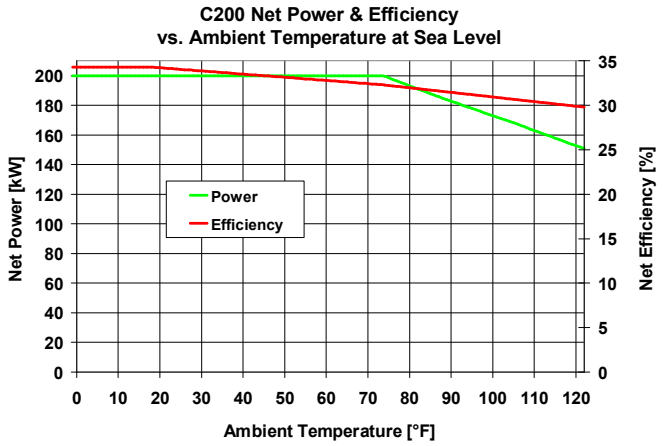
Vertical Clearance	0.6 m (24 in)
Horizontal Clearance	
Left & Right	1.1 m (42 in)
Front	1.1 m (42 in)
Rear	1.8 m (70 in)

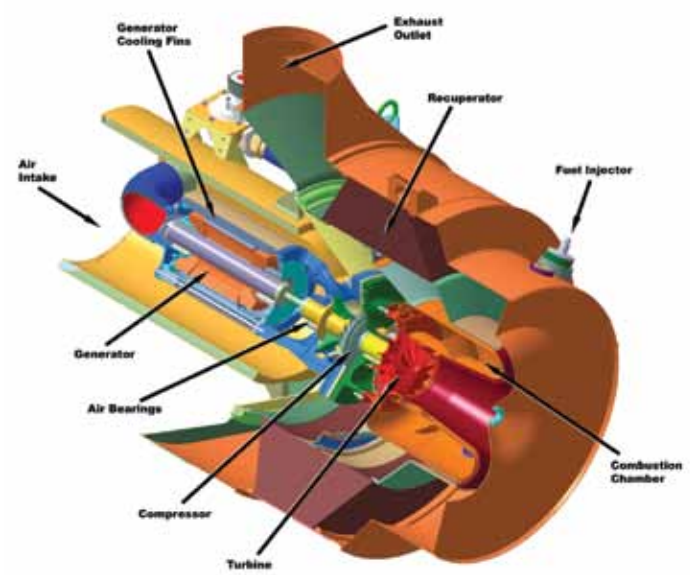
Sound Levels

Acoustic Emissions at Full Load Power	
Nominal at 10 m (33 ft)	65 dBA

Certifications

- UL 2200 and UL 1741 natural gas operation[8]
- Complies with IEEE 1547 and meets statewide utility interconnection requirements for California Rule 21 and the New York State Public Service Commission
- CE certified





(1) Nominal full power performance at ISO conditions: 59°F, 14.696 psia, 60% RH
(2) With linear load
(3) Inlet pressure for standard natural gas at 39.4 MJ/Nm^3 (1,000 BTU/scf) (HHV)
(4) Emissions for standard natural gas at 39.4 MJ/Nm^3 (1,000 BTU/scf) (HHV)
(5) Approximate dimensions and weight
(6) Height dimensions are to the roof line. Exhaust outlet extends at least 8 inches above the roof line
(7) Clearance requirements may increase due to local code considerations
(8) All natural gas models are planned to be UL Listed

Specifications are not warranted and are subject to change without notice.

21211 Nordhoff Street • Chatsworth • CA • 91311 • 866.422.7786 • 818.734.5300 • www.capstoneturbine.com
©2010 Capstone Turbine Corporation. P0911 C200 HP Natural Gas Data Sheet CAP146 | Capstone P/N 331042E

Capstone Turbine Corporation • 1111 Nordhoff Street • Chatsworth • CA 91111 • USA
Phone: (1) 818-5000 • Fax: (1) 818-5000 • Web: www.microturbine.com

Technical Reference

Capstone MicroTurbine™ Systems Emissions

Summary

Capstone MicroTurbine™ systems are inherently clean and can meet some of the strictest emissions standards in the world. This technical reference is to provide customers with information that may be requested by local air permitting organizations or to compare air quality impacts of different technologies for a specific project. The preferred units of measure are "output based", meaning that the quantity of a particular exhaust emission is reported relative to the useable output of the microturbine – typically in pounds per megawatt hour for electrical generating equipment. This technical reference also provides volumetric measurements in parts per million and milligrams per normal cubic meter. A conversion between several common units is also provided.

Maximum Exhaust Emissions at ISO Conditions

Table 1 below summarizes the exhaust emissions at full power and ISO conditions for different Capstone microturbine models. Note that the fuel can have a significant impact on certain emissions. For example landfill and digester gas can be made up of a wide variety of fuel elements and impurities, and typically contains some percentage of carbon dioxide (CO_2). This CO_2 dilutes the fuel, makes complete combustion more difficult, and results in higher carbon monoxide emissions (CO) than for pipeline-quality natural gas.

Table 1: Emission for Different Capstone Microturbine Models in lb/MWhe

Model	Fuel	NOx	CO	VOC (5)
C30 NG	Natural Gas (1)	0.64	1.8	0.23
CR30 MBT	Landfill Gas (2)	0.64	22.0	1.00
CR30 MBT	Digester Gas (3)	0.64	11.0	1.00
C30 Liquid	Diesel #2 (4)	2.60	0.41	0.23
C65 NG Standard	Natural Gas (1)	0.46	1.25	0.10
C65 NG Low NOx	Natural Gas (1)	0.17	1.30	0.10
C65 NG CARB	Natural Gas (1)	0.17	0.24	0.05
CR65 Landfill	Landfill Gas (2)	0.46	4.0	0.10
CR65 Digester	Digester Gas (3)	0.46	4.0	0.10
C200 NG	Natural Gas (1)	0.40	1.10	0.10
C200 NG CARB	Natural Gas (1)	0.14	0.20	0.04
CR200 Digester	Digester Gas (3)	0.40	3.6	0.10

Notes:

(1) Emissions for standard natural gas at 1,000 BTU/scf (HHV) or 34.4 MJ/m3 (HHV)
(2) Emissions for surrogate gas containing 42% natural gas, 30% CO2, and 10% Nitrogen
(3) Emissions for surrogate gas containing 63% natural gas and 37% CO2
(4) Emissions for Diesel #2 according to ASTM D975-07b
(5) Expressed as Methane

Capstone reserves the right to change or modify, without notice, the design, specifications, and/or contents of this document without incurring any obligation either with respect to equipment previously sold or in the process of construction.

Table 2 pro□ides the same output-based information shown in Table 1, but expressed in grams per horsepower hour (g/hp-hr).

Table □□Emission for Different Capstone Microturbine Models in □g/hp-hr□

Model	Fuel	NOx	CO	□OC (5)
C30 NG	Natural Gas (1)	0.22	0.60	0.078
CR30 MBT□	□andfill Gas (2)	0.22	7.4	0.340
CR30 MBT□	Digester Gas (3)	0.22	3.7	0.340
C30 □iquid	Diesel #2 (4)	0.□0	0.14	0.078
C65 NG Standard	Natural Gas (1)	0.16	0.42	0.034
C65 NG □ow NOx	Natural Gas (1)	0.06	0.44	0.034
C65 NG CARB	Natural Gas (1)	0.06	0.08	0.017
CR65 □andfill	□andfill Gas (2)	0.16	1.4	0.034
CR65 Digester	Digester Gas (3)	0.16	1.4	0.034
C200 NG	Natural Gas (1)	0.14	0.37	0.034
C200 NG CARB	Natural Gas (1)	0.05	0.07	0.014
CR200 Digester	Digester Gas (3)	0.14	1.3	0.034

Notes: - same as for Table 1

Emissions may also be reported on a □olumetric basis, with the most common unit of measurement being parts per million. This is typically a measurement that is corrected to specific oxygen content in the exhaust and without considering moisture content. The abbre□iation for this unit of measurement is □ppm□d□(parts per million by □olume, dry) and is corrected to 15% oxygen for electrical generating equipment such as microturbines. The relationship between an output based measurement li□e pounds per MWh and a □olumetric measurement li□e ppm□d depends on the characteristics of the generating equipment and the molecular weight of the criteria pollutant being measured. Table 3 expresses the emissions in ppm□d at 15% oxygen for the Capstone microturbine models shown in Table 1. Note that raw measurements expressed in ppm□will typically be lower than the corrected □alues shown in Table 3 because the microturbine exhaust has greater than 15% oxygen.

Another □olumetric unit of measurement expresses the mass of a specific criteria pollutant per standard unit of □olume. Table 4 expresses the emissions in milligrams per normal cubic meter at 15% oxygen. Normal conditions for this purpose are expresses as one atmosphere of pressure and □ero degrees Celsius. Note that both the ppm□d and mg/m3 measurements are for specific oxygen content. A con□ersion can be made to ad□ust either unit of measurement to other reference oxygen contents, if required. □se the equation below to con□ert from one reference oxygen content to another:

$$\text{Emissions at New } O_2 \;\square\; \frac{(20.\square - \text{New } O_2 \text{ Percent})}{(20.\square - \text{Current } O_2 \text{ Percent})} \text{ X Emissions at Current } O_2$$

For example, to express □ppm□d of NOx at 15% oxygen to ppm□d at 3% oxygen:

$$\text{Emissions at 3\% } O_2 \;\square\; \frac{(20.\square - 3.0)}{(20.\square - 15.0)} \text{ X } \square\square 27 \text{ ppm}\square\text{d}$$

Capstone reser□es the right to change or modify, without notice, the design, specifications, and/or contents of this document without incurring any obligation either with respect to equipment pre□iously sold or in the process of construction.

Table □□ Emission for Different Capstone Microturbine Models in □ppmvd□at 15% O□

Model	Fuel	NOx	CO	□OC
C30 NG	Natural Gas (1)	□	40	□
CR30 MBT□	□andfill Gas (2)	□	500	40
CR30 MBT□	Digester Gas (3)	□	250	40
C30 □iquid	Diesel #2 (4)	35	□	□
C65 NG Standard	Natural Gas (1)	□	40	7
C65 NG □ow NOx	Natural Gas (1)	4	40	7
C65 NG CARB	Natural Gas (1)	4	8	3
CR65 □andfill	□andfill Gas (2)	□	130	7
CR65 Digester	Digester Gas (3)	□	130	7
C200 NG	Natural Gas (1)	□	40	7
C200 NG CARB	Natural Gas (1)	4	8	3
CR200 Digester	Digester Gas (3)	□	130	7

Notes: same as Table 1

Table □□ Emission for Different Capstone Microturbine Models in □mg/m□□at 15% O□

Model	Fuel	NOx	CO	□OC (5)
C30 NG	Natural Gas (1)	18	50	6
CR30 MBT□	□andfill Gas (2)	18	620	30
CR30 MBT□	Digester Gas (3)	18	310	30
C30 □iquid	Diesel #2 (4)	72	11	6
C65 NG Standard	Natural Gas (1)	1□	50	5
C65 NG □ow NOx	Natural Gas (1)	8	50	5
C65 NG CARB	Natural Gas (1)	8	□	2
CR65 □andfill	□andfill Gas (2)	18	160	5
CR65 Digester	Digester Gas (3)	18	160	5
C200 NG	Natural Gas (1)	18	50	5
C200 NG CARB	Natural Gas (1)	8	□	2
CR200 Digester	Digester Gas (3)	18	160	5

Notes: same as Table 1

The emissions stated in Tables 1, 2, 3 and 4 are guaranteed by Capstone for new microturbines during the standard warranty period. They are also the expected emissions for a properly maintained microturbine according to manufacturer□s published maintenance schedule for the useful life of the equipment.

Emissions at Full Power but Not at ISO Conditions

The maximum emissions in Tables 1, 2, 3 and 4 are at full power under ISO conditions. These le□els are also the expected □alues at full power operation o□er the published allowable ambient temperature and ele□ation ranges.

Capstone reser□es the right to change or modify, without notice, the design, specifications, and/or contents of this document without incurring any obligation either with respect to equipment pre□iously sold or in the process of construction.

Emissions at Part Power

Capstone microturbines are designed to maintain combustion stability and low emissions o□er a wide operating range. Capstone microturbines utili□e multiple fuel in□ectors, which are switched on or off depending on the power output of the turbine. All in□ectors are typically on when maximum power is demanded, regardless of the ambient temperature or ele□ation. As the load requirements of the microturbine are decreased, in□ectors will be switched off to maintain stability and low emissions. Howe□er, the emissions relati□e to the lower power output may increase. This effect differs for each microturbine model.

Emissions Calculations for Permitting

Air Permitting agencies are normally concerned with the maximum amount of a gi□en pollutant being emitted per unit of time (for example pounds per day of NOx). The simplest way to ma□e this calculation is to use the maximum microturbine full electrical power output (expressed in MW) multiplied by the emissions rate in pounds per MWhe times the number of hours per day. For example, the C65 CARB microturbine operating on natural gas would ha□e a NOx emissions rate of:

NOx □.17 X (65/1000) X 24 □.27 pounds per day

This would be representati□e of operating the equipment full time, 24 hours per day, at full power output of 65 □We.

As a general rule, if local permitting is required, use the published agency le□els as the stated emissions for the permit and ma□e sure that this permitted le□el is abo□e the calculated □alues in this technical reference.

Consideration of Useful Thermal Output

Capstone microturbines are often deployed where their clean exhaust can be used to pro□ide heating or cooling, either directly or using hot water or other heat transfer fluids. In this case, the local permitting or standards agencies will usually consider the emissions from traditional heating sources as being displaced by the useful thermal output of the microturbine exhaust energy. This increases the useful output of the microturbine, and decreases the relati□e emissions of the combined heat and power system. For example, the CARB □ersion C65 ICHP system with integral heat reco□ery can achie□e a total system efficiency of 70% or more, depending on inlet water temperatures and other installation-specific characteristics. The electric efficiency of the CARB □ersion C65 microturbine is 28% at ISO conditions. This means that the total NOx output based emissions, including the captured thermal □alue, is the electric-only emissions times the ratio of electric efficiency di□ided by total system efficiency:

NOx □.17 X 28/70 □.068 pounds per MWh (based on total system output)

This is typically much less than the emissions that would result from pro□iding electric power using traditional central power plants, plus the emissions from a local hot water heater or boiler. In fact microturbine emissions are so low compared with traditional hot water heaters that installing a Capstone microturbine with heat reco□ery can actually decrease the local emissions of NOx and other criteria pollutants, without e□en considering the elimination of emissions from a remote power plant.

Capstone reser□es the right to change or modify, without notice, the design, specifications, and/or contents of this document without incurring any obligation either with respect to equipment pre□iously sold or in the process of construction.

Greenhouse Gas Emissions

Many gasses are considered □greenhouse gasses□, and agencies ha□e ran□ed them based on their global warming potential (GWP) in the atmosphere compared with carbon dioxide (CO_2), as well as their ability to maintain this effect o□er time. For example, methane is a greenhouse gas with a GWP of 21. Criteria pollutants li□e NOx and organic compounds li□e methane are monitored by local air permitting authorities, and are sub□ect to strong emissions controls. E□en though some of these criteria pollutants can be more troublesome for global warming than CO_2, they are released in small quantities – especially from Capstone microturbines. So the ma□or contributor of concern is carbon dioxide, or CO_2. Emission of CO_2 depends on two things:

1. Carbon content in the fuel
2. Efficiency of con□erting fuel to useful energy

It is for these reasons that many local authorities are focused on using clean fuels (for example natural gas compared with diesel fuel), achie□ing high efficiency using combined heat and power systems, and displacing emissions from traditional power plants using renewable fuels li□e waste landfill and digester gasses.

Table 5 shows the typical CO_2 emissions due to combustion for different Capstone microturbine models at full power and ISO conditions. The □alues do not include CO_2 that may already exist in the fuel itself, which is typical for renewable fuels li□e landfill and digester gas. These □alues are expressed on an output basis, as is done for criteria pollutants in Table 1. The table shows the pounds per megawatt hour based on electric power output only, as well as considering total useful output in a CHP system with total 70% efficiency (□HV). As for criteria pollutants, the relati□e quantity of CO_2 released is substantially less when useful thermal output is also considered in the measurement.

Table 5□CO□ Emission for Capstone Microturbine Models in □lb/MWh□

Model	Fuel	CO□	
		Electric Only	□□% Total CHP
C30 NG	Natural Gas (1)	1,6□0	625
CR30 MBT□	□andfill Gas (1)	1,6□0	625
CR30 MBT□	Digester Gas (1)	1,6□0	625
C30 □iquid	Diesel #2 (2)	2,400	855
C65 NG Standard	Natural Gas (1)	1,520	625
C65 NG □ow NOx	Natural Gas (1)	1,570	625
C65 NG CARB	Natural Gas (1)	1,570	625
CR65 □andfill	□andfill Gas (1)	1,520	625
CR65 Digester	Digester Gas (1)	1,520	625
C200 NG	Natural Gas (1)	1,330	625
C200 NG CARB	Natural Gas (1)	1,330	625
CR200 Digester	Digester Gas (1)	1,330	625

Notes:

(1) Emissions due to combustion, assuming natural gas with CO_2 content of 117 lb/MMBT□ (HHV)

(2) Emissions due to combustion, assuming diesel fuel with CO_2 content of 160 lb/MMBT□ (HHV)

Capstone reser□es the right to change or modify, without notice, the design, specifications, and/or contents of this document without incurring any obligation either with respect to equipment pre□iously sold or in the process of construction.

Useful Conversions

The con□ersions shown in Table 6 can be used to obtain other units of emissions outputs. These are approximate con□ersions.

Table 6□ □seful □nit Conversions

From	Multiply □y	To Get
lb/MWh	0.338	g/bhp-hr
g/bhp-hr	2.□6	lb/MWh
lb	0.454	□g
□g	2.20	lb
□g	1,000	g
hp (electric)	.746	□W
□W	1.34	hp (electric)
MW	1,000	□W
□W	0.001	MW

Definitions

- ISO conditions are defined as: 15 °C (5□ °F), 60% relati□e humidity, and sea le□el pressure of 101.3 □Pa (14.6□6 psia).
- HHV: Higher Heating Value
- □HV: □ower Heating Value
- □W_{th}: □ilowatt (thermal)
- □W_e : □ilowatt (electric)
- MWh: Megawatt-hour
- hp-hr: horsepower-hour (sometimes referred to as □electric horsepower-hour□)
- Scf: Standard cubic foot (standard references ISO temperature and pressure)
- m3: Normal cubic meter (normal references 0 °C and one atmosphere pressure)

Capstone Contact Information

If questions arise regarding this technical reference, please contact Capstone Turbine Corporation for assistance and information:

Capstone Applications

Toll Free Telephone: (866) 4-CAPSTONE or (866) 422-7786

Fax: (818) 734-5385

E-mail: applications□ capstoneturbine.com

Capstone reser□es the right to change or modify, without notice, the design, specifications, and/or contents of this document without incurring any obligation either with respect to equipment pre□iously sold or in the process of construction.

USA COMPRESSION

USA Compression Unit TBD Caterpillar G3608TALE Engine Emissions

Date of Manufacture	TBD	Engine Serial Number	TBD	Date Modified/Reconstructed	Not Any
Driver Rated HP	2370	Rated Speed in RPM	1000	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	8	Compression Ratio	9:1	Combustion Setting	Ultra Lean Burn
Total Displacement, in^3	10350	Fuel Delivery Method	Fuel Injection	Combustion Air Treatment	T.C./Aftercooled

Raw Engine Emissions (905 LHV BTU/SCF Fuel Gas with little to no H2S)

Fuel Consumption *6791 LHV BTU/bhp-hr* *or* *7533 HHV BTU/bhp-hr*
Altitude *1200 ft*
Maximum Air Inlet Temp *100 F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	0.5		2.61	11.44
Carbon Monoxide (CO)	2.75		14.37	62.93
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.63		3.29	14.42
Formaldehyde (CH2O)	0.26		1.36	5.95
Particulate Matter (PM) Filterable+Condensable		9.99E-03	1.78E-01	7.81E-01
Sulfur Dioxide (SO2)		5.88E-04	1.05E-02	4.60E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	441	2304	9154
Methane (CH4)	4.9	25.60	101.71

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) assuming 905 LHV BTU/SCF fuel gas, 1200 ft elevation, and 105 F Max Air Inlet Temperature. Note that g/bhp-hr values are based on 100% Load Operation. For air permitting, it is recommended to use a 20% safety margin for CO, VOC and other organic compounds to allow for variation in operating parameters and fuel gas quality.

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

Catalytic Converter Emissions

Catalytic Converter Make amd Model: *DCL DC64L3-20HGS+*
Element Type: *Oxidation*
Number of Elements in Housing: *3*
Air/Fuel Ratio Control *Caterpillar ADEM3*

	% Reduction	**lb/hr**	**TPY**
Nitrogen Oxides (NOx)	0	**2.61**	**11.44**
Carbon Monoxide (CO)	93	**1.01**	**4.41**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	61	**1.28**	**5.62**
Formaldehyde (CH2O)	81	**0.26**	**1.13**
Particulate Matter (PM)	0	**1.78E-01**	**7.81E-01**
Sulfur Dioxide (SO2)	0	**1.05E-02**	**4.60E-02**

	% Reduction	**lb/hr**	**Metric Tonne/yr**
Carbon Dioxide (CO2)	0	**2304**	**9154**
Methane (CH4)	0	**25.60**	**101.71**

DCL America Inc.
12620 FM 1960 W, Ste A4 Box # 560, Houston, TX 77065
Tel.: 877-897-9759 *Fax:* 281-605-5858 *E-mail:* info@dclamerica.com

To:	Chris Magee	**Phone:**	
	USA Compression	**Fax:**	
		E-mail:	
Date:	May 20, 2015	**No. Pages:**	

RE: Emissions Guarantee

Dear Chris,

We hereby guarantee that our QUICK-LID™ Model 3-DC64-20 Catalytic Converter with three (3) elements installed as described below:

Catalyst model	3-DC64-20 CC
Catalyst coating	Oxidation, Q
Outside Diameter of catalyst substrate	24.23"
No. of catalyst substrates	3
Cell Density	300 cpsi
Catalyst Backpressure	3.5" w.c

and sized for the following engine:

Engine model	Caterpillar G3608 TALE
Power	2370 bhp
Exhaust Flow	16,094 cfm
Exhaust Gas Temperature	857 °F
Fuel	PQNG

will perform as follows:

Emissions	**Pre-catalyst emissions (g/bhp-hr)**	**Post Catalyst emissions (%)**	
Oxides of Nitrogen (NOx)	-		
Carbon Monoxide (CO)	2.75	93	0.1925
Volatile Organic Compounds (VOCs)	0.63	70	0.189
Formaldehyde (CH2O)	0.26	81	0.0494

for a period of 1 year or 8000 hours, whichever comes first, subject to all terms and conditions contained in the attached warranty document being respected and met.

Best regards,
On behalf of DCL America Inc.

Lisa Barber
416-788-8021
lbarber@dcl-inc.com

Emissions Report

04/23/2014

USA Compression Unit 5161 G8.3/H302

Engine Serial Number :	46930956	Engine Manufactured Date :	11/03/2008
Max HP :	118	Max RPM :	1800
Number of Engine Cylinders :	6	Total Displacement (in3) :	505
Combustion Type & Setting :	4 Stroke Rich Burn	Fuel Delivery Method:	Carburetor
Compression Ratio :	10.5:1	Combustion Air Treatment :	Naturally Aspirated
Engine Modified/Reconstructed? :	Built After 7/1/2008		
Compressor Frame Serial # :		Unit Packaged Date :	11/24/2008
Compressor Frame Max RPM :	0	# of Compressor Throws :	2

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Marshall WV

NSPS JJJJ	NOx	2.0	g/hp-hr	CO	4.0	g/hp-hr	VOC	1.0	g/hp-hr			
Ozone Non-Attainment / General Permit	NOx		g/hp-hr	CO		g/hp-hr	VOC		g/hp-hr	CH2O		g/hp-hr

RAW ENGINE EMISSIONS

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

Fuel Consumption : 8,924 HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :	13.00		3.382	14.812
Carbon Monoxide (CO) :	8.60		2.237	9.799
Volatile Organic Compounds (NMNEHC excluding CH2O) :				
Formaldehyde (CH2O) :				
Particulate Matter (PM) Filterable+Condensable :		0.0194	0.020	0.090
Sulfur Dioxide (SO2) :		0.0006	0.001	0.003

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	452.00		117.58	467.14
Methane (CH4) :				

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:	VXC-1408-04-HSG
Catalyst Element Type:	3-Way
Number of Catalyst Elements currently in Housing:	1
Air/Fuel Ratio Control :	Yes
Other Engine Emissions Control Equipment :	

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	84.62	0.520	2.279
Carbon Monoxide (CO) :	53.49	1.040	4.557
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0.00		
Formaldehyde (CH2O) :			
Particulate Matter (PM) Filterable+Condensable :	0.00	0.020	0.090
Sulfur Dioxide (SO2) :	0.00	0.001	0.003

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0.00	117.58	467.14
Methane (CH4) :	0.00		

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

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

Engine Performance Data

Cummins Inc

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

Industrial

G8.3

FR92228

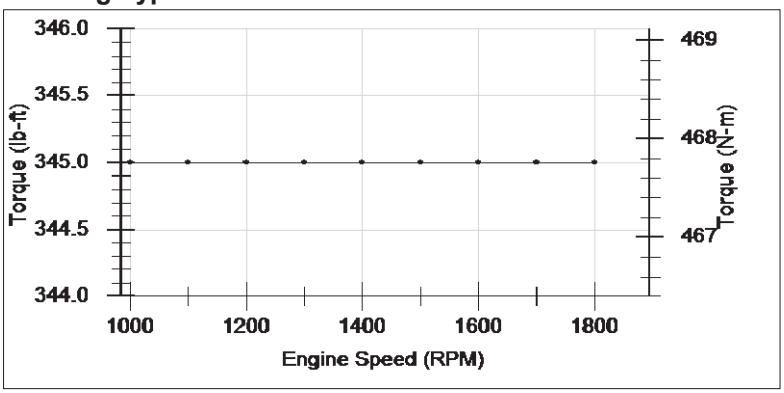
118 BHP (88 kW) @ 1800 RPM
344 lb-ft (466 N-m) @ 1800 RPM

Configuration	CPL Code	Revision
D551013CX03	**2482**	**13-May-2011**

Compression Ratio:	**10.5:1**	Displacement:	**505 in3 (8.3 L)**
Fuel System:	**Field Gas, Dry Processed Nat Gas**	Aspiration:	**Naturally Aspirated**
Emission Certification:	**Non-certified, Catalyst**		

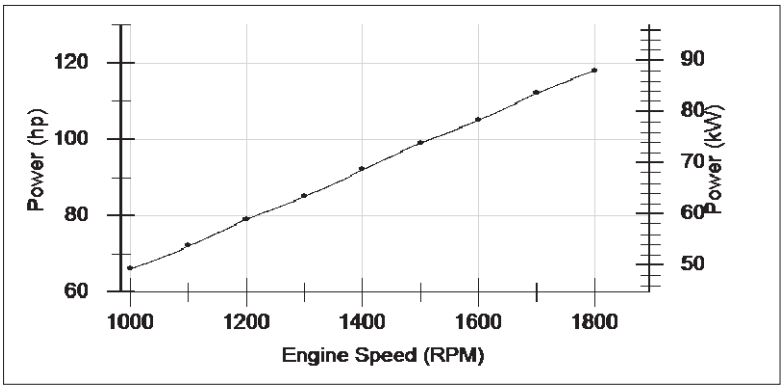
All data is based on the engine operating with fuel system, water pump, and 6 in H2O (1.49 kPa) inlet air restriction with 3 in (76 mm) inner diameter, and with 1 in Hg (3 kPa) exhaust restriction with 3 in (76 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. Coolant flows and heat rejection data based on coolants as 50% ethylene glycol/50% water. All data is subject to change without notice.

Rating Type: Continuous/WMR



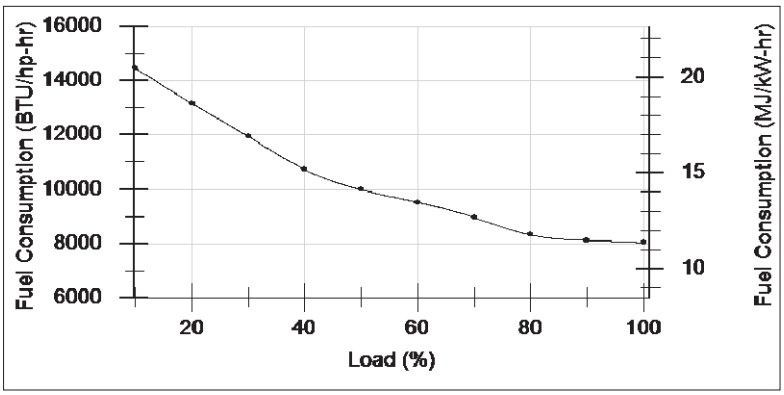
Torque Output

RPM	lb-ft	N-m
1,000	345	468
1,100	345	468
1,200	345	468
1,300	345	468
1,400	345	468
1,500	345	468
1,600	345	468
1,700	345	468
1,800	345	468



Power Output

RPM	hp	kW
1,000	66	49
1,100	72	54
1,200	79	59
1,300	85	63
1,400	92	69
1,500	99	74
1,600	105	78
1,700	112	84
1,800	118	88



Fuel Consumption @ 1,800 RPM

hp	kW	% Load	BTU/hp-hr	MJ/kW-hr
118	88	100	8,032	11.36
106	79	90	8,114	11.48
94	70	80	8,311	11.76
83	62	70	8,957	12.67
71	53	60	9,520	13.47
59	44	50	9,981	14.12
47	35	40	10,724	15.17
35	26	30	11,943	16.9
24	18	20	13,159	18.62
12	9	10	14,465	20.46

Data represents gross engine capabilities obtained and corrected in accordance with SAE J1995 using dry processed natural gas fuel with 935 BTU per standard cubic foot lower heating value. Deration may be required due to altitude, temperature and type of fuel. Consult Cummins Customer Engineering with operating questions.

STATUS FOR CURVES AND DATA: Beta-(Measured data)

Tolerance: Within +/- 5%

CHIEF ENGINEER:

Alfred S Weber

Bold entries revised after 1-Mar-2010

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

Intake Air System

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

Cooling System

Maximum coolant temperature for engine protection controls	215 deg F	102 deg C
Maximum coolant operating temperature at engine outlet (max. top tank temp):	212 deg F	100 deg C

Exhaust System

Maximum exhaust back pressure:	2 in-Hg	7 kPa
Recommended exhaust piping size (inner diameter):	3 in	76 mm

Lubrication System

Nominal operating oil pressure		
@ minimum low idle	10 psi	69 kPa
@ maximum rated speed	50 psi	345 kPa
Minimum engine oil pressure for engine protection devices		
@ minimum low idle	10 psi	69 kPa

Fuel System

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

Performance Data

Engine low idle speed:	900 RPM	
Maximum low idle speed:	1,800 RPM	
Minimum low idle speed:	800 RPM	
Engine high idle speed	1,800 RPM	
Governor break speed:		
Maximum torque available at closed throttle low idle speed:	50 lb-ft	68 N-m

	100% Load		75% Load		50% Load	
Engine Speed	1,800 RPM		1,800 RPM		1,800 RPM	
Output Power	118 hp	88 kW	89 hp	66 kW	59 hp	44 kW
Torque	344 lb-ft	466 N-m	260 lb-ft	353 N-m	172 lb-ft	233 N-m
Intake Manifold Pressure	-1 in-Hg	-3 kPa	-3 in-Hg	-9 kPa	-4 in-Hg	-14 kPa
Inlet Air Flow	166 ft3/min	78 L/s	137 ft3/min	65 L/s	106 ft3/min	50 L/s
Exhaust Gas Flow	528 ft3/min	249 L/s	423 ft3/min	200 L/s	317 ft3/min	150 L/s
Exhaust Gas Temperature	1,127 deg F	608 deg C	1,069 deg F	576 deg C	1,002 deg F	539 deg C
Heat Rejection to Coolant	5,596 BTU/min	98 kW	4,879 BTU/min	86 kW	4,173 BTU/min	73 kW
Heat Rejection to Ambient	282 BTU/min	5 kW	253 BTU/min	4 kW	211 BTU/min	4 kW
Heat Rejection to Exhaust	3,340 BTU/min	59 kW	2,587 BTU/min	45 kW	1,862 BTU/min	33 kW
Fuel Consumption	8,032 BTU/hp-hr	11 MJ/kW-hr	8,689 BTU/hp-hr	12 MJ/kW-hr	9,981 BTU/hp-hr	14 MJ/kW-hr
Air Fuel Ratio (dry)	15.5 vol/vol		15.9 vol/vol		16.1 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	26 deg	26 deg
Total Hydrocarbons	2.25 g/hp-hr		2.84 g/hp-hr		4 g/hp-hr	
VOC ppm w/o Catalyst						
VOC ppm with Catalyst						
NOx	13 g/hp-hr	17.43 g/kW-hr	14.1 g/hp-hr	18.91 g/kW-hr	15.1 g/hp-hr	20.25 g/kW-hr
NOx ppm w/o Catalyst						
NOx ppm with Catalyst						
CO	8.6 g/hp-hr	11.53 g/kW-hr	9.2 g/hp-hr	12.34 g/kW-hr	9.9 g/hp-hr	13.28 g/kW-hr
CO ppm w/o Catalyst						
CO ppm with Catalyst						
CO2	452 g/hp-hr	606 g/kW-hr	498 g/hp-hr	668 g/kW-hr	578 g/hp-hr	775 g/kW-hr
O2	0.53 %		0.58 %		0.66 %	

Bold entries revised after 1-Mar-2010

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

Cranking System (Cold Starting Capability)

Unaided Cold Start:

Minimum cranking speed	250	RPM		
Minimum ambient temperature for unaided cold start	0	deg F	-17.8	deg C
Breakaway torque at minimum unaided cold start temperature:	480	lb-ft	651	N-m
Cold starting aids available	Block Heater			
Maximum parasitic load at 10 deg F @				

Noise Emissions

Top	89.9	dBa
Right Side	91.2	dBa
Left Side	91.7	dBa
Front	90.3	dBa
Exhaust noise emissions	105.3	dBa

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

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

Ambient Temp deg F (deg C)

Altitude ft (m)	**120 (49)**	**110 (43)**	**100 (38)**	**90 (32)**	**80 (27)**	**70 (21)**
0 (0)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
1000 (305)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
2000 (610)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
3000 (914)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
4000 (1219)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
5000 (1524)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
6000 (1829)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
7000 (2134)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
8000 (2438)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
9000 (2743)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)
10000 (3048)	(.0)	(.0)	(.0)	(.0)	(.0)	(.0)

End of Report

Bold entries revised after 1-Mar-2010

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

Proposal Number: TJ-11-1965 Rev(6)

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Cummins
Model Number:	G 8.3
Power Output:	118 bhp
Power Output:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	528 acfm (cfm)
Exhaust Temperature:	1127 F

System Details

Housing Model Number:	VXC-1408-04-HSG
Element Model Number:	VX-RE-08XC
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	3.0 inches of WC (Clean)
Sound Attenuation:	28-32 dBA insertion loss
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	VXC-1408-04-XC1
Material:	Carbon Steel
Inlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	53 inches
Weight Without Catalyst:	152 lbs
Weight Including Catalyst:	162 lbs
Instrumentation Ports:	1 inlet/1 outlet (1/2" NPT)

Emission Requirements

Exhaust Gases	Engine Outputs (g/bhp-hr)	Reduction (%)	Warranted Converter Ouputs (g/bhp-hr)	Requested Emissions Targets
CH_2O	0.08			
CO	8.6	53.5	4	4 g/bhp-hr
NMHC*	0.07			
NMNEHC**	0.12	0	1	1 g/bhp-hr
NO_x***	13	84.6	2	2 g/bhp-hr
PM_{10}	0			
THC	2.25			
O2	0.5%			
H2O	18.5%			

† MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.

*MW referenced as CH_4 **MW referenced as CH_4 ***MW referenced as NO_2

USA COMPRESSION

USA Compression Unit 1011 Arrow VRG330 Engine Emissions

Date of Manufacture	May 7, 1982	Engine Serial Number	380788	Date Modified/Reconstructed	Not Any
Driver Rated HP	68	Rated Speed in RPM	1800	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	4	Compression Ratio	N/A	Combustion Setting	Rich Burn
Displacement, in^3	330	Fuel Delivery Method	Carburetor	Combustion Air Treatment	Naturally Aspirated

Raw Engine Emissions (900 LHV BTU/SCF Fuel Gas with little to no H2S)

Fuel Consumption *8100 LHV BTU/bhp-hr or 9000 HHV BTU/bhp-hr*
Altitude *500 ft*
Maximum Air Inlet Temp *77 F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	14.4		2.159	9.455
Carbon Monoxide (CO)	16.3		2.444	10.703
TOC (Total Organic Carbon)		3.58E-01	0.219	0.960
Volatile Organic Compounds (VOC or NMNEHC)		2.96E-02	0.018	0.079
Formaldehyde (CH2O)		2.05E-02	0.013	0.055
Particulate Matter (PM) Filterable+Condensable		1.94E-02	0.012	0.052
Sulfur Dioxide (SO2)		5.88E-04	0.000	0.002

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)		110.0	67	267
Methane (CH4)		2.30E-01	0.141	0.559

[1] g/bhp-hr are based on Arrow Specifications. Note that g/bhp-hr values are based on 100% Load Operation.
It is recommended to add a safety margin to emissions to allow for operational flexibility and fuel gas composition variability.
[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-3).

Catalytic Converter Emissions

Catalytic Converter Make and Model: *Not Equipped*
Element Type: *None*
Number of Elements in Housing: *0*
Air/Fuel Ratio Control *Not Equipped*

	% Reduction	lb/hr	TPY
Nitrogen Oxides (NOx)	0	**2.16**	**9.46**
Carbon Monoxide (CO)	0.0	**2.44**	**10.70**
TOC (Total Organic Carbon)	0.0	**0.22**	**0.96**
Volatile Organic Compounds (VOC or NMNEHC)	0	**0.02**	**0.08**
Formaldehyde (CH2O)	0	**0.01**	**0.05**
Particulate Matter (PM)	0	**1.19E-02**	**5.20E-02**
Sulfur Dioxide (SO2)	0	**3.60E-04**	**1.58E-03**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**67**	**267**
Methane (CH4)	0	**0.14**	**0.56**

ENGINE MODEL:	K-6	C-46	C-66	C-96	C-101	C-106	C-255	L-795	A-42 (VRG 260)	A-54 (VRG 330)	A-54 CF (VRG 330 CF)	A-62 (VRG 380)	A-62 TA (VRG 380 TA)
Rich/Lean Burn	Rich	Rich	Rich	Rich	Rich	Rich	Rich	Lean	Rich	Rich	Rich	Rich	Rich
2 or 4 Cycle	4	4	4	4	4	4	4	2	4	4	4	4	4
Bore	4.00	5.00	5.25	7.00	7.50	7.50	7.50	7.50	4.134	3.875	3.875	4.134	4.134
Stroke	4.50	6.25	7.50	8.50	8.50	8.50	7.50	9.00	4.724	4.665	4.665	4.724	4.724
Displacement (CI.)	56.5	122.7	195	327	376	376	660	795	253	330	330	380.8	380.8
No. Cylinders	1	1	1	1	1	1	2	2	4	6	6	6	6
RPM Max/Min.	800/400	800/400	700/350	600/300	800/400	800/400	750/400	600/300	1800/1000	1800/1000	1800/1000	1800/1000	1800/1000
Max HP (cont.)	4.8	9	13	19	24.5	32	55	65	47	68	72	80	115
BMEP	84	73	75	77	65	84	88	54	82	91	96	92	133
BSFC (BTU/HP-HR)	14950	11640	11450	13000	13050	10350	11900	13500	8900	9000	8800	8268	8580
Exhaust Stack													
NPT Dia. (in.)	1 1/4"	1 1/2"	2"	2 1/2"	2 1/2"	2 1/2"	4"	4"	2"	2 1/2"	2 1/2"	+3"	+3"
Height (in.) **	©28.5"	ⁿ5.5"	ⁿ7.5"	ⁿ11"	ⁿ11"	ⁿ11"	©20"	©7"	27"	28"	27 1/4"	28"	29 1/2"
Temp. (Deg. F)	1260	1300	1300	1300	1275	1302	1300	900	1230	1238	1238	1230	1350
Flow (acfm)	31	70	97	139	210	213	350	625	310	406	406	466	1331
Emissions (g/hp-hr)													
Pre-Cat Nox	N/A	N/A	N/A	N/A	N/A	14	IP	1.89	12.8	14.4	12.3	14.7	15.5
Pre-Cat CO	N/A	N/A	N/A	N/A	N/A	11.5	IP	2.58	5.1	16.3	11	5.8	11.15
Pre-Cat VOC	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.04	0.04	0.04	0.04	0.10
Pre-Cat HCHO	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.09	0.09	0.09	0.09	0.09
	*6℗	*6℗											
Max. Exhaust Back Pressure ("W.C.)	20	20	20	20	20	20	20	TE	20	20	20	20	20
Weight (lb.)Dry	670	1360	1640	2580	2690	2690	3980	4510	1234	1000	1000	1851	1900

* = EPA emission regulation limits as of March 1, 2011. Check with your local DEQ, as they maybe lower than the EPA requirements.
** = Stack height is from the base of the mounting feet to the exhaust manifold outlet.
+= Catalyst equiped engines.
ⁿ = MUF-1 standard muffler outlet height.
TE = Tuned Exhaust.
IP = In Process
Emissions vary depending on AFR set point and emission equipment from engine to engine. This information is for reference only.

© = Center of exhaust outlet
N/A = Not available at this time.
℗ = Does not require a catalyst to meet the current requirements
BSFC (BTU/HP-HR) @ max rated RPM

Power Generation

2015 EPA Tier 3 Exhaust Emission Compliance Statement 250DQDAA Stationary Emergency

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 3 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII when tested per ISO8178 D2.

Engine Manufacturer:	Cummins Inc
EPA Certificate Number:	FCEXL0540AAB-030
Effective Date:	12/09/2014
Date Issued:	12/09/2014
EPA Engine Family (Cummins Emissions Family):	FCEXL0540AAB(B563)

Engine Information:

Model:	QSL / QSL9 / QSL9-G7 NR3	Bore:	4.49 in. (114 mm)
Engine Nameplate HP:	464	Stroke:	5.69 in. (145 mm)
Type:	4 Cycle, In-line, 6 Cylinder Diesel	Displacement:	543 cu. in. (8.9 liters)
Aspiration:	Turbocharged and CAC	Compression Ratio:	17.8:1
Emission Control Device:		Exhaust Stack Diameter:	6 in.

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NOx + NMHC	CO	PM	NOx + NMHC	CO	PM
Test Results - Diesel Fuel (300-4000 ppm Sulfur)	2.8	1.7	0.07	3.8	2.3	0.10
EPA Emissions Limit	3.0	2.6	0.15	4.0	3.5	0.20
Test Results - CARB Diesel Fuel (<15 ppm Sulfur)	2.6	1.7	0.07	3.5	2.3	0.09
CARB Emissions Limit	3.0	2.6	0.15	4.0	3.5	0.20

The CARB emission values are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.
Test Methods: EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A for Constant Speed Engines (ref. ISO8178-4, D2)

Diesel Fuel Specifications: Cetane Number: 40-48. Reference: ASTM D975 No. 2-D.
Reference Conditions: Air Inlet Temperature: 25°C (77°F), Fuel Inlet Temperature: 40°C (104°F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.
Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Engine Performance Data

Cummins Inc

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

Power Generation

QSL9-G7

FR92889

Configuration	CPL Code	Revision
D563007GX03	**3301**	**29-Mar-2010**

Compression Ratio: **16.1:1**
Fuel System: **Bosch Electronic**
Emission Certification: **U.S. EPA Tier 3, CARB Tier 3, EU Stage IIIA**

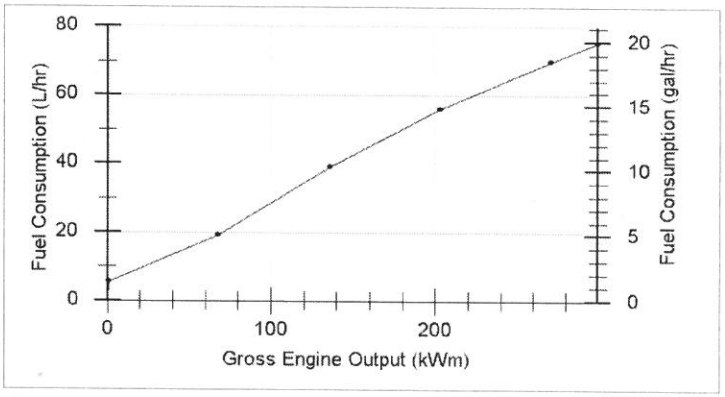
Displacement: **543 in3 (8.9 L)**
Aspiration: **Turbocharged and Charge Air Cooled**

Engine Ratings:

Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	bhp	kWm	bhp	kWm	bhp	kWm
1,500	402	300	363	271	305	227
1,800	464	346	419	312	353	263

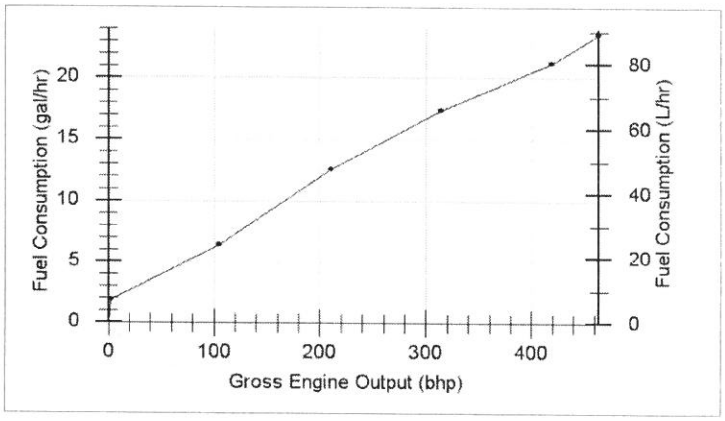
Engine Fuel Consumption @1,500 RPM

Output Power			Fuel Consumption			
%	bhp	kWm	lb/ bhp-h	kg/ kWm-h	gal/hr	l/hr
Standby Power						
100	402	300	0.352	0.214	19.9	75
Prime Power						
100	363	271	0.362	0.220	18.5	70
75	272	203	0.387	0.235	14.8	56
50	182	136	0.402	0.245	10.3	39
25	91	68	0.392	0.238	5	19
Continuous Power						
100	305	227	0.384	0.234	16.5	62



Engine Fuel Consumption @1,800 RPM

Output Power			Fuel Consumption			
%	bhp	kWm	lb/ bhp-h	kg/ kWm-h	gal/hr	l/hr
Standby Power						
100	464	346	0.359	0.218	23.5	89
Prime Power						
100	419	312	0.359	0.218	21.2	80
75	314	234	0.393	0.239	17.4	66
50	210	157	0.427	0.260	12.6	48
25	105	78	0.429	0.261	6.4	24
Continuous Power						
100	353	263	0.387	0.235	19.3	73



Rating Type:

Data Subject to Change Without Notice

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations.**STANDBY POWER RATING:** Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating.Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency.**PRIME POWER RATING:** Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories:

UNLIMITED TIME RUNNING PRIME POWER: Prime Power is available for an unlimited number of hours per year in a variable load application.Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation.Total operating time at the 10% overload power shall not exceed 25 hours per year.**LIMITED TIME RUNNING PRIME POWER:** Limited Time Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment.Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation.Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating.
CONTINUOUS POWER RATING: Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

Reference AEB 10.47 for determining Electrical Output.
Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. Derates shown are based on 15 in H20 air intake restriction and 2 in Hg exhaust back pressure.

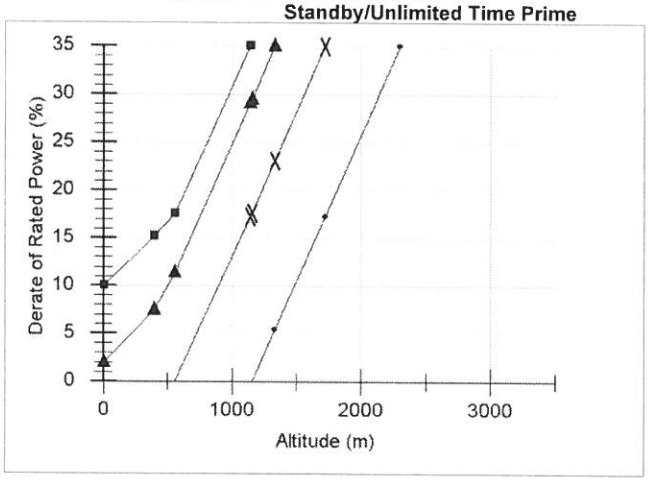
The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/U.S. gal). Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

Data Status:Preliminary-(Measured data)

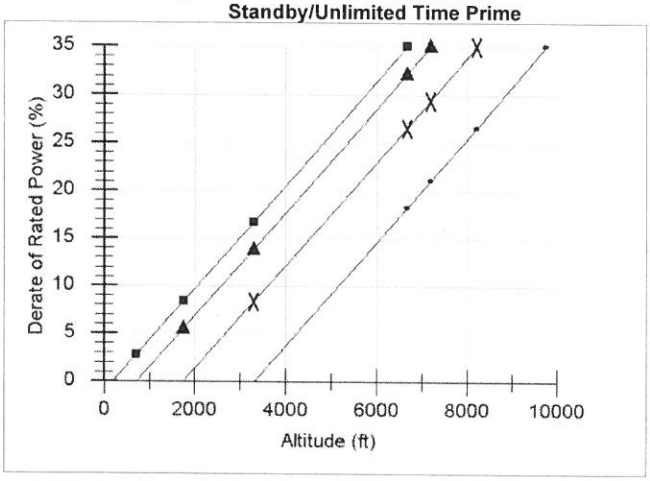
Data Tolerance: +/- 5 %
CHIEF ENGINEER: Cary J Marston

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

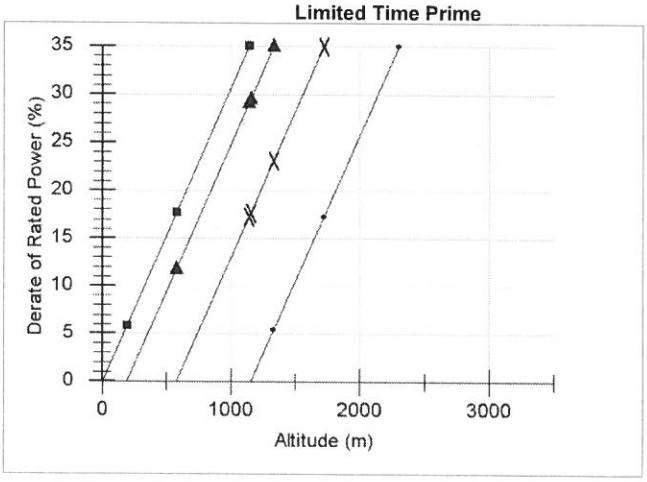
1,500 RPM Power Derate Curves
Standby/Unlimited Time Prime



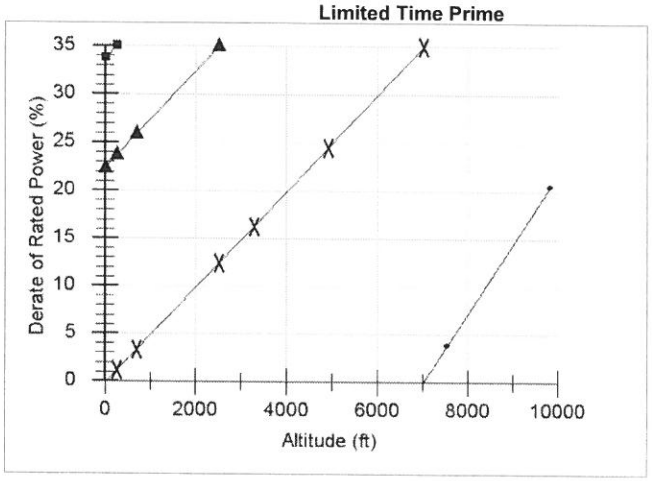
1,800 RPM Power Derate Curves
Standby/Unlimited Time Prime



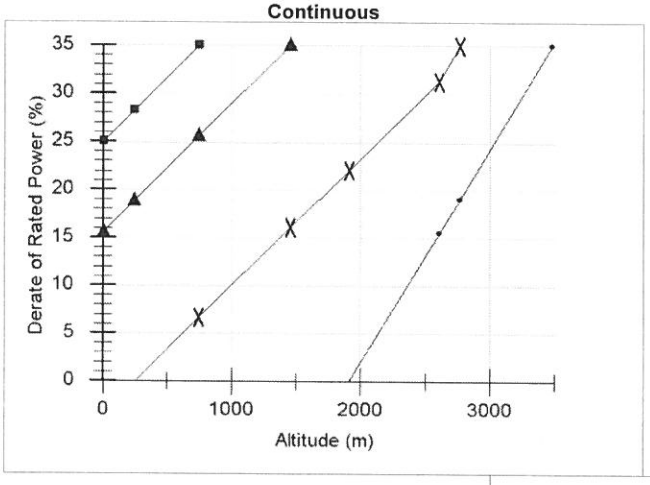
Limited Time Prime



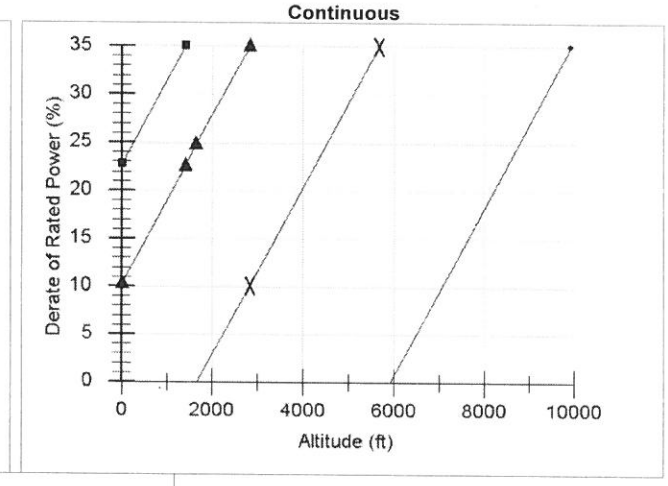
Limited Time Prime



Continuous



Continuous



Operation at Elevated Temperature and Altitude:
For Standby operation above these conditions, derate by an additional 9 % per 984 ft (300 m), and 16 % per 18 delta deg F (10 delta deg C)
For Prime operation above these conditions, derate by an additional 9 % per 984 ft (300 m), and 12 % per 18 delta deg F (10 delta deg C)
For Continuous operation above these conditions, derate by an additional 7 % per 1,000 ft (305 m), and 23 % per 18 delta deg F (10 delta deg C)

- 77 deg F (25 deg C)
- 104 deg F (40 deg C)
- 122 deg F (50 deg C)
- 131 deg F (55 deg C)

Operation at Elevated Temperature and Altitude:
For Standby operation above these conditions, derate by an additional 7 % per 1,000 ft (305 m), and 12 % per 18 delta deg F (10 delta deg C)
For Prime operation above these conditions, derate by an additional 7 % per 984 ft (300 m), and 19 % per 18 delta deg F (10 delta deg C)
For Continuous above these conditions, derate by an additional 9 % per 1,000 ft (305 m), and 25 % per 18 delta deg F (10 delta deg C)

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

General Engine Data

Installation Diagram Number		
Type	Four cycle; Inline; 6 Cylinder	
Aspiration	Turbocharged and Charge Air Cooled	
Bore x Stroke	4.49 x 5.69 in	114 x 145 mm
Displacement	543 in3	8.9 L
Compression Ratio	16.1:1	
Approximate engine weight (dry)	1,575 lbm	714 kg
Approximate engine weight (wet)	1,627 lbm	738 kg
Moment of Inertia of Rotating Components		
with FW 9878 Flywheel	16 in-lbf-sec**2	1.8 kg-m**2
with FW 9525 Flywheel	22 in-lbf-sec**2	2.5 kg-m**2
Center of Gravity		
from rear face of block	16.89 in	429 mm
above crankshaft centerline	8.35 in	212 mm
Maximum Static Loading at Rear Main Bearing	100 lbm	45 kg

Engine Mounting

Maximum Bending Moment at Rear Face of Block	1,000 lb-ft	1,356 N-m

Exhaust System

Maximum back pressure at Standby Power	3 in-Hg	10 kPa

Air Induction System

Maximum Intake Air Restriction		
with Dirty Filter Element	25 in H2O	6.2 kPa
with Normal Duty Air Cleaner and Clean Filter Element	15 in H2O	3.7 kPa

Cooling System

Coolant Capacity		
Engine	11.6 quarts	11 L
Minimum pressure cap rating at sea level	15 psi	103 kPa
Maximum static head of coolant above crankshaft centerline	60 ft	18.3 m
Maximum Coolant Temperature (Max Top Tank Temp) for Standby/Prime power	230 / 219 deg F	110 / 104 deg C
Thermostat (Modulating) Range	180 - 199 deg F	82 - 93 deg C
Jacket Water Circuit Requirements		
Maximum Coolant Friction Head External to Engine - 1,500/1,800 RPM	4 / 5 psi	27.6 / 34.5 kPa
Charge Air Cooler Requirements		
Maximum Intake Manifold Temperature Differential (Ambient to IMT) (IMTD) - 1,500/1,800 RPM	45 / 45 delta deg F	25 / 25 delta deg C
Maximum allowable pressure drop across charge air cooler and OEM CAC piping (IMPD) - 1,500/1,800 RPM	2.5 / 4 in-Hg	8 / 14 kPa
Maximum Intake Manifold Temperature for Engine Protection	200 deg F	93 deg C
Maximum Intake Manifold Temperature @ 77°F (25°C) ambient	122 deg F	50 deg C

Lubrication System

Oil Pressure		
@ Minimum low idle	15 psi	103 kPa
@ Governed speed	40 - 60 psi	275.8 - 413.7 kPa
Maximum Oil Temperature	250 deg F	121 deg C
Oil Capacity with OP 9339 Oil Pan: Low-High	7.9 - 5.3 gal	30 - 20 L
Total System Capacity (with Combo Filter)	9 gal	34 L

Fuel System

Type Injection System	Bosch Electronic	
Maximum fuel supply restriction at fuel pump inlet		
with clean fuel filter element(s) at maximum fuel flow	6 in-Hg	20.3 kPa
with dirty fuel filter element(s) at maximum fuel flow	10 in-Hg	34 kPa
Maximum Allowable Head on Injectors Return Line (Consisting of Friction Head and Static Head)	10 in-Hg	34 kPa
Maximum fuel inlet temperature	160 deg F	71 deg C
Maximum supply fuel flow	42 gal/hr	159 L/hr
Maximum return fuel flow	18 gal/hr	68 L/hr

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

Electrical System

	12 V	24 V
System voltage		
Minimum Recommended Battery Capacity		
cold soak at 10 deg C (50 deg F) and above		
cold soak at 0 to 10 deg C (32 to 50 deg F)	1,500 CCA	750 CCA
cold soak at -18 to 0 deg C (0 to 32 deg F)		
Maximum starting circuit resistance	0.001 Ohm	0.002 Ohm

Cold start capability

Unaided Cold Start		
Minimum cranking speed		150 RPM
Minimum ambient temperature for unaided cold start	10 deg F	-12.2 deg C
Breakaway torque at minimum unaided cold start temperature:	162 lb-ft	220 N-m
Aided Cold Start		
Cold starting aids available	Intake Manifold Heater, Block Heater	
Min Amb Temp for NFPA 110 Cold Start (90 deg F min coolant temp)	32 deg F	0 deg C

Performance Data

All data is based on:

- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
- Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
- ISO 3046, Part 1, Standard Reference Conditions of:

Barometric Pressure :	100 kPa (29.53 in Hg)	Air Temperature:	25 °C (77 °F)
Altitude:	110 m (361 ft)	Relative Humidity:	30%

Steady State Stability Band at any constant load (+/-)	0.25 %
Estimated Free Field Sound Pressure Level; Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); 1,500/1,800 RPM	112.7 / 110.3 dBa
Exhaust Noise at Rated 1 m Horizontally From Centerline of Exhaust Pipe Outlet Upwards at 45%; 1,500/1,800 RPM	113.6 / 109 dBa

		Standby Power		Prime Power	
Governed Engine Speed	RPM	1,800	1,500	1,800	1,500
Engine Idle Speed	RPM	700 - 900	700 - 900	700 - 900	700 - 900
Gross Engine PowerOutput	hp (kW)	464 (346)	402 (300)	419 (312)	363 (271)
Brake Mean EffectivePressure	psi (kPa)	378 (2,606)	393 (2,710)	341 (2,351)	355 (2,448)
Piston Speed	ft/min (m/s)	1,707 (8.7)	1,422 (7.2)	1,707 (8.7)	1,422 (7.2)
Friction Horsepower	hp (kW)	47 (35)	35 (26)	47 (35)	35 (26)
Engine Jacket Water Flow at Stated Friction Head external to Engine					
- 1 psi-1 psi FrictionHead	gpm (L/min)	72 (273)	60 (227)	72 (273)	60 (227)
- Maximum FrictionHead	gpm (L/min)	57 (216)	45 (170)	57 (216)	45 (170)
Engine Data					
Intake Air Flow	ft3/min (L/s)	898 (424)	730 (345)	867 (409)	723 (341)
Exhaust Gas Temp - DryStack	deg F (deg C)	977 (525)	971 (522)	919 (493)	948 (509)
Exhaust Gas Flow	ft3/min (L/s)	2,341 (1,105)	1,911 (902)	2,200 (1,038)	1,861 (878)
Air to Fuel ratio		23.0:1	22.3:1	25.0:1	23.8:1
Heat Rejection to Ambient	BTU/min (kW)	2,033 (36)	1,728 (30)	1,837 (32)	1,605 (28)
Heat Rejection to JacketCoolant	BTU/min (kW)	8,262 (145)	7,119 (125)	7,469 (131)	6,560 (115)
Heat Rejection to Exhaust	BTU/min (kW)	15,743 (277)	13,200 (232)	14,150 (249)	12,563 (221)
Heat Rejection to Fuel*	BTU/min (kW)	75 (1.3)	48 (0.8)	68 (1.2)	40 (0.7)
ATA CAC					
Heat Rejection toAftercooler	BTU/min (kW)	5,036 (89)	4,041 (71)	4,620 (81)	3,950 (69)
Charge Air Flow	lb/min (kg/min)	64 (29)	53 (24)	63 (28)	52 (24)
TurbochargerCompressor Outlet	in-Hg (kPa)	86 (290)	82 (278)	83 (279)	80 (270)
TurbochargerCompressor Outlet	deg F (deg C)	442 (228)	435 (224)	419 (215)	426 (219)

*This is the maxiumum heat rejection, not specified to the load listed.

End of Report

© 2010, Cummins Inc., All Rights Reserved
Cummins Confidential and Proprietary
Controlled copy is located on gce.cummins.com

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O - MONITORING, RECORDING, REPORTING, AND TESTING PLANS

Plan Type	Emission unit	Pollutant	Requirements	Frequency	Method of Measurement	Regulatory Reference
Monitoring, Recordkeeping	Compressor Engines	NO_X, CO, VOC	Performance test	Initial and every three years or 8,760 hours of operation	EPA Test Methods	NSPS JJJJ
Monitoring, Recordkeeping	Compressor Engines		Maintenance records	Each occurrence	N/A	NSPS JJJJ
Monitoring, Recordkeeping	Compressor Engine, VRU Engines		Hours of operation Amount of natural gas consumed	Monthly	N/A	
Monitoring	Enclosed Ground Flares, Blowdown Flare, Backup VDU		Conduct pilot presence check	Monthly	Thermocouple or equivalent	
Monitoring, Recordkeeping	Compressor	VOC	Change rod packing	Every 36 months or 26,000 hours of operation	N/A	NSPS OOOO
Monitoring, Recordkeeping	Storage Tanks	VOC	Monitor throughput of storage tank	Monthly	Records	
Recordkeeping	Dehydration Unit	HAP	Maintain benzene emissions below 0.9 megagrams/yr	Annual	GRI-GLYCalc with actual operating parameters	40 CFR 63 Subpart HH

ATTACHMENT P

Public Notice

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that CONE Midstream Partners, LP has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a modification to permit number R13-3207 for a Natural Gas Compressor Station (Shirley Compressor Station) located near the Town of Centerville, in Tyler County, West Virginia. The site latitude and longitude coordinates are: 39.41690 N, -80.84390 W.

The applicant estimates the potential increase to discharge the following Regulated Air Pollutants as a result of the change will be:

Particulate Matter (PM) = 1.24 tpy
Sulfur Dioxide (SO2) = 0.50 tpy
Volatile Organic Compounds (VOC) = 2.20 tpy
Carbon Monoxide (CO) = 7.79 tpy
Nitrogen Oxides (NOx) = 2.30 tpy
Hazardous Air Pollutants (HAPs) = -4.88 tpy
Carbon Dioxide Equivalents (CO_2e) = 20,710 tpy

The facility is currently in operation and is seeking to increase the current throughput for the existing dehydration unit and storage tanks, and install additional miscellaneous equipment. 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 XX day of July, 2015.

By: CONSOL Energy
Patrick Flynn
1000 CONSOL Energy Drive
Canonsburg, PA 15317