global environmental solutions

Stone Energy Corporation

Martin Well Pad

New Facility

New Martinsville, West Virginia

Rule 13 Permit Application

April 2015

Martin Well Pad Rule 13 Permit Application

Prepared for:

Stone Energy Corporation
6000 Hampton Center, Suite D
Morgantown, West Virginia 26505

This document has been prepared by SLR International Corporation. The material and data in this permit application were prepared under the supervision and direction of the undersigned.

Ethan Saturday, E.I.
Staff Engineer

Jesse Hanshaw, P.E.
Principal Engineer

CONTENTS

ATTACHMENTS

Notes:

ATTACHMENT Q - No information contained within this application is claimed confidential

ATTACHMENT R - No delegation of authority

ATTACHMENT S - Not a Title V Permit Revision

APPLICATION FOR PERMIT

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

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):*
Stone Energy Corporation

2. Federal Employer ID No. ***(FEIN):***
721235413

3. Name of facility *(if different from above):*
Martin Well Pad

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

5A. Applicant's mailing address:
1300 Fort Pierpont, Suite 201
Morgantown WV, 26508

5B. Facility's present physical address:
1.75 miles off route 7 near New Martinsville, WV

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

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

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

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

- If **YES,** please explain: **The applicant leases the site.**
- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): **Natural Gas Well Pad**

10. North American Industry Classification System **(NAICS)** code for the facility:
211111

11A. DAQ Plant ID No. (for existing facilities only):
New Facility

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

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

12A.

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

From the intersection of Rt. 7 and Rt. 2 southeast of New Martinsville, travel approximately 8.5 miles east on Rt. 7. The access road for the facility is located on the left. Go approximately 0.5 miles to facility.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
N/A	New Martinsville	Wetzel
12.E. UTM Northing (KM): 4384.807	12F. UTM Easting (KM): 520.077	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
This facility will have 2 (104.7hp) electric generators, 2 (225hp) flash gas compressors, 2 (118hp) vapor recovery units, 2 (9.2 MMBtu/hr) vapor combustors, 10 (1 MMBtu/hr) line heaters, and 6 – 400 bbl storage vessels.

14A. Provide the date of anticipated installation or change: **07/15/2015** – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen:	14B. Date of anticipated Start-Up if a permit is granted: **07/15/2015**

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 Year 52

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

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

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

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

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

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

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

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

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

☒ General Emission Unit, specify: **Natural Gas Generators, Compressor Engines, Line Heaters**

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

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

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

☒ Other Collectors, specify NSCR Catalyst on RICE units

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

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

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE _____ *(Please use blue ink)* DATE: 4/16/15 *(Please use blue ink)*

35B. Printed name of signee: Mr. Richard L. Toothman Jr.		35C. Title: Sr. Vice President Appalacia
35D. E-mail: ToothmanRL@StoneEnergy.com	36E. Phone: 304-225-1600	36F. FAX
36A. Printed name of contact person (if different from above): Jesse Hanshaw		36B. Title: Consultant
36C. E-mail: jhanshaw@slrconsulting.com	36D. Phone: 304-545-8563	36E. FAX: 681-205-8969

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.***

ATTACHMENT A

BUSINESS CERTIFICATE

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

RV

State of West Virginia

Certificate

I, Betty Ireland, Secretary of State of the State of West Virginia, hereby certify that

STONE ENERGY CORPORATION

Control Number: 97941

a corporation formed under the laws of Delaware

has filed its "Application for Certificate of Authority" to transact business in West Virginia as required by the provisions of the West Virginia Code. I hereby declare the organization to be registered as a foreign corporation from its effective date of November 2, 2007

Therefore, I issue this

CERTIFICATE OF AUTHORITY

to the corporation authorizing it to transact business in West Virginia

Given under my hand and the Great Seal of the State of West Virginia on this day of November 2, 2007

Betty Ireland

Secretary of State

ATTACHMENT B

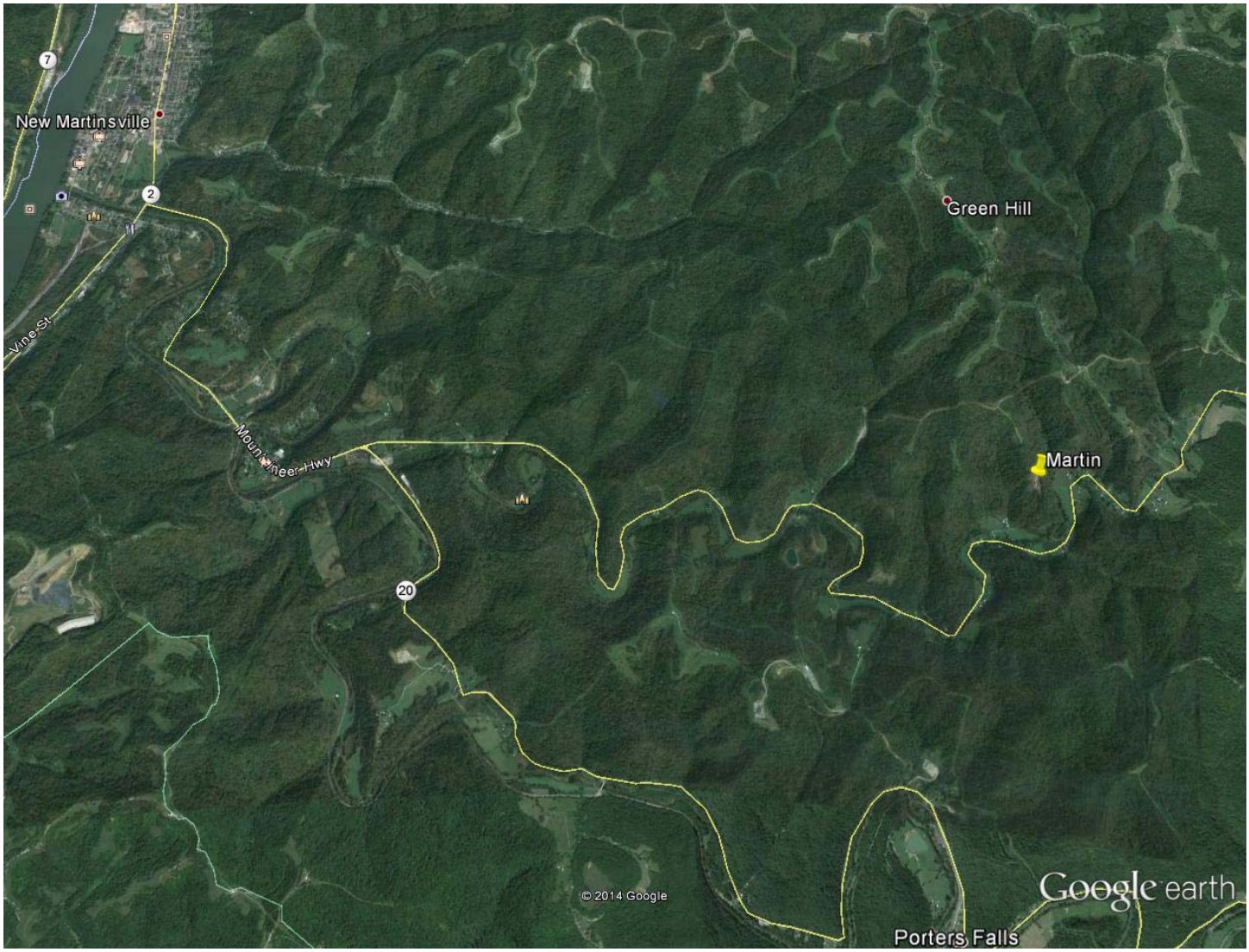
MAP

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015



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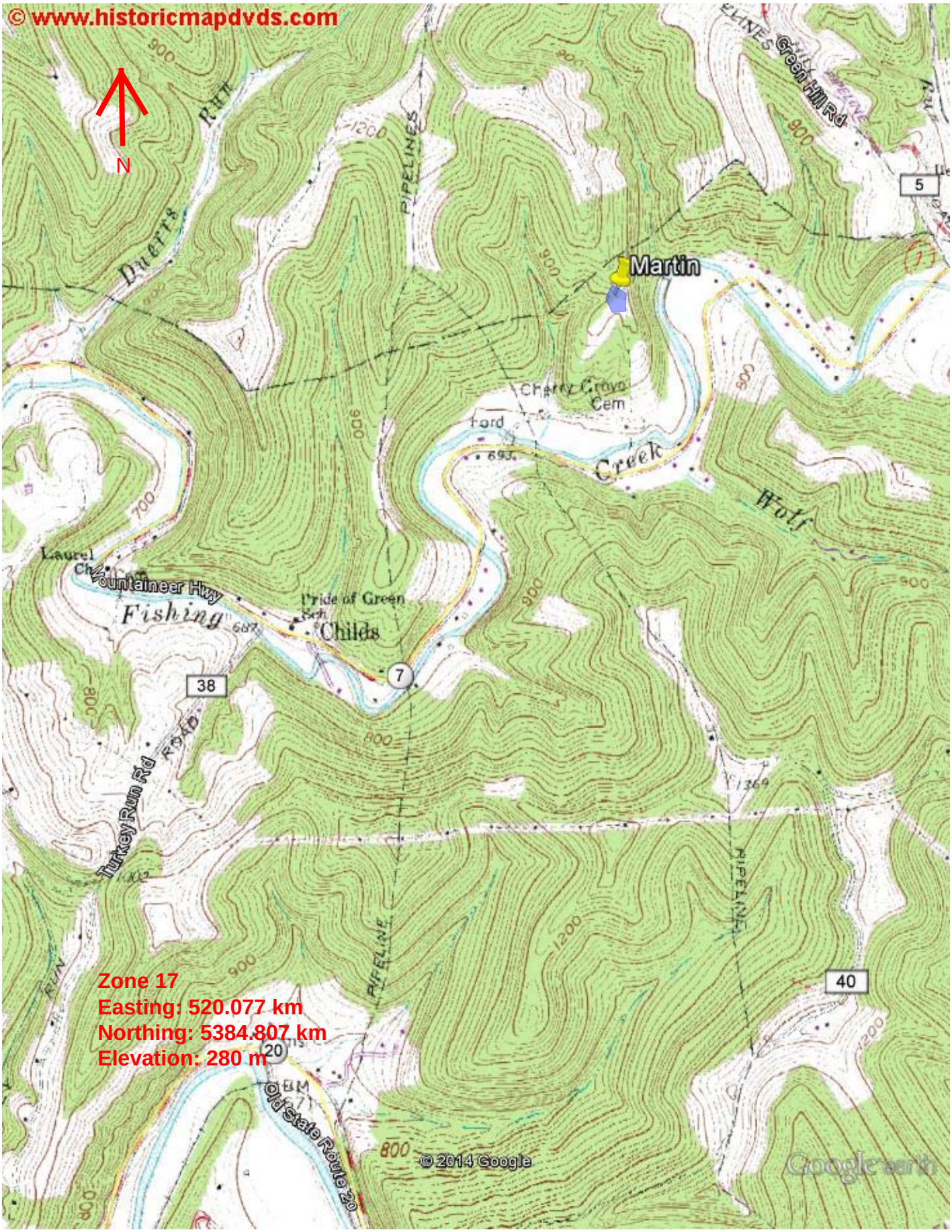
km 4



Google earth

feet 5000

km 1

ATTACHMENT C

INSTALLATION AND START-UP

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

INSTALLATION AND STARTUP SCHEDULE

Stone Energy is preparing this facility for an anticipated initial startup date of July 15, 2015.

ATTACHMENT D

REGULATORY DISCUSSION

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

REGULATORY DISCUSSION

APPLICABLE REGULATIONS

This facility is subject to the following applicable rules and regulations:

Federal and State:

45 CSR 2 – Particulate Matter Standards from Combustion of Fuel in Indirect Heat Exchangers

The indirect heat exchangers consisting of the line heaters are subject to the visible emission standard of §45-2-3 as follows:

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

However, in accordance with the exemptions defined with §45-2-11 these sources have limited requirements as follows:

11.1. Any fuel burning unit(s) having a heat input under ten (10) million B.T.U.'s per hour will be exempt from sections 4, 5, 6, 8 and 9. However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

45 CSR 6 - Open Burning Prohibited

This state rule is geared towards reducing particulate matter emissions from the combustion of refuse and is specific to burning solid waste such as trash as well as combustion of waste gas in flares. The rule sets PM limits and establishes a 20% visible emission limit, both of which shouldn't be any problem for the gas fired flare to meet.

The weight rate of waste gas going to the flare is estimated to be 428.9 lb/hr based on the source's flash gas analysis. Therefore, the corresponding Rule 6 PM limit would be 1.17 lb/hr PM. [E(lb/hr) = 5.43 * 0.2145] When using emission factors for flare combustion devices presented in AP-42 Chapter 13 it specifies that gas combustion sources should not have PM emissions and therefore no factor is given.

45 CSR 10 - Emission of Sulfur Oxides

The well pad facility evaluated within this application utilizes fuel burning units, but they are all less than the exemption threshold of 10 MMBtu/hr as stated in 45CSR§10-10.1 as follows:
10.1 Any fuel burning units having a design heat input under ten (10) million BTU's per hour will be exempt from section 3 and sections 6 through 8. However, failure to attain

acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The natural gas fueled generators are considered new units subject to this NSPS. These units were purchased as certified prime units. Therefore, they are subject to 40 CFR §60.4233(d) and thus the emissions limits of 40 CFR §1048.101(c). Each of these generators has been certified by EPA for their appropriate intended use.

Additionally, the four natural gas compressor engines are considered new units subject to the SI NSPS. These units are greater than 100 Hp so they will be subject to Table 1 emission limitations and will demonstrate compliance through initial and subsequent emission testing.

40 CFR 60 Subpart OOOO – Gas Wells NSPS

The Gas wells located on the Martin pad will have completed their flow back process by the time the surface equipment permitted here is proposed to come online February 15, 2015. Therefore they are required to follow the standards of flowback dictated within §60.5375 (a)(3) and (4) for sources that commence construction after August 23, 2011.

40 CFR 60 Subpart OOOO - Storage Vessel NSPS

The storage vessels located at the Martin pad have been demonstrated to have PTEs < 6tpy with the use of permitted VRU recycle and backup control combustors. Therefore, are not considered affected sources under this regulation.

40 CFR 60 Subpart OOOO – Pneumatic Control Valve NSPS

The site was evaluated and found to contain only intermittent venting pneumatic control valves rated at less than 6 scf/hr. Therefore the Martin pad is not proposing to install or operate any affected sources defined by this NSPS for control valves. However, the source will keep records in accordance with this Regulation to justify associated vent rates for each pneumatic valve utilized at this source.

40 CFR 61 - This facility is subject to the asbestos inspection and notification requirements. However, no asbestos is affected by the proposed changes.

40 CFR 63 Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines

The Engines were all manufactured after 06/12/2006; therefore, the requirements of this regulation, for new SI engines are to comply with NSPS JJJJ as cited above.

45 CSR 4 - No Objectionable Odors

45 CSR 11 - Standby Plans for Emergency Episodes.

45 CSR 13 - Permits for Construction, Modification, Relocation, and Operation of Stationary Source of Air Pollutants

The company has applied to receive coverage of a minor source NSR Rule 13 permit for the construction of the Martin Well Pad.

WV Code § 22-5-4 (a) (14)

The Secretary can request any pertinent information such as annual emission inventory reporting. This station is required to submit an annual air emission inventory.

45 CSR 17 - Fugitive Particulate Emissions

NON-APPLICABILITY DETERMINATIONS

The following requirements have been determined "not applicable" due to the following:

45 CSR 27 - To Prevent and Control the Emissions of Toxic Air Pollutants

This rule is not applicable because natural gas is included as a petroleum product and contains less than 5% benzene by weight. 45CSR § 27-2.4 exempts equipment "used in the production and distribution of petroleum products providing that such equipment does not produce or contact materials containing more than 5% benzene by weight."

45 CSR 30 – Requirements for Operating Permits – Title V of the Clean Air Act

This facility does not meet the emission threshold to trigger a 45 CSR 30 Title V Operating Permit nor is it subject to any Federal Standards that trigger the need for a Title V Permit.

40 CFR 63 Subpart HH - National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities

There is no dehydration unit at this site.

40 CFR 63 HHH - National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities

This subpart is related to Natural Gas Transmission Facilities which are major sources of HAPs. This federal regulation is not applicable since this facility is neither a transmission facility nor is it a major source.

40 CFR 60 Subpart KKK - Natural Gas Processing Plant NSPS

This subpart is not applicable because this station is not a processing site engaged in extracting natural gas liquids by fractionation from natural gas.

> *Natural gas processing plant (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.*

40 CFR 60 Subpart K, Ka, Kb - Storage Vessel NSPS

The two produced water and condensate storage tanks are exempt under 60.110b(d)(4) in accordance with the following: Vessels with a design capacity less than or equal to 1,589.874 m^3 (approx 420,000 gallons) used for petroleum or condensate stored, processed, or treated prior to custody transfer.

40 CFR 63 Subpart DDDDD - Boilers & Process Heaters Located at Major Sources of HAPs

This subpart is not applicable because this facility is not a major source of HAPs.

40 CFR 63 Subpart JJJJJJ - Boilers & Process Heaters Located at Area Sources of HAPs

This subpart is not applicable because the process heaters at this facility use natural gas fuel, which is exempt from regulation under this area source GACT standard.

40 CFR 82 Subpart F - Ozone Depleting Substances

The purpose of this subpart is to reduce emissions of class I and class II refrigerants and their substitutes. The facility does not utilize class I and class II refrigerants and their substitutes.

40 CFR 98 Subpart C - General Stationary Fuel Combustion Sources

This facility has stationary fuel combustion sources that combust gaseous fuel for the purpose of providing electrical energy for industrial use. However, this facility does not have an aggregate maximum heat input capacity of the stationary combustion units greater than 30 MMBtu/hr. Also, the facility will emit less than 25,000 metric tons CO_2e per year.

Aggregation Discussion –

The Martin site is operated solely by Stone Energy. This well pad facility has the ability to transfer its products via pipeline to midstream compression companies like OVM Williams, of which is located on non contiguous or adjacent sites over a mile away. Additionally, these sources are not under common control nor is there any support and/or dependency relationship between the midstream companies and Stone Energy.

Stone Energy does operate other well pads in the area the closest being the Maury, which has a straight line distance of 0.95 miles away. It was also noted the Maury and all other well pads in the area are located on non-adjacent tracts of land.

ATTACHMENT E

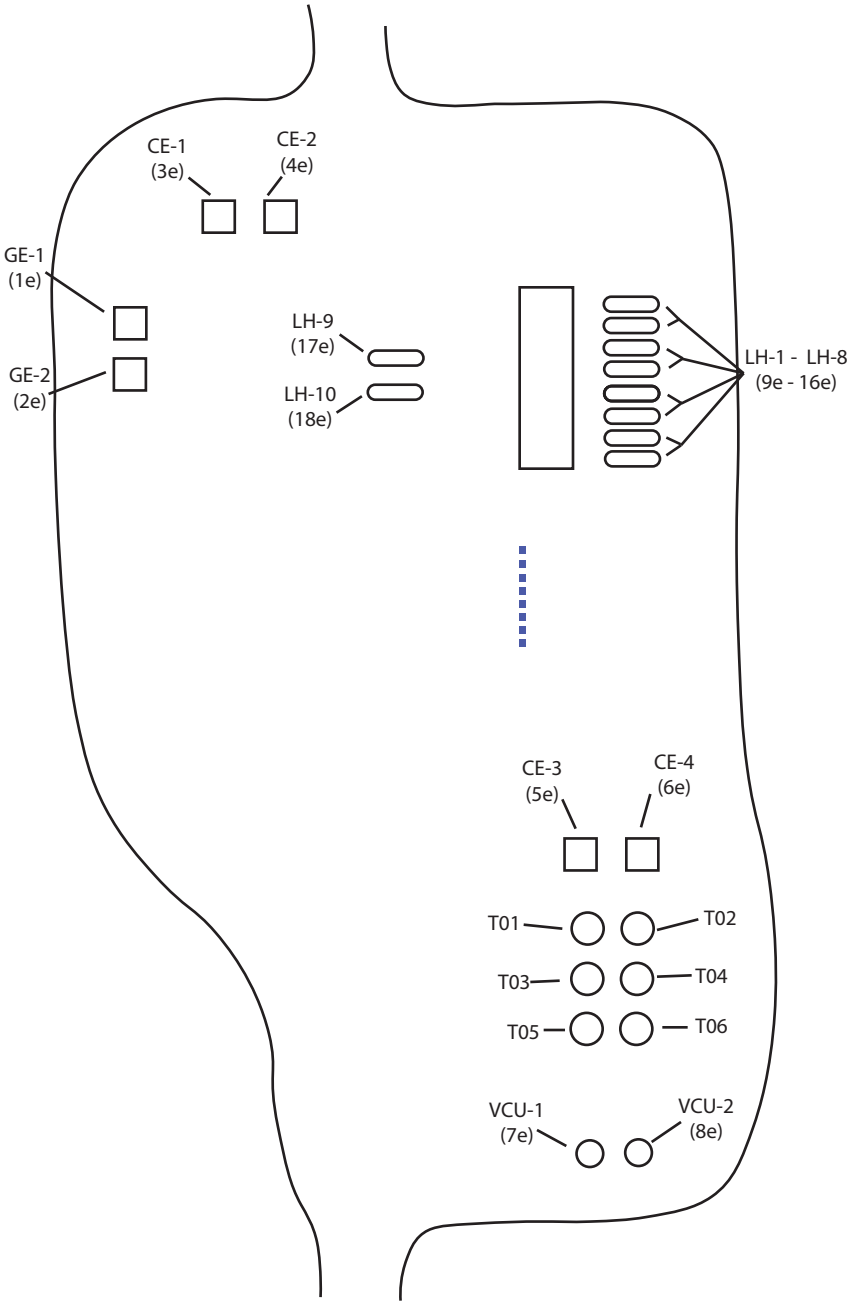
PLOT PLAN

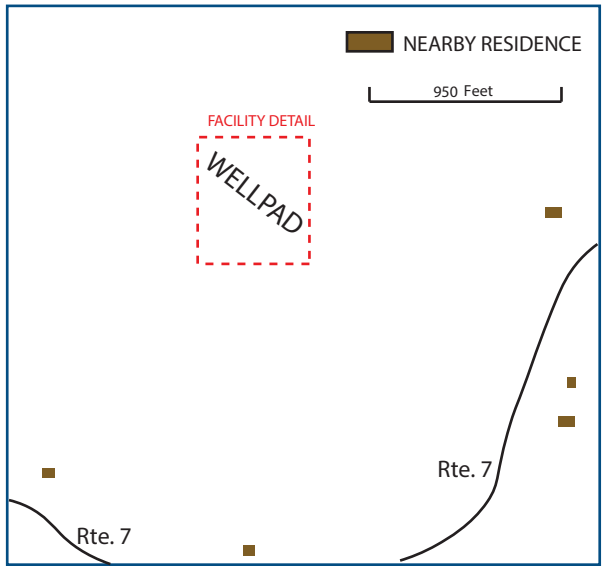
Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015





ELEVATION: 925 ft

REFERENCE CORDINATES (LAT/LONG):
39.612778°/-80.766111°

LEGEND

- BUILDING
- NATURAL GAS WELL
- U UNPAVED
- P PAVED

N

0 90 180 270 Feet

Report
RULE 13 PERMIT APPLICATION

Drawing
PLOT PLAN

Date November 3, 2014 | Proj No. 116.01038.00014 | Fig. No. 1

STONE ENERGY CORPORATION
MARTIN WELL PAD
NEW MARTINSVILLE, WEST VIRGINA

SLR

ATTACHMENT F

PROCESS FLOW DIAGRAM

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
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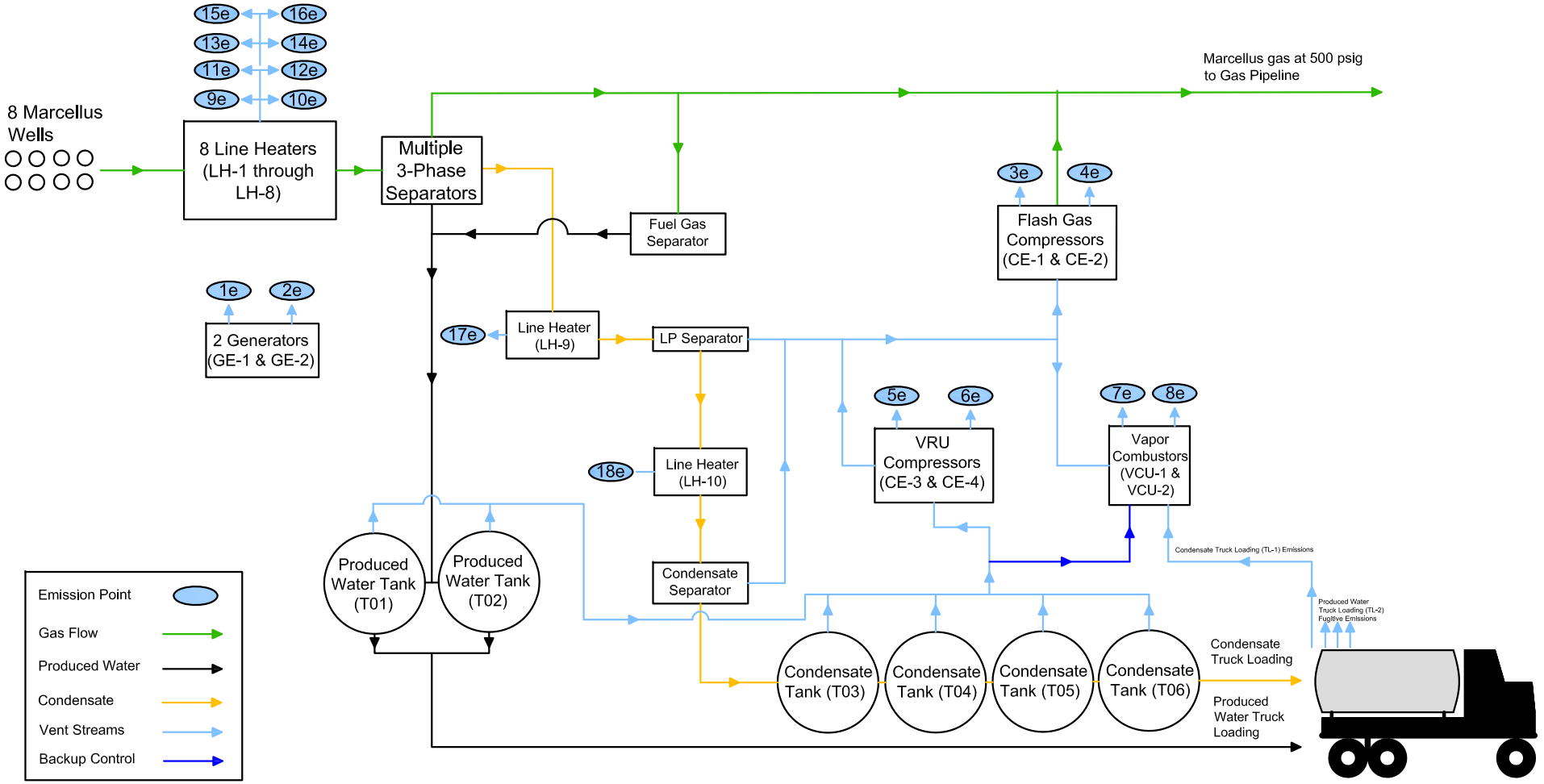

Process Flow Diagram
Stone Energy Corporation
Martin Gas Facility
New Martinsville, West Virginia

ATTACHMENT G

PROCESS DESCRIPTION

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

PROCESS DESCRIPTION

Stone Energy is applying for registration under Regulation 13 permit for the construction and operation of the Martin natural gas well pad.

DESCRIPTION OF PROCESS

Natural gas, condensate and produced water will be collected from eight horizontal wells located onsite producing from the Marcellus formation. The wells will have an anticipated flowing tubing pressure of 500 psig and will flow the gas/liquids mixture through one of eight 1.0 MMBtu/hr heaters (LH-1 – LH-8). The gas/liquid mixture from all heaters will then flow though 3-phase separators.

The well stream will require heating due to pressure reductions experienced by choking the well stream down to the sales line pressure. In the separator, the well stream is divided into sales gas and its associated liquids (produced water and condensate). The gas will leave the separators and go directly into the sales gas line. The produced water dropped out by the 3 phase separators is routed to one of two 400 barrel (bbl) tanks (T01 & T02). The condensate is further conditioned through a series of two 1.0 MMBtu/hr indirect condensate heaters (LH-9 & LH-10) and two stabilization separators prior to being routed to one of four 400 BBL condensate holding tanks (T03-T06). The vapor that is removed in the stabilization separators is termed flash gas and is recycled back into the gas stream by passing through one of two 225 hp flash gas compressors (CE-1 & CE-2).

The emissions from the storage tanks are directed to two vapor recovery unit (VRU) compressors (CE-3 & CE-4) under normal operations. In the event that the flash gas compressors or VRU compressors are not operable, the flash gas and tank vapors would be routed to the vapor combustor units as needed. The produced water and condensate are both hauled away by 100 BBL tank trucks. The displacement emissions from the condensate tank trucks generated during truck loading are directed to the vapor combustion units (VCU-1 & VCU-2).

There are also two 104.7 hp generators (GE-1 & GE-2) on site that provide prime power to the site's water and/or condensate pumps. They have been certified by the EPA for prime power generation.

ATTACHMENT H

SAFETY DATA SHEETS (SDS)

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Processed Natural Gas
Product Code: None
Synonyms: Dry Gas
Generic Name: Natural Gas
Chemical Family: Paraffin hydrocarbon

Responsible Party: Unocal Corporation
Union Oil Company of California
14141 Southwest Freeway
Sugar Land, Texas
77478

For further information contact MSDS Coordinator
8am - 4pm Central Time, Mon - Fri: 281-287-5310

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:

For Chemical Emergencies:
Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800)424-9300
Others: (703)527-3887(collect)

For Health Emergencies:
California Poison
Control System
(800)356-3129

Health Hazards: Use with adequate ventilation.

Physical Hazards: Flammable gas. Can cause flash fire. Gas displaces oxygen available for breathing. Keep away from heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment). Do not enter storage areas or confined space unless adequately ventilated.

< Physical Form: Gas
< Appearance: Colorless
< Odor: Odorless in the absence of H2S or mercaptans

NFPA HAZARD CLASS: Health: 1 (Slight)
Flammability: 4 (Extreme)
Reactivity: 0 (Least)

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% Weight	EXPOSURE GUIDELINE		
		Limits	Agency	Type
Methane CAS# 74-82-8	98	1000 ppm	MSHA	TWA
Carbon Dioxide CAS# 124-38-9	0-5	5000 ppm	ACGIH	TWA
		30000 ppm	ACGIH	STEL
		5000 ppm	OSHA	TWA
		5000 ppm	MSHA	TWA
		5000 ppm	Cal.OSHA	TWA
		30000 ppm	Cal.OSHA	STEL
Nitrogen CAS# 7727-37-9	0-5	1000 ppm	MSHA	TWA
Ethane CAS# 74-84-0	1	1000 ppm	MSHA	TWA

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Not expected to be an eye irritant.

Skin: Skin contact is unlikely. Skin absorption is unlikely.

Inhalation (Breathing): Asphyxiant. High concentrations in confined spaces may limit oxygen available for breathing.

Ingestion (Swallowing): This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Signs and Symptoms: Light hydrocarbon gases are simple asphyxiants which, at high enough concentrations, can reduce the amount of oxygen available for breathing. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion,

decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped. Continued exposure can lead to hypoxia (inadequate oxygen), cyanosis (bluish discoloration of the skin), numbness of the extremities, unconsciousness and death. High concentrations of carbon dioxide can increase heart rate and blood pressure.

Cancer: No data available.

Target Organs: No data available.

Developmental: Limited data - See Other Comments, below.

Other Comments: High concentrations may reduce the amount of oxygen available for breathing, especially in confined spaces. Hypoxia (inadequate oxygen) and respiratory acidosis (increased carbon dioxide in blood), during pregnancy may have adverse effects on the developing fetus. Exposure during pregnancy to high concentrations of carbon monoxide, which is produced during the combustion of hydrocarbon gases, can also cause harm to the developing fetus.

Pre-Existing Medical Conditions: None known.

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: First aid is not normally required. However, it is good practice to wash any chemical from the skin.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): This material is a gas under normal atmospheric conditions and ingestion is unlikely.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash Point: Not applicable (gas)
OSHA Flammability Class: Flammable gas
LEL / UEL: No data
Autoignition Temperature: 800-1000°F

Unusual Fire & Explosion Hazards: This material is flammable and may be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback, or explode. May create vapor/air explosion hazard indoors, outdoors, or in sewers. If container is not properly cooled, it can rupture in the heat of a fire. Closed containers exposed t extreme heat can rupture due to pressure buildup.

Extinguishing Media: Dry chemical or carbon dioxide is recommended. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. If this cannot be done, allow fire to burn. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Stay away from ends of container. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons down wind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with

minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8). Notify fire authorities and appropriate federal, state, and local agencies. Water spray may be useful in minimizing or dispersing vapors (see Section 5).

7. HANDLING AND STORAGE

Handling: The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Section 2 and 8). Use good personal hygiene practice.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: Wear a positive pressure air supplied respirator in oxygen deficient environments (oxygen content <19.5%). A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: Not required based on the hazards of the material. However, it is considered good practice to wear gloves when handling chemicals.

Eye/Face: While contact with this material is not expected to cause irritation, the use of approved eye protection to safeguard against potential eye contact is considered good practice.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed. Self-contained respirators should be available for non-routine and emergency situations.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Flash Point: Not applicable (gas)
Flammable/Explosive Limits (%): No data
Autoignition Temperature: 800-1000°F
Appearance: Colorless
Physical State: Gas
Odor: Odorless in the absence of H2S or mercaptans
Vapor Pressure (mm Hg): No data
Vapor Density (air=1): <1
Boiling Point: -259°F
Freezing/Melting Point: No data
Solubility in Water: Slight
Specific Gravity: 0.30+ (Air=1)
Percent Volatile: 100 vol.%
Evaporation Rate (nBuAc=1): N/A (Gas)

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions of storage and handling.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 & 7).

Incompatible Materials: Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield carbon dioxide and carbon monoxide.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

No definitive information available on carcinogenicity, mutagenicity, target organs or developmental toxicity.

12. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material is subject to the land disposal restriction in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name / Technical Name: Hydrocarbon Gas, Liquified N.O.S. (Methane)
Hazard Class or Division: 2.1
ID #: UN1965

14. REGULATORY INFORMATION

This material contains the following chemicals subject to the reporting requirements of **SARA 313** and 40 CFR 372:

--None--

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or

other reproductive harm, and are subject to the requirements of **California Proposition 65** (CA Health & Safety Code Section 25249.5):

--None Known--

This material has not been identified as a carcinogen by NTP, IARC, or OSHA.

EPA (CERCLA) Reportable Quantity: --None--

15. DOCUMENTARY INFORMATION

Issue Date: 03/18/03
Previous Issue Date: 11/29/99
Product Code: None
Previous Product Code: None

16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. **HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.** This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Natural Gas Condensate, Sweet or Sour
Synonyms	Sweet Condensate, Sour Condensate, Lease Condensate (Sweet or Sour), Field Condensate (Sweet or Sour), Casing Head Gasoline (Sweet or Sour), Natural Gas Liquids (Sweet or Sour), Gas Drips (Sweet or Sour), Natural Gas Condensate C2-C8 (Sweet or Sour)
Chemical Family	Petroleum Hydrocarbon
Intended Use	Feedstock
MARPOL Annex I Category	Naphthas and Condensates
Supplier	J.P. Morgan Ventures Energy Corp. 383 Madison Avenue, 10th Floor New York, NY 10017 JP Morgan Commodities Canada Corp. Suite 600, Vintage Towers II, 326 11th Avenue SW Calgary, Alberta T2R 0C5
24 Hour Emergency Numbers	**Chemtrec:** 800-424-9300 **JP Morgan Technical Information:** 212-834-5788 (USA), 403-532-2000 (Canada) **California Poison Control:** 800-356-3219

2. HAZARDS IDENTIFICATION

GHS Classification

H224	Flammable liquid – Category 1
H304	May be fatal if swallowed and enters airways – Category 1
H319	Eye damage/irritation – Category 2
H335	May cause respiratory irritation – Category 3
H336	Specific target organ toxicity (single exposure) – Category 3
H350	Carcinogenicity – Category 1B
H411	Hazardous to the aquatic environment, chronic toxicity – Category 2

Hazards Not Otherwise Classified

May contain or release poisonous hydrogen sulfide gas

Label Elements

Signal Words Danger

GHS Hazard Statements

H224	Extremely flammable liquid and vapor
H350	May cause cancer
H304	May be fatal if swallowed and enters airways
H319	Causes serious eye irritation
H336	May cause drowsiness or dizziness
H315	Causes skin irritation
H331	Toxic if inhaled
H411	Toxic to aquatic life with long lasting effects

GHS Precautionary Statements

P201	Obtain special instructions before use
P202	Do not handle until all safety precautions have been read and understood
P210	Keep away from heat/sparks/open flames/hot surfaces – no smoking
P233	Keep container tightly closed
P240	Ground/bond container and receiving equipment

2. HAZARDS IDENTIFICATION

P241	Use explosion-proof electrical/ventilating/lighting equipment
P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge
P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P264	Wash thoroughly after handling
P271	Use only outdoors or in a well-ventilated area
P273	Avoid release to the environment
P280	Wear protective gloves / protective clothing / eye protection / face protection
P361, P352, P362	IF ON SKIN OR HAIR: Remove/take off immediately all contaminated clothing. Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse.
P305,P351,P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P313	If eye irritation persists, get medical advice/attention
P301,P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P331	Do NOT induce vomiting
P304,P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P370,P378	In case of fire: Use dry chemical, carbon dioxide, or foam for extinction
P391	Collect spillage
P405	Store locked up
P403,P233, P235	Store in a well-ventilated place. Keep container tightly closed, Keep cool
P501	Dispose of contents/container to approved facility

3. COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS Registration No.	Concentration (%)
Natural Gas Condensate C2-C8	68919-39-1	100
Benzene	71-43-2	0.1 - 5
n-Butane	106-97-8	5 - 15
Cyclohexane	110-82-7	< 1 - 5
Ethyl Benzene	100-41-4	< 1 - 3
n-Heptane	142-82-5	10 - 20
n-Hexane	110-54-3	2 - 50
Hexane (all isomers)	mixture	2 - 50
Hydrogen Sulfide	7783-06-4	< 0.1 - 20
Methylcyclohexane	108-87-2	5 - 10
n-Nonane	111-84-2	5 - 15
n-Octane	111-65-9	10 - 20
n-Pentane	109-66-0	5 - 20
n-Propane	74-98-6	<1 - 8
Toluene	108-88-3	< 1 - 15
1,2,4 Trimethyl Benzene	95-63-6	< 1 – 4
Xylene, all isomers	1330-20-7	< 1 – 12

4. FIRST AID MEASURES

Inhalation (Breathing) Move the exposed person to fresh air. If not breathing, clear airways and give artificial respiration. If breathing is difficult, humidified oxygen should be administered by qualified personnel. Seek medical attention if breathing difficulties continue.

4. FIRST AID MEASURES

Eye Contact

Flush eyes with water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of the eye. Remove contact lenses, if worn, after initial flushing. Do not use eye ointment. Seek medical attention.

Skin Contact

Remove contaminated shoes and clothing, and flush affected areas with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists. Launder or discard contaminated clothing.

Ingestion (Swallowing)

Aspiration hazard. Do not induce vomiting or give anything by mouth because the material can enter the lungs and cause severe lung damage. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention
.

Most Important Symptoms and Effects

Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue
Delayed: Dry skin and possible irritation with repeated or prolonged exposure

Potential Acute Health Effects

Inhalation: Breathing high concentrations may be harmful. Mist or vapor can irritate the throat and lungs. Breathing this material may cause central nervous system depression with symptoms including nausea, headache, dizziness, fatigue, drowsiness or unconsciousness. This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. Hydrogen sulfide and other hazardous vapors may evolve and collect in the headspace of storage tanks or other enclosed vessels. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (light sensitivity) and pulmonary edema (fluid accumulation in lungs). Severe exposures can result in nausea, vomiting, muscle weakness or convulsions, respiratory failure and death.
Eye Contact: This product can cause eye irritation from short-term contact with liquid, mists or vapors. Symptoms include stinging, watering, redness and swelling. Effects may be more serious with repeated or prolonged contact. Hydrogen sulfide vapors may cause moderate to severe eye irritation and photophobia (light sensitivity).
Skin Contact: This product is a skin irritant. Contact may cause redness, itching, burning and skin damage.
Ingestion: Ingestion may result in nausea, vomiting, diarrhea and restlessness. Aspiration (inadvertent suction) of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema or hemorrhage and even death.

Potential Chronic Health Effects

Chronic effects of overexposure are similar to acute effects including central nervous system (CNS) effects and CNS depression. Effects may also include irritation of the digestive tract, irritation of the respiratory tract, nausea, vomiting and skin dermatitis.

Notes to Physician

This material may contain or liberate hydrogen sulfide. In high doses, hydrogen sulfide may produce pulmonary edema and respiratory depression or paralysis. The first priority in treatment should be providing adequate ventilation and administering 100% oxygen. If unresponsive to supportive care, nitrites (amyl nitrite by inhalation or sodium nitrite by I.V.) may be an effective antidote, if delivered within the first few minutes of exposure. For adults, the dose is 10 ml of a 3$NaNO_2$ solution (0.5 gm $NaNO_2$ in 15 ml water) IV over 2 to 4 minutes. The dosage should be adjusted in children or in the

4. FIRST AID MEASURES

presence of anemia and methemoglobin levels, arterial blood gases, and electrolyties should be monitored.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis. Inhalation overexposure can produce toxic effects, monitor for respiratory distress. If cough or breathing difficulties develop, evaluate for upper respiratory tract inflammation, bronchitis and pneumonitis.

Skin contact may aggravate an existing dermatitis. High pressure injection injuries may cause necrosis of underlying tissue regardless of superficial appearance.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

5. FIRE FIGHTING MEASURES

Flammability Classification
OSHA Classification (29 CFR 1910.1200): Flammable Liquid
NFPA Class-1B Flammable Liquid
NFPA Ratings: Health: 3, Flammability: 4, Reactivity: 0

Flash Point
< -46^{o}C, < -50^{o}F (ASTM D-56)

Flammable Limits
Lower Limit: < 1%
Upper Limit: 10%

Autoignition Temperature
232^{o}C, 450^{o}F

Combustion Products
Highly dependent on combustion conditions. Fume, smoke, carbon monoxide, carbon dioxide, sulfur and nitrogen oxides, aldehydes and unburned hydrocarbons.

Fire and Explosion Hazards
This material is extremely flammable and can be ignited by heat, sparks, flames or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment and electronic devices such as cell phones, computers, calculators and pagers which have not been certified as intrinsically safe). Vapors are heavier than air and can accumulate in low areas. May create vapor/air explosion hazard indoors, in confined spaces, outdoors or in sewers. Vapors may travel considerable distances to a remote source of ignition where they can ignite, flash back or explode. Product can accumulate a static charge that may cause a fire or explosion. A product container, if not properly cooled, can rupture in the heat of a fire.

Extinguishing Media
Dry chemical, carbon dioxide or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be

5. FIRE FIGHTING MEASURES

ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Use water spray to cool fire-exposed containers and to protect personnel. Isolate immediate hazard area and keep unauthorized personnel out. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water. Avoid spreading burning liquid with water used for cooling. For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by regulations, a self-contained breathing apparatus should be worn. Wear other appropriate protective equipment as conditions warrant.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Extremely Flammable. Spillage of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof electrical equipment is recommended. Product may contain or release poisonous hydrogen sulfide gas. If the presence of dangerous amounts of H_2S around the spilled product is suspected, additional or special actions may be warranted including access restrictions and the use of protective equipment. Stay upwind and away from spill/release. Isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment as conditions warrant per Exposure Controls/Personal Protection guidelines.

Environmental Precautions Stop the leak if it can be done without risk. Prevent spilled material from entering waterways, sewers, basements or confined areas. Contain release to prevent further contamination of soils, surface water or groundwater. Clean up spill as soon as possible using appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil.

Methods for Containment and Clean Up Immediate cleanup of any spill is recommended. Build dike far ahead of spill for containment and later recovery or disposal of spilled material. Absorb spill with inert material such as sand or vermiculite and place in suitable container for disposal. If spilled on water, remove with appropriate equipment like skimmers, booms or absorbents. In case of soil contamination, remove contaminated soil for remediation or disposal in accordance with applicable regulations.

Reporting Report spills/releases as required, to appropriate local, state and federal authorities. US Coast Guard and Environmental Protection Agency regulations require immediate reporting of spills/release that could reach any waterway including intermittent dry creeks. Report spill/release to the National Response Center at (800) 424-8802. In case of accident or road spill, notify Chemtrec at (800) 424-9300.

7. HANDLING AND STORAGE

Precautions for Safe Handling Extremely flammable. May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas.

7. HANDLING AND STORAGE

Use non-sparking tools and explosion-proof equipment. Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. Explosion-proof electrical equipment is recommended and may be required by fire codes.

Warning! Use of this material in spaces without adequate ventilation may result in the generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Do not use electronic devices (such as cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or storage area unless the devices are certified as intrinsically safe. Electrical equipment and fittings should comply with local fire codes.

Precautions for Safe Storage

Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces and all sources of ignition. Post area warnings: 'No Smoking or Open Flame'. Keep away from incompatible material. Outdoor or detached storage of portable containers is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

In a tank, barge or other closed container, the vapor space above materials containing hydrogen sulfide may result in concentrations of H_2S immediately dangerous to life or health. Check atmosphere for oxygen content, H_2S and flammability prior to entry.

Portable containers should never be filled while they are in or on a motor vehicle or marine craft. Static electricity may ignite vapors when filling non-grounded containers or vehicles on trailers. To avoid static buildup, do not use a nozzle lock open device. Use only approved containers. Keep containers tightly closed. Place the container on the ground before filling. Keep the nozzle in contact with the container during filling.

Empty containers retain liquid and vapor residues and can be dangerous. Do NOT pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat, flame, sparks, static electricity or other sources of ignition; they may explode and cause injury or death. Do not attempt to refill or clean containers since residue is difficult to remove. Empty drums should be completely drained, properly closed and returned to the supplier or a qualified drum reconditioner. All containers should be disposed of in an environmentally safe manner in accordance with government regulations.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component	ACGIH Exposure Limits	OSHA Exposure Limits	NIOSH Exposure Limits
Natural Gas Condensate	300 ppm TWA 500 ppm STEL (as gasoline)	300 ppm TWA 500 ppm STEL (as petroleum distillate (naphtha))	450 ppm TWA 1100 ppm IDLH (as petroleum distillate (naphtha))
Benzene	0.5 ppm TWA 2.5 ppm STEL Skin	1 ppm TWA 5 ppm STEL Skin	0.5 ppm TWA 1 ppm STEL Skin 500 ppm IDLH
n-Butane	800 ppm TWA		800 ppm TWA

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component	ACGIH Exposure Limits	OSHA Exposure Limits	NIOSH Exposure Limits
Cyclohexane	100 ppm TWA	300 ppm TWA	300 ppm TWA 1300 ppm IDLH
Ethyl Benzene	100 ppm TWA 125 ppm STEL	100 ppm TWA 125 ppm STEL	100 ppm TWA 125 ppm STEL 800 ppm IDLH
n-Heptane	400 ppm TWA 500 ppm STEL	500 ppm TWA	85 ppm TWA 440 ppm Ceiling 750 ppm IDLH
n-Hexane	50 ppm TWA Skin	500 ppm TWA	50 ppm TWA 1100 ppm IDLH
Hexane (all isomers)	500 ppm TWA 1000 ppm STEL		100 ppm TWA 510 ppm IDLH Ceiling
Hydrogen Sulfide	10 ppm TWA 15 ppm STEL	20 ppm Ceiling 50 ppm Peak	10 ppm Ceiling 100 ppm IDLH
Methylcyclohexane	400 ppm TWA	500 ppm TWA	400 ppm TWA 1200 ppm IDLH
n-Nonane	200 ppm TWA		200 ppm TWA
n-Octane	300 ppm TWA	500 ppm TWA	75 ppm TWA 385 ppm Ceiling 1000 ppm IDLH
n-Pentane	600 ppm TWA	1000 ppm TWA	120 ppm TWA 610 ppm Ceiling 1500 ppm IDLH
n-Propane	2500 ppm TWA	1000 ppm TWA	1000 ppm TWA 2100 ppm IDLH
Toluene	50 ppm TWA Skin	200 ppm TWA 300 ppm Ceiling 500 ppm Peak-10 min	100 ppm TWA 150 ppm STEL 500 ppm IDLH
1,2,4 Trimethyl Benzene	25 ppm TWA	25 ppm TWA	25 ppm TWA
Xylene, all isomers	100 ppm TWA 150 ppm STEL	100 ppm TWA 150 ppm STEL	900 ppm IDLH

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional for further information.

ACGIH - American Conference of Government Industrial Hygienists, OSHA - Occupational Safety and Health Administration, NIOSH - National Institute for Industrial Safety and Health, TWA - Time Weighted Average (8 hour average for ACGIH and OSHA, 10 hour average for NIOSH), STEL - 15 Minute Short Term Exposure Level, Skin - indicates potential for cutaneous absorption of liquid or vapor through the eyes or mucous membranes, Ceiling - Ceiling Level, Peak - Acceptable peak over the ceiling concentration for a specified number of minutes, IDLH - Immediately Dangerous to Life and Health

Personal Protective Equipment

General Considerations Consider the potential hazards of this material, applicable exposure limits, job activities and other substances in the work place when designing engineering controls and selecting personal protective equipment.

Engineering Controls Use process enclosures, local exhaust ventilation or other engineering controls to maintain airborne levels below the recommended exposure limits. An emergency eye wash station and safety shower should be located near the work station.

Personal Protective Equipment

Personal Protective Equipment

If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, personal protective equipment (PPE) is recommended. A hazard assessment of the work should be conducted by a qualified professional to determine what PPE is required.

Respiratory Protection

A respiratory protection program that meets or exceeds OSHA 29 CFR 1910.134 and ANSI Z.88.2 should be followed whenever workplace conditions warrant the use of a respirator. When airborne concentrations are expected to exceed the established exposure limits given in Section 8, use a NIOSH approved air purifying respirator equipped with organic vapor cartridges/canisters. Use a full-face positive-pressure supplied air respirator in circumstances where air-purifying respirators may not provide adequate protection or where there may be the potential for airborne exposure above the exposure limits. If exposure concentration is unknown, IDLH conditions exist or there is a potential for exposure to hydrogen sulfide above exposure limits, use a NIOSH approved self contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode.

Eye Protection

Eye protection that meets or exceeds ANSI Z.87.1 is recommended if there is a potential for liquid contact to the eyes. Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing or spraying of this material. A face shield may be necessary depending on conditions of use.

Skin and Body Protection

Avoid skin contact. Wear long-sleeved fire-retardant garments while working with flammable and combustible liquids. Additional chemical-resistant protective gear may be required if splashing or spraying conditions exist. This may include an apron, arm covers, impervious gloves, boots and additional facial protection.

Hand Protection

Avoid skin contact. Use impervious gloves (e.g., PVC, neoprene, nitrile rubber). Check with glove suppliers to confirm the breakthrough performance of gloves. PVC and neoprene may be suitable for incidental contact. Nitrile rubber should be used for longer term protection when prolonged or frequent contact may occur. Gloves should be worn on clean hands and hands should be washed after removing gloves. Also wash hands with plenty of mild soap and water before eating, drinking, smoking, using toilet facilities or leaving work.

Special Considerations

Workplace monitoring plans should consider the possibility that heavy metals such as mercury may concentrate in process vessels and equipment presenting the possibility of exposure during sampling and maintenance operations. Mercury and other heavy metals may be present in trace quantities in crude oil, raw natural gas and condensates. Storage and processing of these materials can result in these metals, including elemental mercury, accumulating in enclosed vessels and piping, typically at the low point of the processing equipment. Mercury may also concentrate in sludges, sands, scales, waxes and filter media.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear to dark brown liquid	**Physical Form**	Liquid
Odor	Strong hydrocarbon, sulfurous odor possible	**Odor Threshold**	Not established
pH	Neutral	**Vapor Pressure**	5 - 15 psi (Reid)
Vapor Density	>1 (air = 1)	**Boiling Point/Range**	-20-1000^{o}F/-17-538^{o}C

9. PHYSICAL AND CHEMICAL PROPERTIES

Percent Volatile	>50%	**Partition Coefficient**	Not established
Specific Gravity	0.6 - 0.8 @ 60°F	**Density**	6.3 lb/gal @ 60°F
Molecular Weight	Not determined	**Evaporation Rate**	Not established
Flash Point	<100°F/<38°C	**Test Method**	ASTM D-56
Explosive Limits	< 1% LEL, 10% UEL	**Autoignition Temperature**	450°F/232°C
Solubility in Water	Slightly soluble in water		

10. STABILITY AND REACTIVITY

Stability Stable under normal anticipated storage and handling temperatures and pressures. Extremely flammable liquid and vapor. Vapor can cause flash fire.
.

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

Incompatibility (Materials to Avoid) Avoid contact with strong oxidizing agents such as strong acids, alkalies, chlorine and other halogens, dichromates or permanganates, which can cause fire or explosion.

Hazardous Decomposition Products Hazardous decomposition products are not expected to form curing normal storage. The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.

Hazardous Polymerization Not known to occur

11. TOXICOLOGICAL INFORMATION

Overview This product is a clear to dark brown liquid with a strong hydrocarbon odor. It may also have a sulfurous or rotten egg odor. Hydrogen sulfide, an extremely flammable and very toxic gas is expected to be present. This product is a volatile and extremely flammable liquid that may cause flash fires. Keep away from heat, sparks and flames and other sources of ignition. This product contains benzene, which may cause cancer or be toxic to blood forming organs. It contains material that has caused cancer based on animal data. Never siphon this product by mouth. If swallowed, this product may be aspirated into the lungs and cause lung damage or death.

This material may contain benzene and ethyl benzene at concentrations above 0.1%. Benzene is considered to be a known human carcinogen by OSHA, IARC and NTP. IARC has ethyl benzene, gasoline and gasoline engine exhaust as possibly carcinogenic to humans (Group 2B) based on laboratory animal studiesal studies.

Toxicological Information of the Material.

Acute Toxicity **Dermal:** Low Toxicity: LD50 > 2000 mg/kg (rabbit)
Causes mild skin irritation. Repeated exposure may cause skin dryness or cracking that can lead to dermatitis.

Inhalation: Hydrogen Sulfide is Extremely Toxic: LC100 = 600 ppm(v), 30 min (man)

11. TOXICOLOGICAL INFORMATION

Product expected to have low degree of toxicity by inhalation: LC 50 > 5.2 mg/l (vapor)
Effect of overexposure may include irritation of the digestive tract, irritation of the respiratory tract, nausea, vomiting, diarrhea and signs of central nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued inhalation may result in unconsciousness and/or death.

Ingestion: Product expected to have low degree of toxicity by ingestion: Oral LD50 > 5 g/kg (rat), > 10 g/kg (mice)
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Eye Damage / Irritation Causes serious eye irritation.

Sensitization **Skin:** Not expected to be a skin sensitizer
Respiratory: Not expected to be a respiratory sensitizer

Specific Target Organ Toxicity **Single Exposure:** High concentrations may cause irritation of the skin, eyes, digestive tract, irritation of the respiratory tract, nausea, vomiting, diarrhea and signs of central nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued inhalation may result in unconsciousness and/or death.

Repeated Exposure: Two year inhalation studies of wholly vaporized unleaded gasoline and 90 day studies of various petroleum naphthas did not produce significant target organ toxicity in laboratory animals. Nephropathy in male rates, characterized by the accumulation of alpha-2-uglobulin in epithelial cells of the proximal tubules was observed, however follow up studies suggest that these changes are unique to the male rat.

Conditions Aggravated by Overexposure Disorders of the organs or organ systems that may be aggravated by significant exposure to this material or its components include the skin, respiratory system, liver, kidneys, CNS, cardiovascular system and blood-forming system.

Carcinogenicity May cause cancer based on component information.

Two year inhalation studies of vaporized unleaded gasoline produced an increased incidence of kidney tumors in male rats and liver tumors in female mice. Repeated skin application of various petroleum naphthas in mice for two years resulted in an increased incidence of skin tumors but only in the presence of severe skin irritation. Follow up mechanistic studies suggest that the occurrence of these tumors may be the consequence of promotional process and not relevant to human risk assessment. Epidemiology data collected from a study of more than 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma or kidney cancer from gasoline exposure.

Unleaded gasoline has been identified as a possible carcinogen by the International Agency for Research on Cancer.

Germ Cell Mutagenicity Inadequate information available, not expected to be mutagenic.

11. TOXICOLOGICAL INFORMATION

Reproductive and Developmental Toxicity

Not expected to cause reproductive or developmental toxicity. No evidence of developmental toxicity was found in pregnant laboratory animals (rats and mice) exposed to high vapor concentrations of unleaded gasoline and petroleum naphthas via inhalation. A two generation reproductive toxicity study of vapor recovery gasoline did not adversely affect reproductive function or offspring survival and development.

Additional Information

Hydrogen Sulfide (H_2S). This material may contain or liberate H_2S, a poisonous gas with the smell of rotten eggs. Odor is not a reliable indicator of exposure because olfactory fatigue causes the smell to disappear. H_2S has a broad range of effects depending on the airborne concentration and length of exposure:
10 ppm: eye and respiratory tract irritation
100 ppm: coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes
200 ppm: potential for pulmonary edema after 20 minutes
500 ppm: loss of consciousness after short exposures, potential for respiratory arrest
1000 ppm: Immediate loss of consciousness may lead rapidely to death, prompt cardiopulmonary resuscitation may be required.

Toxicological Information of Components

Benzene 71-43-2

Acute Data:
Dermal LD50 > 9400 mg/kg (Rabbit), (Guinea Pig)
LC50 = 9980 ppm (Mouse); 10000 ppm/7hr (Rat)
Oral LD50 = 4700 mg/kg (Mouse); 930 mg/kg (Rat); 5700 mg/kg (Mammal)
Carcinogenicity: Benzene is an animal carcinogen and is known to produce acute myelogenous leukemia (a form of cancer) in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.
Target Organs: Prolonged or repeated exposures to benzene vapors has been linked to bone marrow toxicity which can result in blood disorders such as leukopenia, thrombocytopenia, and aplastic anemia. All of these diseases can be fatal.
Developmental: Exposure to benzene during pregnancy demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased body eight and increased skeletal variations in rodents. Alterations in hematopoeisis have been observed in the fetuses and offspring of pregnant mice.
Mutagenicity: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells, and DNA damage in mammalian cells in vitro

Cyclohexane 110-82-7

Acute Toxicity:
Dermal LD50 => 2 g/kg (Rabbit)
LC50 > 4,044 ppm (4-hr, Rat)
Oral LD50 > 2 g/kg (Rat)
Target Organs: Cyclohexane can cause eye, skin and mucous membrane irritation, CNS depressant and narcosis at elevated concentrations. In experimental animals exposed to lethal concentrations by inhalation or oral route, generalized vascular damage and degenerative changes in the heart, lungs, liver, kidneys and brain were identified.
Developmental: Cyclohexane has been the focus of substantial testing in laboratory animals. Cyclohexane was not found to be genotoxic in several tests including unscheduled DNA synthesis, bacterial and mammalian cell mutation assays, and in vivo chromosomal aberration. An increase in chromosomal aberrations in bone marrow cells of rats exposed to cyclohexane was reported in the 1980's. However, a careful reevaluation of slides from this study by the laboratory which conducted the study indicates these findings were in error, and that no significant chromosomal effects were

11. TOXICOLOGICAL INFORMATION

observed in animals exposed to cyclohexane. Findings indicate long-term exposure to cyclohexane does not promote dermal tumorigenesis.

Ethyl Benzene 100-41-4

Acute Toxicity:
Dermal LD50 = 17800 mg/kg (Rabbit)
LC50 = 4000 ppm/4 hr; 13367 ppm (Rat)
Oral LD50 = 3500 mg/kg (Rat)
Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC. Ethyl benzene has not been listed as a carcinogen by NTP or OSHA.
Target Organs: In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilio foci,hypertrophy, necrosis), thyroid (hyperplasia) and pituitary (hyperplasia).

n-Hexane 110-54-3

Acute Toxicity:
Dermal LD50 = >2,000 mg/kg (Rabbit)
LC50 > 3,367 ppm (4 hr, Rat)
Oral LD50 > 5,000 mg/kg (Rat)
Target Organs: Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Hydrogen Sulfide 7783-06-4

Acute Toxicity:
Dermal - No data
LCLo= 600 ppm, 30 min (Human)
Hydrogen sulfide concentrations will vary significantly depending on the source and sulfur content of the product. Sweet natural gas condensate (<0.5% sulfur) may contain toxicologically significant levels of hydrogen sulfide in the vapor spaces of bulk storage tanks and transport compartments. Concentrations of H_2S as low as 10 ppm over an 8 hour workshift may cause eye or throat irritation. Prolonged breathing of 50-100 ppm H_2S vapors can produce significant eye and respiratory irritation. Sour condensates commonly contain extremely high concentrations of H_2S (500-70,000 ppm) in the vapor spaces of bulk storage vessels. Exposure to 250-600 ppm for 15-30 minutes can produce headache, dizziness, nervousness, staggering gait, nausea and pulmonary edema or bronchial pneumonia. Concentrations >1,000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisonings have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

Toluene 108-88-3

Acute Toxicity:
Dermal LD50 = 14 g/kg (Rabbit)

11. TOXICOLOGICAL INFORMATION

LC50 = 8,000 ppm (4-hr, Rat)
Oral LD50 = 2.5 - 7.9 g/kg (Rat)
Target Organs: Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.
Developmental: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies.

1,2,4 Trimethyl Benzene 95-63-6
Acute Toxicity:
Dermal LD50 = No data available
LC50 = 18 gm/m^3/4hr (Rat)
Oral LD50 = 3-6 g/kg (Rat)

Xylenes 1330-20-7
Acute Toxicity:
Dermal LD50 >3.16 ml/kg (Rabbit)
LC50= 5000 ppm/4 hr. (Rat)
Oral LD50 = 4300 mg/kg (Rat)
Target Organs: A six week inhalation study with xylene produced hearing loss in rats.
Developmental: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions.

12. ECOLOGICAL INFORMATION

Toxicity

This material is expected to be toxic to aquatic organisms with the potential to cause long term adverse effects in the aquatic environment. Acute aquatic toxicity studies on samples of gasoline and naphtha streams show acute toxicity values greater than 1 mg/l and mostly in the range of 1 to 100 mg/l. These tests were carried out on water accommodated fractions in closed systems to prevent evaporative loss. Results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon composition.

Classification H411, Chronic Category 2

96 hours LC50: 8.3 mg/l (Cyprinodon variegatus)
96 hours LC50: 1.8 mg/l (Mysidopsis bahia)
48 hours LC50: 3.0 mg/l (Daphnia magna)
96 hours LC50: 2.7 mg/l (Oncorhynchus mykiss)

Coating action of oil can kill birds, plankton, aquatic life, algae and fish.

Persistence and Degradability

This material is not readily biodegradable. Most of the nonvolatile constituents are inherently biodegradable. Some of the highest molecular weight components are persistent in water. The individual hydrocarbon components of this material are differentially soluble in water with aromatic hydrocarbons tending to be more water soluble than aliphatic hydrocarbons. If spilled, the lighter components will generally

12. ECOLOGICAL INFORMATION

evaporate but depending on local environmental conditions (temperature, wind, soil type, mixing or wave action in water, etc), photo-oxidation and biodegradation, the remainder may become dispersed in the water column or absorbed to soil or sediment. Because of their differential solubility, the occurrence of hydrocarbons in groundwater will be at different proportions than the parent material. Under anaerobic conditions, such as in anoxic sediments, rates of biodegradation are negligible.

Persistence per IOPC Fund Definition	Non-Persistent
Bioaccumulative Potential	Contains components with the potential to bioaccumulate. The octanol water coefficient values measured for the hydrocarbon components of this material range from 3 to greater than 6, and therefore would be considered as having the potential to bioaccumulate.
Mobility	**Air:** Contains volatile components. Lighter components will volatilize in the air. In air, the volatile hydrocarbons undergo photodegradation by reaction with hydroxyl radicals with half lives varying from 0.5 days for n-dodecane to 6.5 days for benzene. **Water:** Spreads on a film on the surface of water. Significant proportion of spill will remain after one day. Lower molecular weight aromatic hydrocarbons and some polar compounds have low but significant water solubility. Some higher molecular weight compounds are removed by emulsification and these also slowly biodegrade while others adsorb to sediment and sink. Heavier fractions agglomerate to form tars, some of which sink. **Soil:** Some constituents may be mobile and contaminate groundwater.
Other Adverse Effects	Films form on water and may affect oxygen transfer and damage organisms.

13. DISPOSAL CONSIDERATIONS

Recover or recycle if possible. It is the responsibility of the generator to determine the toxicity and physical properties of the material generated so as to properly classify the waste and ensure disposal methods comply with applicable regulations.

This material, if discarded as produced, is not a RCRA "listed" hazardous waste. However, it should be fully characterized for ignitability (D001), reactivity (D003) and benzene (D018) prior to disposal (40 CFR 261). Use which results in chemical or physical change or contamination may subject it to regulation as a hazardous waste. Along with properly characterizing all waste materials, consult state and local regulations regarding the proper disposal of this material.

Do not dispose of tank water bottoms by draining onto the ground. This will result in soil and groundwater contamination. Waste arising from spillage or tank cleaning should be disposed of in accordance with applicable regulations.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a qualified drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

14. TRANSPORTATION INFORMATION

United States Department of Transportation (US DOT) **Transportation of Dangerous Goods (TDG) Canada**	**Shipping Description:** Petroleum Distillates, n.o.s., 3, UN1268, I or II **Shipping Name:** Petroleum Distillates, n.o.s (contains natural gas condensate) **Hazard Class and Division:** 3 **ID Number:** UN1268 **Packing Group:** I or II **Label:** Flammable Liquid **Placard:** Flammable **Reportable Quantity:** None established for this material **Emergency Response Guide:** 128
International Maritime Dangerous Goods Code (IMDG)	**Shipping Description:** Petroleum Distillates, n.o.s., 3, UN1268, I or II **Shipping Name:** Petroleum Distillates, n.o.s (contains natural gas condensate) **Hazard Class and Division:** 3 **UN Number:** 1268 **Label:** Flammable Liquid **EMS Guide:** F-E, S-E Not a DOT Marine Pollutant per 49 CFR 71.8
European Agreements Concerning the International Carriage by Rail (RID) and by Road (ADR)	**Shipping Name**: Petroleum Distillates, n.o.s (contains natural gas condensate) **Hazard Class:** 3 **Packing Group:** I or II **Label:** Flammable Liquid **Danger Number:** 33 **UN Number:** 1268
International Civil Aviation Organization / International Air Transport Association (ICAO/IATA)	**Shipping Name:** Petroleum Distillates, n.o.s (contains natural gas condensate) or Natural Gasoline **UN/ID Number:** UN1268 **Hazard Class/Division:** 3 **Packing Group:** I or II **Labels:** Flammable **Emergency Response Guide:** 3H

15. REGULATORY INFORMATION

United States Federal Regulatory Information

EPA TSCA Inventory	This product and/or its components are listed on the Toxic Substances Control Act (TSCA) Inventory
EPA SARA 302/304 Emergency Planning and Notification	This material contains the following chemicals subject to reporting under the Superfund Amendments and Reauthorization Act of 1986 (SARA): Material contains hydrogen sulfide, considered an extremely hazardous substance. TPQ– 500 lb, EPCRA RQ – 100 lb
EPA SARA 311/312 (Title III Hazard Categories)	Acute Health: Yes Chronic Health: Yes Fire Hazard: Yes Pressure Hazard: No Reactive Hazard: No

15. REGULATORY INFORMATION

EPA SARA Toxic Chemical Notification and Release Reporting (40 CFR 372) and CERCLA Reportable Quantities (40 CFR 302.4)

Component	CAS Number	Concentration	RQ
Benzene	71-43-2	< 5 %	10 lb
Cyclohexane	110-82-7	< 5 %	1000 lb
Ethyl Benzene	100-41-4	< 3 %	1000 lb
n-Hexane	110-54-3	< 50 %	5000 lb
Toluene	108-88-3	< 15 %	1000 lb
1,2,4 Trimethyl Benzene	95-63-6	< 4 %	not listed
Xylene, all isomers	1330-20-7	< 12 %	100 lb

CERCLA Section 101(14) excludes crude oil and crude oil fractions, including hazardous constituents of petroleum, from the definition of hazardous substances. The petroleum exclusion applies to this product.

EPA CWA and OPA

This product is classified as an oil under Section 311 of the Clean Water Act (CWA) and Oil Pollution Act of 1990 (OPA), subject to spill reporting requirements.

Canadian Regulatory Information

DSL/NDSL Inventory

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

Workplace Hazardous Materials Information System (WHMIS) Hazard Class

B2 - Flammable Liquid
D1A – Material Causing Immediate and Serious Toxic Effects - Very Toxic Material
D2A: Material Causing Other Toxic Effects Very Toxic
D2B - Material Causing Other Toxic Effects - Toxic Material

European Union Regulatory Information

Labeling

Product is dangerous as defined by the European Union Dangerous Substances / Preparations Directives
Contains: Low Boiling Point Naphtha

Symbol

F+ Extremely Flammable
T Toxic
N Dangerous for the Environment

Risk Phrases

R12-45-38-65-67-51/53
Extremely flammable. May cause cancer. Irritating to skin. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases

S16-53-45-2-23-24-29-43-62
Keep away from sources of ignition – No smoking. Avoid exposure – obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Keep out of reach of children. Do not breathe vapor. Avoid contact with skin. Do not empty into drains. In case of fire use foam/dry powder/CO_2. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

15. REGULATORY INFORMATION

California Proposition 65
This product may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects, or other reproductive harm and which may be subject to the warning requirements of California Proposition 65. Chemicals known to the State of California to cause cancer, birth defects or other reproductive harm are created by the combustion of this product.
Carcinogens: Benzene, Ethyl Benzene
Developmental Toxicity: Benzene, Toluene
Male Reproductive Toxicity: Benzene

Carcinogen Identification by International Agency for Research on Cancer

	Group 1	Carcinogenic to Humans	Benzene
	Group 2A	Probably Carcinogenic to Humans	
	Group 2B	Possibly Carcinogenic to Humans	Ethyl Benzene, Gasoline, Gasoline Engine Exhaust
	Group 3	Not Classifiable	Toluene, Xylenes

16. OTHER INFORMATION

Prepared By

J.P. Morgan Ventures Energy Corp.
383 Madison Avenue, 10th Floor
New York, NY 10017

JP Morgan Commodities Canada Corp.
Suite 600, Vintage Towers II, 326 11th Avenue SW
Calgary, Alberta
T2R 0C5

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ATTACHMENT I

EMISSION UNITS TABLE

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

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]
GE-1	1e	Natural Gas SI Generator	2015	104.7 hp	New	C1
GE-2	2e	Natural Gas SI Generator	2015	104.7 hp	New	C2
CE-1	3e	Flash Compressor Engine	2015	225 hp	New	C3
CE-2	4e	Flash Compressor Engine	2015	225 hp	New	C4
CE-3	5e	Vapor Recovery Unit (VRU) Compressor Engine	2015	118 hp	New	C5
CE-4	6e	Vapor Recovery Unit (VRU) Compressor Engine	2015	118 hp	New	C6
VCU-1	7e	Vapor Combustor	2015	9.21 MMBtu/hr	New	None
VCU-2	8e	Vapor Combustor	2015	9.21 MMBtu/hr	New	None
LH-1	9e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-2	10e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-3	11e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-4	12e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-5	13e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-6	14e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-7	15e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-8	16e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-9	17e	Condensate Line Heater	2015	1.0 MMBtu/hr	New	None
LH-10	18e	Condensate Line Heater	2015	1.0 MMBtu/hr	New	None
T01-T02	7e and 8e	Produced Water Tanks	2015	400 bbl each	New	VCU-1 or VCU-2
T03-T06	7e and 8e	Condensate Tanks	2015	400 bbl each	New	VCU-1 or VCU-2
TL-1	7e and 8e	Tank Truck Loading (Condensate)	2015	438,000 bbl/yr	New	VCU-1 or VCU-2
TL-2	Fug.	Tank Truck Loading (Water)	2015	292,000 bbl/yr	New	None
Area	Fug	Equipment Leaks	2015	-	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

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1e	Vertical Stack	GE-1	Prime Generator	C1	NSCR	NA	NA	PM	0.01	0.04	0.01	0.04	Gas/ Vapor	EE	Can Supply Upon Request
								SO_2	<0.01	0.01	<0.01	0.01			
								NO_x	0.12	0.53	0.02	0.06			
								CO	0.83	3.64	0.09	0.37			
								VOC	0.12	0.53	0.02	0.06			
								Acetaldehyde	0.01	0.01	0.01	0.01			
								Acrolin	0.01	0.01	0.01	0.01			
								Benzene	0.01	0.01	0.01	0.01			
								Formaldehyde	0.02	0.07	0.02	0.07			
								Methanol	0.01	0.01	0.01	0.01			
								Total HAPs	0.03	0.11	0.03	0.11			
2e	Vertical Stack	GE-2	Prime Generator	C2	NSCR	NA	NA	PM	0.01	0.04	0.01	0.04	Gas/ Vapor	EE	Can Supply Upon Request
								SO_2	<0.01	0.01	<0.01	0.01			
								NO_x	0.12	0.53	0.02	0.06			
								CO	0.83	3.64	0.09	0.37			
								VOC	0.12	0.53	0.02	0.06			
								Acetaldehyde	0.01	0.01	0.01	0.01			
								Acrolin	0.01	0.01	0.01	0.01			
								Benzene	0.01	0.01	0.01	0.01			
								Formaldehyde	0.02	0.07	0.02	0.07			
								Methanol	0.01	0.01	0.01	0.01			
								Total HAPs	0.03	0.11	0.03	0.11			
3e	Vertical Stack	CE-1	Flash Compressor Engine	C3	NSCR	NA	NA	PM	<0.01	0.01	<0.01	0.01	Gas/ Vapor	EE	Can Supply Upon Request
								SO_2	0.01	0.01	0.01	0.01			
								NO_x	6.01	26.29	0.50	2.18			
								CO	1.44	6.31	1.00	4.35			
								VOC	0.71	3.11	0.35	1.53			
								Acetaldehyde	0.01	0.03	0.01	0.03			
								Acrolin	0.01	0.03	0.01	0.03			
								Benzene	0.01	0.02	0.01	0.02			
								Formaldehyde	0.04	0.18	0.04	0.18			
								Methanol	0.01	0.03	0.01	0.03			
								Total HAPs	0.07	0.28	0.07	0.28			

4e	Vertical Stack	CE-2	Flash Compressor Engine	C4	NSCR	NA	NA	PM SO_2 NO_x CO VOC Acetaldehyde Acrolin Benzene Formaldehyde Methanol Total HAPs	<0.01 0.01 6.01 1.44 0.71 0.01 0.01 0.01 0.04 0.01 0.07	0.01 0.01 26.29 6.31 3.11 0.03 0.03 0.02 0.18 0.03 0.28	<0.01 0.01 0.50 1.00 0.35 0.01 0.01 0.01 0.04 0.01 0.07	0.01 0.01 2.18 4.35 1.53 0.03 0.03 0.02 0.18 0.03 0.28	Gas/ Vapor	EE	Can Supply Upon Request
5e	Vertical Stack	CE-3	VRU Compressor Engine	C5	NSCR	NA	NA	PM SO_2 NO_x CO VOC Acetaldehyde Acrolin Benzene Formaldehyde Methanol Total HAPs	<0.01 0.1 3.39 2.24 0.59 0.01 0.01 0.01 0.02 0.01 0.04	<0.01 0.01 14.82 9.80 2.57 0.02 0.02 0.01 0.09 0.02 0.14	<0.01 0.1 0.27 0.53 0.19 0.01 0.01 0.01 0.02 0.01 0.04	<0.01 0.01 1.14 2.28 0.80 0.02 0.02 0.01 0.09 0.02 0.14	Gas/ Vapor	EE	Can Supply Upon Request
6e	Vertical Stack	CE-4	VRU Compressor Engine	C6	NSCR	NA	NA	PM SO_2 NO_x CO VOC Acetaldehyde Acrolin Benzene Formaldehyde Methanol Total HAPs	<0.01 0.1 3.39 2.24 0.59 0.01 0.01 0.01 0.02 0.01 0.04	<0.01 0.01 14.82 9.80 2.57 0.02 0.02 0.01 0.09 0.02 0.14	<0.01 0.1 0.27 0.53 0.19 0.01 0.01 0.01 0.02 0.01 0.04	<0.01 0.01 1.14 2.28 0.80 0.02 0.02 0.01 0.09 0.02 0.14	Gas/ Vapor	EE	Can Supply Upon Request
7e	Vertical Stack	VCU-1	Vapor Combustion Unit	NA	NA	NA	NA	VOC NOx CO SO2 Benzene Toluene Ethylbenzene Xylenes n-Hexane	64.5 0.63 3.40 0.17 0.01 0.02 <0.01 0.01 0.28	281.5 2.74 14.86 0.72 0.03 0.06 0.01 0.03 1.21	1.29 0.63 3.40 0.17 0.01 0.02 <0.01 0.01 0.28	5.63 2.74 14.86 0.72 0.03 0.06 0.01 0.03 1.21	Gas/ Vapor	EE	Can Supply Upon Request
8e	Vertical Stack	VCU-2	Vapor Combustion Unit	NA	NA	NA	NA	VOC NOx CO SO2 Benzene Toluene Ethylbenzene Xylenes n-Hexane	64.5 0.63 3.40 0.17 0.01 0.02 <0.01 0.01 0.28	281.5 2.74 14.86 0.72 0.03 0.06 0.01 0.03 1.21	1.29 0.63 3.40 0.17 0.01 0.02 <0.01 0.01 0.28	5.63 2.74 14.86 0.72 0.03 0.06 0.01 0.03 1.21	Gas/ Vapor	EE	Can Supply Upon Request

9e	Vertical Stack	LH-1	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
10e	Vertical Stack	LH-2	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
11e	Vertical Stack	LH-3	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
12e	Vertical Stack	LH-4	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
13e	Vertical Stack	LH-5	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request

14e	Vertical Stack	LH-6	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
15e	Vertical Stack	LH-7	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
16e	Vertical Stack	LH-8	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
17e	Vertical Stack	LH-9	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
18e	Vertical Stack	LH-10	Line Heater	NA	NA	NA	NA	NO_x CO VOC PM SO2 Benzene N-hexane Toluene Formaldehyde CO_2e	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	0.10 0.09 0.01 0.01 <0.01 <0.01 0.01 <0.01 <0.01 117.01	0.43 0.37 0.03 0.04 0.01 <0.01 0.01 <0.01 <0.01 512.51	Gas/ Vapor	EE	Can Supply Upon Request
7e and 8e	Vertical Stack	T01-T02	Produced Water Tanks	NA	NA	NA	NA	VOC Per Tank	0.21	0.90	0.01	0.02	Gas/ Vapor	EE	Can Supply Upon Request

7e and 8e	Vertical Stack	T03-T06	Condensate Tanks	VCU-1 and VCU-2	Flares	NA	NA	VOC Per Tank also already included in VOC total for Combustors	6.37	27.87	0.13	0.56	Gas/ Vapor	EE	Can Supply Upon Request
7e / 8e	Vertical Stack	TL-1	Truck Loading (Cond.)	VCU-1 and VCU-2	Flares	NA	NA	VOC also already included in VOC total for Combustors	6.11	26.75	1.86	8.14	Gas/ Vapor	EE	Can Supply Upon Request
Fugitives	Fugitives	TL-2	Truck Loading (Water)	NA	NA	NA	NA	VOC	1.03	4.49	1.03	4.49	Gas/ Vapor	EE	Can Supply Upon Request
Area Source	Fugitives	Fug	Equipment Leaks	NA	NA	NA	NA	VOC CO_2e	0.41 3.62	1.78 15.83	0.41 3.62	1.78 15.83	Gas/ Vapor	EE	Can Supply Upon Request

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
1e	0.25	1100	550	186.7	925	12	4384.807	520.008
2e	0.25	1100	550	186.7	925	12	4384.807	520.008
3e	0.33	1304	945	184.1	925	12	4384.807	520.008
4e	0.33	1304	945	184.1	925	12	4384.807	520.008
5e	0.33	1150	528	102.9	925	12	4384.807	520.008
6e	0.33	1150	528	102.9	925	12	4384.807	520.008
7e	2.75	2100	69.5	11.7	925	16	4384.807	520.008
8e	2.75	2100	69.5	11.7	925	16	4384.807	520.008
9e	1.0	450	282.3	6.0	925	12	4384.807	520.008
10e	1.0	450	282.3	6.0	925	12	4384.807	520.008
11e	1.0	450	282.3	6.0	925	12	4384.807	520.008
12e	1.0	450	282.3	6.0	925	12	4384.807	520.008
13e	1.0	450	282.3	6.0	925	12	4384.807	520.008
14e	1.0	450	282.3	6.0	925	12	4384.807	520.008
15e	1.0	450	282.3	6.0	925	12	4384.807	520.008
16e	1.0	450	282.3	6.0	925	12	4384.807	520.008
17e	1.0	450	282.3	6.0	925	12	4384.807	520.008
18e	1.0	450	282.3	6.0	925	12	4384.807	520.008

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

ATTACHMENT K

FUGITIVE EMISSIONS DATA SHEET

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

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		-	-	-	-	EE
Unpaved Haul Roads		-	-	-	-	EE
Storage Pile Emissions		-	-	-	-	EE
Loading/Unloading Operations	VOC	2.82	12.62	-	-	EE
Wastewater Treatment Evaporation & Operations		-	-	-	-	EE
Equipment Leaks	VOC CO_2e	0.41 3.62	1.78 15.83	-	-	EE
General Clean-up VOC Emissions		-	-	-	-	EE
Other		-	-	-	-	EE

[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).

ATTACHMENT L

EMISSION UNIT DATA SHEET

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification, or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

Please provide the API number(s) for each NG well at this facility:	
Martin 1H	047-103-02956
Martin 2H	047-103-02957
Martin 3H	047-103-02923
Martin 4H	047-103-02958
Martin 5H	047-103-02924
Martin 6H	047-103-02959
Martin 7H	047-103-02925
Martin 8H	047-103-02960

Note: This is the same API well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).

Every oil and gas well permitted in West Virginia since 1929 has been issued an API (American Petroleum Institute) number. This API is used by agencies to identify and track oil and gas wells.

The API number has the following format: 047-001-00001

Where,
047 = State code. The state code for WV is 047.
001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).
00001= Well number. Each well will have a unique well number.

STORAGE VESSEL EMISSION UNIT DATA SHEET

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Martin Pad	2. Tank Name Produced Water Tank
3. Emission Unit ID number T01 & T02	4. Emission Point ID number 7e & 8e
5. Date Installed or Modified *(for existing tanks)* 2015	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable) NA*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (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. 400 bbl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 20	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 20	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. 400 bbl	
13A. Maximum annual throughput (gal/yr) 6,132,000	13B. Maximum daily throughput (gal/day) 52,500
14. Number of tank turnovers per year 365	15. Maximum tank fill rate (gal/min) 37
16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof _x_ vertical ___ horizontal _x_ flat roof ___ 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 AND OPERATION INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1]
☐ Other[1] (describe)
☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____
☐ Conservation Vent (psig
Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss VOC		Breathing Loss VOC		Working Loss VOC		Total Emissions Loss - VOC		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	Tpy	
Fuel Oil #2 (Worst Case Assumption)	0.004	0.018	<0.001	<0.001	<0.001	0.001	0.005	0.018	EPA Tank, EE

[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 and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

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

20A. Shell Color:	20B. Roof Color:	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, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):

25. Complete item 25 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:

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 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)

26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:

SITE INFORMATION:

27. Provide the city and state on which the data in this section are based:

28. Daily Avg. Ambient Temperature (°F):	29. Annual Avg. Maximum Temperature (°F):
30. Annual Avg. Minimum Temperature (°F):	31. Avg. Wind Speed (mph):
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	33. Atmospheric Pressure (psia):

LIQUID INFORMATION:

34. Avg. daily temperature range of bulk liquid (°F):	34A. Minimum (°F):	34B. Maximum (°F):

35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):		35B. Maximum (psig):
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From: To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Martin Pad	2. Tank Name Condensate
3. Emission Unit ID number T03, T04, T05 & T06	4. Emission Point ID number 7e & 8e
5. Date Installed or Modified *(for existing tanks)* 2015	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable) NA*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (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. 400 bbl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 20	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 20	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity *(specify barrels or gallons)*. This is also known as "working volume. 400 bbl	
13A. Maximum annual throughput (gal/yr) 4,599,000	13B. Maximum daily throughput (gal/day) 42,000
14. Number of tank turnovers per year 274	15. Maximum tank fill rate (gal/min) 30
16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	

18. Type of tank (check all that apply):

☒ Fixed Roof _x_ vertical ___ horizontal _x_ flat roof ___ 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 AND OPERATION INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 19 – 26 in section VII

IV. SITE INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 27 – 33 in section VII

V. LIQUID INFORMATION *(check which one applies)*

☒ Refer to enclosed TANKS Summary Sheets
☐ Refer to the responses to items 34 – 39 in section VII

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply):

☐ Does Not Apply
☐ Carbon Adsorption[1]
☒ Vent to Vapor Combustion Device[1] (vapor combustors, flares, thermal oxidizers)
☐ Condenser[1]
☐ Other[1] (describe)
☐ Rupture Disc (psig)
☐ Inert Gas Blanket of _____
☐ Conservation Vent (psig
Vacuum Setting Pressure Setting
☐ Emergency Relief Valve (psig)

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
Gasoline RVP 15 (Worst Case Assumption)	0.083	0.362	0.011	0.045	0.035	0.152	0.128	0.558	

[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 and other modeling summary sheets if applicable.

SECTION VII (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:

☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color:	20B. Roof Color:	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, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

24. Is the tank a **Vertical Fixed Roof Tank**? ☐ Yes ☐ No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):

25. Complete item 25 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:			
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 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)			
26D. Deck seam length (ft.):	26E. Area of deck (ft^2):	26F. For column supported tanks, # of columns:	26G. For column supported tanks, diameter of column:
SITE INFORMATION:			
27. Provide the city and state on which the data in this section are based:			
28. Daily Avg. Ambient Temperature (°F):		29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):		31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):		33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:			
34. Avg. daily temperature range of bulk liquid (°F):	34A. Minimum (°F):	34B. Maximum (°F):	
35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):	35B. Maximum (psig):	
36A. Minimum liquid surface temperature (°F):		36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):		37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):		38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.			
39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From: To:			

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
LH-1	9e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-2	10e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-3	11e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-4	12e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-5	13e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-6	14e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-7	15e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-8	16e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-9	17e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-10	18e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020

[1] Enter the appropriate Emission Unit (or Sources) identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the *Glycol Dehydration Unit Data Sheet*.

[2] Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

[3] New, modification, removal

[4] Complete appropriate air pollution control device sheet for any control device.

[5] Enter design heat input capacity in mmBtu/hr.

[6] Enter the fuel heating value in Btu/standard cubic foot.

NATURAL GAS-FIRED COMPRESSOR ENGINE (RICE)
EMISSION UNIT DATA SHEET

Complete this section for any natural gas-fired reciprocating internal combustion engine.

Emission Unit (Source) ID No.[1]		GE-1		GE-2		CE-1	
Emission Point ID No. [2]		1e		2e		3e	
Engine Manufacturer and Model		Power Solutions EPSIB5.70NGP		Power Solutions EPSIB5.70NGP		Cummins GTA855	
Manufacturer's Rated bhp/rpm		104.7/1800		104.7/1800		225/1800	
Source Status[3]		NS		NS		NS	
Date Installed/Modified/Removed[4]		02/2015		02/2015		02/2015	
Engine Manufactured/Reconstruction Date[5]		2014		2014		2014	
Is this engine subject to 40CFR60, Subpart JJJJ?		Yes		Yes		Yes	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60, Subpart JJJJ? (Yes or No)[6]		Yes		Yes		No	
Is this engine subject to 40CFR63, Subpart ZZZZ? (yes or no)		Yes		Yes		Yes	
Engine, Fuel and Combustion Data	Engine Type[7]	4SRB		4SRB		4SRB	
	APCD Type[8]	NSCR		NSCR		NSCR	
	Fuel Type[9]	PQ		PQ		PQ	
	H_2S (gr/100 scf)	0.25		0.25		0.25	
	Operating bhp/rpm	74/1800		74/1800		225/1800	
	BSFC (Btu/bhp-hr)	10255		10255		8476	
	Fuel throughput (ft^3/hr)	744		744		1869.7	
	Fuel throughput ($MMft^3$/yr)	6.52		6.52		16.38	
	Operation (hrs/yr)	8760		8760		8760	
Reference[10]	Potential Emissions[11]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO_X	0.02	0.06	0.02	0.06	0.50	2.18
	CO	0.09	0.37	0.09	0.37	1.00	4.35
	VOC	0.02	0.06	0.02	0.06	0.35	1.53
	SO_2	<0.01	0.01	<0.01	0.01	0.01	0.01
	PM_{10}	0.01	0.04	0.01	0.04	<0.01	<0.01
	Formaldehyde	0.02	0.07	0.02	0.07	0.04	0.18
MRR[12]	Proposed Monitoring:	Hours of operation		Hours of operation		Hours of operation	
	Proposed Recordkeeping:	Will keep records for 5 years and 2 years on site.		Will keep records for 5 years and 2 years on site.		Will keep records for 5 years and 2 years on site.	
	Proposed Reporting:	Will report any emissions limits or opacity deviations		Will report any emissions limits or opacity deviations		Will report any emissions limits or opacity deviations	

Emission Unit (Source) ID No.[1]		CE-2		CE-3		CE-4	
Emission Point ID No. [2]		4e		5e		6e	
Engine Manufacturer and Model		Cummins GTA855		Cummins G 8.3		Cummins G 8.3	
Manufacturer's Rated bhp/rpm		225/1800		118/1800		118/1800	
Source Status[3]		NS		NS		NS	
Date Installed/Modified/Removed[4]		02/2015		02/2015		02/2015	
Engine Manufactured/Reconstruction Date[5]		2014		2014		2014	
Is this engine subject to 40CFR60, Subpart JJJJ?		Yes		Yes		Yes	
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60, Subpart JJJJ? (Yes or No)[6]		No		No		No	
Is this engine subject to 40CFR63, Subpart ZZZZ? (yes or no)		Yes		Yes		Yes	
Engine, Fuel and Combustion Data	Engine Type[7]	4SRB		4SRB		4SRB	
	APCD Type[8]	NSCR		NSCR		NSCR	
	Fuel Type[9]	PQ		PQ		PQ	
	H_2S (gr/100 scf)	0.25		0.25		0.25	
	Operating bhp/rpm	225/1800		118/1800		118/1800	
	BSFC (Btu/bhp-hr)	8476		8032		8032	
	Fuel throughput (ft^3/hr)	1869.7		929.2		929.2	
	Fuel throughput ($MMft^3$/yr)	16.38		8.14		8.14	
	Operation (hrs/yr)	8760		8760		8760	
Reference[10]	Potential Emissions[11]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO_X	0.50	2.18	0.27	1.14	0.27	1.14
	CO	1.00	4.35	0.53	2.28	0.53	2.28
	VOC	0.35	1.53	0.19	0.80	0.19	0.80
	SO_2	0.01	0.01	<0.01	0.01	<0.01	0.01
	PM_{10}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Formaldehyde	0.04	0.18	0.02	0.09	0.02	0.09
MRR[12]	Proposed Monitoring:	Hours of operation		Hours of operation		Hours of operation	
	Proposed Recordkeeping:	Will keep records for 5 years and 2 years on site.		Will keep records for 5 years and 2 years on site.		Will keep records for 5 years and 2 years on site.	
	Proposed Reporting:	Will report any emissions limits or opacity deviations		Will report any emissions limits or opacity deviations		Will report any emissions limits or opacity deviations	

Instructions for completing the Engine Emission Unit Data Sheet:

1. Enter the appropriate Emission Unit (Source) identification number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the production pad. Multiple compressor engines should be designated CE-1S, CE-2S, etc. or other appropriate designation. Generator engines should be designated GE-1S, GE-2S, etc. or other appropriate designation. If more than three (3) engines exist, please use additional sheets.
2. For Emission Points, use the following numbering system: 1E, 2E, etc. or other appropriate designation.
3. Enter the Source Status using the following codes: NS = Construction of New Source (installation); ES = Existing Source; MS = Modification of Existing Source; and RS = Removal of Source
4. Enter the date (or anticipated date) of the engine's installation (construction of source), modification or removal.
5. Enter the date that the engine was manufactured, modified or reconstructed.
6. Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart JJJJ. If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance according to 40CFR§60.4243a(2)(i) through (iii), as appropriate. ***Provide a manufacturer's data sheet for all engines being registered and a manufacturer's EPA certification of conformity sheet.***
7. Enter the Engine Type designation(s) using the following codes: LB2S = Lean Burn Two Stroke, RB4S = Rich Burn Four Stroke, and LB4S =Lean Burn Four Stroke.
8. Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes: NSCR = Rich Burn & Non-Selective Catalytic Reduction, PSC = Rich Burn & Prestratified Charge, SCR = Lean Burn & Selective Catalytic Reduction, or CAT = Lean Burn & Catalytic Oxidation
9. Enter the Fuel Type using the following codes: PQ = Pipeline Quality Natural Gas, or RG = Raw Natural Gas
10. Enter the Potential Emissions Data Reference designation using the following codes. Attach all referenced data to this *Compressor/Generator Data Sheet(s)*. Codes: MD = Manufacturer's Data, AP = AP-42 Factors, GR = GRI-HAPCalc™ , or OT = Other _____ (please list)
11. Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet as Attachment O*.
12. Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the operation of this engine operation and associated air pollution control device. Include operating ranges and maintenance procedures required by the manufacturer to maintain the warranty.

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.

1. Emission Unit ID: TL-1	2. Emission Point ID: 7e or 8e	3. Year Installed/ Modified: 2015
4. Emission Unit Description: Emissions are captured and routed to a vapor combustor unit		
5. Loading Area Data: Adjacent to tanks		
5A. Number of pumps: 1 on truck	5B. Number of liquids loaded: 1	5C. Maximum number of tank trucks loading at one time: 1
6. Describe cleaning location, compounds and procedure for tank trucks: NA		
7. Are tank trucks pressure tested for leaks at this or any other location? ☐ Yes ☐ No If YES, describe: NA		

8. 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

9. Bulk Liquid Data *(add pages as necessary):*

Liquid Name	Condensate	Produced Water	
Max. daily throughput (1000 gal/day)	168	105	
Max. annual throughput (1000 gal/yr)	18,396	12,264	
Loading Method [1]	Sub	Sub	
Max. Fill Rate (gal/min)	100	100	
Average Fill Time (min/loading)	50	50	
Max. Bulk Liquid Temperature (^{o}F)	100	100	
True Vapor Pressure [2]	3.5	1.2	
Cargo Vessel Condition[3]	C	C	
Control Equipment or Method [4]	ECD	--	
Minimum collection efficiency (%)	71	0	
Minimum control efficiency (%)	98	0	

** Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	1.86	1.03	
	Annual (ton/yr)	8.14	4.49	
Estimation Method [5]		EPA		

Notes:

[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 as Attachment "H"*):
CA = Carbon Adsorption
VB = Dedicated Vapor Balance (closed system)
ECD = Enclosed Combustion Device
F = Flare
TO = Thermal Oxidation or Incineration

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

10. **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 *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.* The load out operation will be visual monitored during the procedure, including opacity check on the flare.	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.* Records will be kept of the amount of liquids transferred, as well as the frequency of the operation.
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.* Reporting of records will be performed as required by permit standards.	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.* Testing will be performed as required by permit standards

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

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]				
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC	166	Quarterly	As soon as possible	0.22
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC-CO2e	166	Quarterly	As soon as possible	995.33
Safety Relief Valves[11]	Gas VOC	7	Quarterly	As soon as possible	0.09
	Non VOC-CO2e	7	Quarterly	As soon as possible	387.43
Open-ended Lines[12]	VOC	18	Quarterly	As soon as possible	0.22
	Non-VOC-CO2e	18	Quarterly	As soon as possible	968.58
Sampling Connections[13]	VOC				
	Non-VOC				
Compressors	VOC				
	Non-VOC				
Flanges	VOC				
	Non-VOC				
Other - Connectors	VOC	766	Quarterly	As soon as possible	9.34
	Non-VOC-CO2e	766	Quarterly	As soon as possible	42,395.91

[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 M

AIR POLLUTION CONTROL DEVICE

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

Attachment M
Air Pollution Control Device Sheet
(NSCR 3-Way Engine Catalyst)

Control Device ID No. (C1 and C2):

Equipment Information

1. Manufacturer: Power Solutions Inc. Model No. 38900641	2. Control Device Name: C1 and C2 Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. See attached converter drawing	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device. This is an EPA Certified unit that has been proven effective by EPA testing. See Certificate of Conformity Attached.	
5. Provide a scale diagram of the control device showing internal construction. See Converter Drawing Attached	
6. Submit a schematic and diagram with dimensions and flow rates. No diagram was provided by manufacturer, but engine is listed as having a maximum flow of 550 cfm at 1350F	
7. Guaranteed minimum collection efficiency for each pollutant collected: The catalyst manufacturer list 90% reduction efficiency for NOx, CO, and VOC at 700F and greater.	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 163 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. No liquid flow associated with this catalytic converter and although pressure drop may be measured periodically, the inlet and outlet temperature will be measured continuously by this unit in order to assess performance with manufacturer's operating requirements.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):	NA	
Heat Content (BTU/scf):	NA	
Oxygen Content (%):	0.5 to 1.0 %	
Moisture Content (%):	NA	
Relative Humidity (%):	NA	

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

17. Inlet gas velocity: 40.71 ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
550cfm ACF @ 1350°F and 16.01 PSIA

20. Gas stream temperature:
Inlet: 600 °F
Outlet: 1550 °F

21. Gas flow rate:
Design Maximum: 550 ACFM
Average Expected: 465 ACFM

22. Particulate Grain Loading in grains/scf:
Inlet: NA
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 NOx	0.115		100	0.012		90
B CO	0.830		100	0.083		90
C VOC	0.115		100	0.012		90
D						
E						

24. Dimensions of stack: Height 6 ft. Diameter 0.29 ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector. Not Available just 90% above 700F

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet? Yes Cat 1, Cat 2

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: Hours of operation and malfunctions will be monitored	RECORDKEEPING: All maintenance records will be maintained and made available upon request.
REPORTING: Upon Request	TESTING: This is an EPA certified prime power unit which doesn't require testing.

MONITORING:	Please list and describe the process parasmeters 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. 90% for NOx, CO, and VOCs

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. Same as #31

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

Manufacturer's emission related instructions limits the inlet Temp. to no more than 1550 degrees F.

Attachment M
Air Pollution Control Device Sheet
(NSCR 3-Way Engine Catalyst)

Control Device ID No. (C3 AND C4):

Equipment Information

1. Manufacturer: Miratech Model No. VXC-1610-05-HSG	2. Control Device Name: C3 and C4 for Cummins GTA855, 225 Hp Flash gas compressor Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device. This is an EPA Certified unit that has been proven effective by EPA testing. **See Miratech Emissions Control Equipment Specification Summary.**	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates. No diagram was provided by manufacturer, but engine is listed as having a maximum flow of 945 cfm at 1250F	
7. Guaranteed minimum collection efficiency for each pollutant collected: See emissions section below for details on each pollutant's efficiency.	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 297 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. No liquid flow associated with this catalytic converter and although pressure drop may be measured periodically, the inlet and outlet temperature will be measured continuously by this unit in order to assess performance with manufacturer's operating requirements.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):	NA	
Heat Content (BTU/scf):	NA	
Oxygen Content (%):	0.4%	
Moisture Content (%):	NA	
Relative Humidity (%):	NA	

16. Type of pollutant(s) controlled: ☐ Particulate (type):	☐ SO_x ☐ Odor ☒ Other NOx, CO, and VOC
17. Inlet gas velocity: 115.8 ft/sec	18. Pollutant specific gravity:
19. Gas flow into the collector: 945cfm ACF @ 1250°F and 16.01 PSIA	20. Gas stream temperature: Inlet: 700 °F Outlet: 1250 °F
21. Gas flow rate: Design Maximum: 297 ACFM Average Expected: 265 ACFM	22. Particulate Grain Loading in grains/scf: Inlet: NA 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 NOx	6.00		100	0.50		92
B CO	1.44		100	1.00		31
C VOC	0.71		100	0.35		49
E						

24. Dimensions of stack: Height 7 ft. Diameter .42 ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector. Not Available

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet? Yes Cat 3, Cat 4

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: Hours of operation and malfunctions will be monitored	RECORDKEEPING: All maintenance records will be maintained and made available upon request.
REPORTING: Initial Stack Testing under Subpart JJJJ will be reported	TESTING: Initial Compliance Testing will be conducted within 180 days if startup or within 60 days of reaching maximum production, whichever comes first.

MONITORING:	Please list and describe the process parasmeters 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. 92% for NOx, 31% for CO and although VOCs will also be controlled by this catalyst the manufacturer didn't list a guarantee on the spec sheet because the unit uncontrolled was meeting the 0.7 g/Hp hr limits of the Regulation.

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. Same as #31

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

Manufacturer's emission related instructions limits the inlet Temp. to no more than 1250 degrees F.

Attachment M
Air Pollution Control Device Sheet
(NSCR 3-Way Engine Catalyst)

Control Device ID No. (C5 and C6):

Equipment Information

1. Manufacturer: Miratech Model No. VXC-1408-04-HSG	2. Control Device Name: C5 and C6 for Cummins G8.3, 118 Hp Vapor Recovery Compressor Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device. This is an EPA Certified unit that has been proven effective by EPA testing. **See Miratech Emissions Control Equipment Specification Summary.**	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates. No diagram was provided by manufacturer, but engine is listed as having a maximum flow of 528 cfm at 1127F	
7. Guaranteed minimum collection efficiency for each pollutant collected: See emissions section below for details on each pollutant's efficiency.	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 179 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. No liquid flow associated with this catalytic converter and although pressure drop may be measured periodically, the inlet and outlet temperature will be measured continuously by this unit in order to assess performance with manufacturer's operating requirements.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):	NA	
Heat Content (BTU/scf):	NA	
Oxygen Content (%):	0.4%	
Moisture Content (%):	NA	
Relative Humidity (%):	NA	

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

17. Inlet gas velocity: 115.8 ft/sec

18. Pollutant specific gravity:

19. Gas flow into the collector:
945cfm ACF @ 1250°F and 16.01 PSIA

20. Gas stream temperature:
Inlet: 750 °F
Outlet: 1350 °F

21. Gas flow rate:
Design Maximum: 179 ACFM
Average Expected: 156 ACFM

22. Particulate Grain Loading in grains/scf:
Inlet: NA
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 NOx	3.38		100	0.26		92
B CO	2.24		100	0.52		77
C VOC	0.58		100	0.18		70
E						

24. Dimensions of stack: Height 7 ft. Diameter .33 ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector. Not Available

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet? Yes Cat 5, Cat 6

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: Hours of operation and malfunctions will be monitored	RECORDKEEPING: All maintenance records will be maintained and made available upon request.
REPORTING: Initial Stack Testing under Subpart JJJJ will be reported	TESTING: Initial Compliance Testing will be conducted within 180 days if startup or within 60 days of reaching maximum production, whichever comes first.

MONITORING:	Please list and describe the process parasmeters 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. 92% for NOx, 77% for CO and although VOCs will also be controlled by this catalyst the manufacturer didn't list a guarantee on the spec sheet because the unit uncontrolled was meeting the 0.7 g/Hp hr limits of the Regulation.

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. Same as #31

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

Manufacturer's emission related instructions limits the inlet Temp. to no more than 1250 degrees F.

AIR POLLUTION CONTROL DEVICE
Vapor Combustion Control Device Sheet

Complete this vapor combustion control device sheet for each enclosed combustion device, flare, thermal oxidizer, or completion combustion device that is located at the natural gas production pad for the purpose of thermally destructing waste gas to control emissions of regulated pollutants to the atmosphere.

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1. Control Device ID#: VRU-1 & VRU-2	2. Installation Date: 02/2015 ☒ New	
3. Maximum Rated Total Flow Capacity: 4167 scfh 100,000 scfd 428.9 lb/hr	4. Maximum Design Heat Input: 9.21 MMBtu/hr	5. Design Heat Content: BTU/scf

Control Device Information

6. Select the type of vapor combustion control device being used: ☒ Enclosed Combustion Device

☐ Elevated Flare ☐ Ground Flare ☐ Thermal Oxidizer ☐ Completion Combustion Device

7. Manufacturer: Hy-Bon Model No.: Abutec 100	8. Hours of operation per year: 8760

9. List the emission units whose emissions are controlled by this vapor combustion control device:
(Emission Point ID#: 7e & 8e)

10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
T01	Produced Water Tank	T05	Condensate Tank
T02	Produced Water Tank	T06	Condensate Tank
T03	Condensate Tank	TL-1	Truck Loading
T04	Condensate Tank		

If this vapor combustor controls emissions from more than six emission units, please attach additional pages.

11. Assist Type	12. Flare Height	13. Tip Diameter Stack diameter-33 in.	14. Was the design per §60.18?
☐ Steam - ☐ Air - ☐ Pressure - ☒ Non -	16 ft	Multi-tip burner	☒Yes ☐No

Waste Gas Information

15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft3)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (ft/s)
69.5	2200	1400-2100	11.7

19. Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Information

20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Process Gas	1	7	15,400	☒ Yes ☐ No

25. If automatic re-ignition will be used, describe the method:

The unit uses an automatic ignition system as the pilot light alternative

26. Describe the method of controlling flame:

Tempurature

27. Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	28. If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, describe:

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
VOCs	99	99

32. Has the control device been tested by the manufacturer and certified?

Yes

33. Describe all operating ranges and maintenance procedures required by the manufacturer to maintain warranty:

1400 ˚F – 2100 ˚F

34. Additional Information Attached? ☒ **YES** ☐ **NO**

Please attach a copy of manufacturer's data sheet.
Please attach a copy of manufacturer's drawing.
Please attach a copy of the manufacturer's performance testing.

If any of the requested information is not available, please contact the manufacturer.

INSTRUCTIONS:
Vapor Combustion Control Device

This form assumes one vapor combustion control device emissions are being released from the emission point identification number (including the waste gas emissions and pilot emissions). If multiple vapor combustion control devices are being used at the oil and natural gas production facility, a vapor control device sheet must be completed for each device. The same form is being used for all types of vapor combustion control devices.

General Information

1. Enter the control device ID#(s) that has been assigned to this control device. A unique control device identification number should identify each control device located at the affected facility.
2. Enter the date that the control device was installed at the affected facility. Include the month, day, and year. If this is a new control device that has yet to be installed, check the "NEW" box.
3. Enter the maximum rated total flow rate of the vapor combustion device. This includes the flow rate of all materials to be burned including the pilot fuel and the waste gas.
4. Enter the maximum rated design heat input capacity of the vapor combustion device in terms of million British thermal units per hour (MMBtu/hr).
5. Enter the total design heat content of the pilot in terms of million British thermal units per hour (MMBtu/hr).

Control Device Information

6. Indicate the type of vapor combustion device that applies.
7. Enter the manufacturer and model number of the control device.
8. Enter the hours of operation that the control device is planned to be used. This should be the same basis as the emissions calculations.
9. Enter the emission point identification number.
10. Enter ALL of the emission units whose emissions will be controlled and then emitted from the control device.
11. Select whether the flare is steam-assisted, air-assisted, pressure-assisted, or non-assisted.
12. Enter the height of the stack in terms of feet.
13. Enter the tip diameter (in feet) of the top of the stack where the emissions are discharged.
14. Is the applicant having the combustion device designed per §60.18? Only flares required by an NSPS standard are required to be designed and operated in accordance with §60.18.

Waste Gas Information

The waste gas is the vapor emissions that are being controlled.

15. Enter the waste gas flow rate in cubic feet per minute that is being consumed.
16. Enter the heat content of the waste gas being combusted in units of BTU per cubic feet.
17. Enter the minimum temperature of the emissions stream (°F).
18. Enter the velocity in feet per second of the gas as it discharges from the top of the stack.
19. Provide the characterization of the waste gas stream that is being controlled. This could be a certificate of analysis of the natural gas from this facility or from a similar facility. This is the basis of the emissions calculations.

Pilot Information

20. Enter the type/grade(s) of fuel that will combusted in the combustion flare's pilot (examples: natural gas pipeline quality, propane, etc.).
21. How many pilot lights does the device have?
22. What is the fuel capacity for each pilot?
23. What is the heat input for each pilot?
24. Is the system designed with automatic re-ignition?
25. Describe the re-ignition method and system.
26. Describe the method of controlling the pilot flame.
27. Is the pilot flame equipped with a monitoring device?
28. What is the monitoring device for the pilot flame?

**continued next page*

Control Information

29. Enter the types of pollutants that the control equipment controls (i.e., reduces). If numerous pollutants are controlled, indicate the different pollutants controlled in line with their respective control efficiencies.
30. What is the % capture efficiency of the collection system to the control device? In other words, what is the percentage of the waste gas stream will be controlled?
31. Enter the control efficiency of the control equipment for each pollutant being controlled. The manufacturer typically provides a manufacturer's minimum guarantee control efficiency. Provide the manufacturer's data sheet that documents the minimum guarantee.
32. Please answer if the control device had a performance test conducted by the manufacturer and if it is certified.
33. Describe the manufacturer's operating and maintenance requirements that the guaranteed control efficiency is based upon.
34. Please include any additional information associated with the control device you feel should be submitted with this application. Please attach a copy of the manufacturer's data sheet. Please include the manufacturer's performance testing.

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

Table 1. Annual Potential To Emit (PTE) Summary
Stone Energy - Martin Gas Facility

Criteria PTE

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	CO2e
Line Heaters (tpy)	0.326	0.326	0.326	0.026	4.294	3.607	0.236	5125.034
Engines (tpy)	0.066	0.066	0.066	0.019	6.725	13.976	4.738	3703.321
Tanks (tpy)	--	--	--	--	--	--	2.265	--
Vapor Combustors (tpy)	--	--	--	1.434	5.461	29.713	11.243	--
Truck Loading (tpy)	--	--	--	--	--	--	12.617	--
Fugitives (tpy)	--	--	--	--	--	--	1.780	15.824
Total Emissions (tpy)	**0.392**	**0.392**	**0.392**	**1.478**	**16.480**	**47.296**	**32.880**	**8844.179**
Total Emissions (lb/hr)	0.089	0.089	0.089	0.338	3.763	10.798	7.507	2019.219

HAP PTE

Source	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs Listed (tpy)
Line Heaters (tpy)	0.000	0.000	--	--	0.077	0.003	0.081
Engines (tpy)	0.050	0.018	0.001	0.006	--	0.649	0.724
Vapor Combustors (tpy)	0.047	0.105	0.006	0.051	2.415	--	2.623
Total Emissions (tpy)	**0.097**	**0.122**	**0.007**	**0.057**	**2.492**	**0.652**	**3.427**
Total Emissions (lb/hr)	0.022	0.028	0.002	0.013	0.569	0.149	0.782

Table 2. Line Heater (LH-1 through LH-10) Rates and Emissions
Stone Energy - Martin Gas Facility

Pollutant	Emission Factor			1.0 MBtu/hr LH Emissions (lb/hr)	1.0 MMBtu/hr LH Emissions (ton/yr)	1.0 MMBtu/hr LH Emissions x 10 (lb/hr)	1.0 MMBtu/hr LH Emissions x 10 (ton/yr)
Criteria Pollutants							
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.0075	0.0326	7.45E-02	3.26E-01
SO_2	0.6	lb/MMcf	(1)	0.0006	0.0026	5.88E-03	2.58E-02
NOx	100	lb/MMcf	(2)	0.0980	0.4294	0.980	4.294
CO	84	lb/MMcf	(2)	0.0824	0.3607	0.824	3.607
VOC	5.5	lb/MMcf	(1)	0.0054	0.0236	5.39E-02	2.36E-01
Hazardous Air Pollutants							
Arsenic	2.0E-04	lb/MMcf	(3)	0.0000	0.0000	1.96E-06	8.59E-06
Benzene	2.1E-03	lb/MMcf	(4)	0.0000	0.0000	2.06E-05	9.02E-05
Beryllium	1.2E-05	lb/MMcf	(3)	0.0000	0.0000	1.18E-07	5.15E-07
Cadmium	1.1E-03	lb/MMcf	(3)	0.0000	0.0000	1.08E-05	4.72E-05
Chromium	1.4E-03	lb/MMcf	(3)	0.0000	0.0000	1.37E-05	6.01E-05
Cobalt	8.4E-05	lb/MMcf	(3)	0.0000	0.0000	8.24E-07	3.61E-06
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	0.0000	0.0000	1.18E-05	5.15E-05
Formaldehyde	7.5E-02	lb/MMcf	(4)	0.0001	0.0003	7.35E-04	3.22E-03
Hexane	1.8E+00	lb/MMcf	(4)	0.0018	0.0077	1.76E-02	7.73E-02
Lead	5.0E-04	lb/MMcf	(3)	0.0000	0.0000	4.90E-06	2.15E-05
Manganese	3.8E-04	lb/MMcf	(3)	0.0000	0.0000	3.73E-06	1.63E-05
Mercury	2.6E-04	lb/MMcf	(3)	0.0000	0.0000	2.55E-06	1.12E-05
Naphthalene	6.1E-04	lb/MMcf	(4)	0.0000	0.0000	5.98E-06	2.62E-05
Nickel	2.1E-03	lb/MMcf	(3)	0.0000	0.0000	2.06E-05	9.02E-05
PAH/POM	1.3E-03	lb/MMcf	(4)	0.0000	0.0000	1.26E-05	5.53E-05
Selenium	2.4E-05	lb/MMcf	(3)	0.0000	0.0000	2.35E-07	1.03E-06
Toluene	3.4E-03	lb/MMcf	(4)	0.0000	0.0000	3.33E-05	1.46E-04
Total HAP	**1.9E+00**	**lb/MMCF**		0.0019	0.0081	1.85E-02	8.11E-02
Greenhouse Gas Emissions							
CO_2	116.89	lb/MMBtu	(5)	116.8891	511.9742	1168.89	5119.74
CH_4	2.2E-03	lb/MMBtu	(5)	0.0022	0.0097	2.20E-02	0.10
N_2O	0.0	lb/MMBtu	(5)	0.0002	0.0010	2.20E-03	0.01
CO_2e[(b)]	-	-		117.0099	512.5034	1170.10	5125.03

Calculations:

(a) Annual emissions (tons/yr) = [Annual Usage (MMBtu/yr or MMCF/yr)]x

Number of Line Heaters= 10
Fuel Use (MMBtu/hr) = 1
Hours of Operation (hr/yr)= 8760
PTE Fuel Use (MMcf/yr) = 8.6

(b) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]
Global Warming Potential (GWP)

CO_2	1	(6)
CH_4	25	(6)
N_2O	298	(6)

Notes:

(1) AP-42, Chapter 1.4, Table 1.4-2. Emission Factors For Criteria Pollutants and Greenhouse Gases From Natural Gas Combustion, July 1998.
(2) AP-42, Chapter 1.4, Table 1.4-1. Emission Factors For Nitrogen Oxides (Nox) and Carbon Monoxide(CO) From Natural Gas Combustion, July 1998.
(3) AP-42, Chapter 1.4, Table 1.4-4. Emission Factors For Metals From Natural Gas Combustion, July 1998.
(4) AP-42, Chapter 1.4, Table 1.4-3. Emission Factors for Speciated Organic Compounds from Natural Gas Combustion, July 1998.
(5) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.
(6) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1
(7) MMBtu to MMcf conversion factor is 1020. AP-42, Chapter 1.4

Table 3. Tank Emissions
Stone Energy - Martin Gas Facility

Emission Unit	Tank Contents	Control Devices	Tank Throughput (bbls/day)	Flashing EF (lbs/bbls)		Flashing Emissions (lbs/day) (a)	Working and Breathing Emissions (lbs/day) (b)	VOC Emissions (lb/hr)	VOC Emissions (tons/yr)	VOC Emissions Controlled (lb/hr)(c)	VOC Emissions Controlled (tons/yr)(c)
T01	Produced Water	VCU-1 or VCU-2	400.0	0.012	(1)	4.80	0.10	0.2043	0.8949	0.0041	0.0179
T02	Produced Water	VCU-1 or VCU-2	400.0	0.012	(1)	4.80	0.10	0.2043	0.8949	0.0041	0.0179
T03	Condensate	VCU-1 or VCU-2	300.0	0.330	(2)	99.00	53.71	6.3629	27.8695	0.1273	0.5574
T04	Condensate	VCU-1 or VCU-2	300.0	0.330	(2)	99.00	53.71	6.3629	27.8695	0.1273	0.5574
T05	Condensate	VCU-1 or VCU-2	300.0	0.330	(2)	99.00	53.71	6.3629	27.8695	0.1273	0.5574
T06	Condensate	VCU-1 or VCU-2	300.0	0.330	(2)	99.00	53.71	6.3629	27.8695	0.1273	0.5574
Total								**25.8602**	**113.2676**	**0.5172**	**2.2654**

Calculations:

(a) Flashing Emissions

PTE emissions (lbs/day) = [Tank Throughput (bbls/day)] x [Flashing EF (lbs/bbls)]

(b) Working and Breathing Emissions (2)

PTE emissions (lbs/day) = [Tank 4.0 Emissions (lbs/year)] / [(days/year)]

(c) Emissions routed to combustion device with conservative 98% destruction efficiency

Notes:

(1) Flashing EF from Fesco Petroleum Engineers Flash Liberation of Separator Water at Pad No. 1 facility.

(2) Flashing EF taken from Promax Simulation using low pressure stabalization tower

(2) Model output from Tank 4.0 (See backup documentation)

Table 4. Natural Gas-Fired Generator Emissions (GE1 & GE2)
Stone Energy - Martin Gas Facility

Pollutant	Emission Factor		PTE per Generator (lb/hr)	PTE per Generator[(a)] (tons/yr)	PTE x 2 (lb/hr)	PTE x 2 (tons/yr)
Criteria Pollutants						
PM/PM10/PM2.5	9.50E-03 lb/MMBtu	(2)	0.00721	0.03158	0.014	0.063
SO_2	5.88E-04 lb/MMBtu	(2)	0.00045	0.00195	0.001	0.004
NOx	0.05 g/HP-hr	(1)	0.01154	0.05055	0.023	0.101
CO	0.36 g/HP-hr	(1)	0.08310	0.36396	0.166	0.728
VOC	0.05 g/HP-hr	(1)	0.01154	0.05055	0.023	0.101
Hazardous Air Pollutants						
1,1,2,2-Tetrachloroethane	2.53E-05 lb/MMBtu	(2)	0.00002	0.00008	3.84E-05	1.68E-04
1,1,2-Trichloroethane	1.53E-05 lb/MMBtu	(2)	0.00001	0.00005	2.32E-05	1.02E-04
1,3-Butadiene	6.63E-04 lb/MMBtu	(2)	0.00050	0.00220	1.01E-03	4.41E-03
1,3-Dichloropropene	1.27E-05 lb/MMBtu	(2)	0.00001	0.00004	1.93E-05	8.44E-05
Acetaldehyde	2.79E-03 lb/MMBtu	(2)	0.00212	0.00927	4.23E-03	1.85E-02
Acrolein	2.63E-03 lb/MMBtu	(2)	0.00200	0.00874	3.99E-03	1.75E-02
Benzene	1.58E-03 lb/MMBtu	(2)	0.00120	0.00525	2.40E-03	1.05E-02
Carbon Tetrachloride	1.77E-05 lb/MMBtu	(2)	0.00001	0.00006	2.69E-05	1.18E-04
Chlorobenzene	1.29E-05 lb/MMBtu	(2)	0.00001	0.00004	1.96E-05	8.58E-05
Chloroform	1.37E-05 lb/MMBtu	(2)	0.00001	0.00005	2.08E-05	9.11E-05
Ethylbenzene	2.48E-05 lb/MMBtu	(2)	0.00002	0.00008	3.76E-05	1.65E-04
Ethylene Dibromide	2.13E-05 lb/MMBtu	(2)	0.00002	0.00007	3.23E-05	1.42E-04
Formaldehyde	2.05E-02 lb/MMBtu	(2)	0.01556	0.06814	3.11E-02	1.36E-01
Methanol	3.06E-03 lb/MMBtu	(2)	0.00232	0.01017	4.64E-03	2.03E-02
Methylene Chloride	4.12E-05 lb/MMBtu	(2)	0.00003	0.00014	6.25E-05	2.74E-04
Naphthalene	9.71E-05 lb/MMBtu	(2)	0.00007	0.00032	1.47E-04	6.46E-04
PAH (POM)	1.41E-04 lb/MMBtu	(2)	0.00011	0.00047	2.14E-04	9.37E-04
Styrene	1.19E-05 lb/MMBtu	(2)	0.00001	0.00004	1.81E-05	7.91E-05
Toluene	5.58E-04 lb/MMBtu	(2)	0.00042	0.00185	8.47E-04	3.71E-03
Vinyl Chloride	7.18E-06 lb/MMBtu	(2)	0.00001	0.00002	1.09E-05	4.77E-05
Xylenes	1.95E-04 lb/MMBtu	(2)	0.00015	0.00065	2.96E-04	1.30E-03
Total HAP			**0.025**	**0.10775**	**0.04920**	**0.21551**
Greenhouse Gas Emissions						
CO_2	116.89 lb/MMBtu	(3)	8.87E+01	3.89E+02	1.77E+02	7.77E+02
CH_4	2.2E-03 lb/MMBtu	(3)	1.67E-03	7.33E-03	3.35E-03	1.47E-02
N_2O	2.2E-04 lb/MMBtu	(3)	1.67E-04	7.33E-04	3.35E-04	1.47E-03
CO_2e[(b)]	- -		88.80	388.93	177.41	777.05

Calculations: If emission factor note 1 is used, use calculation (a). If emission factor note 2 or 3 is used, use calculation (b).

(a) Annual emissions (tons/yr) = [Emission Factor (g/(kW or HP)-hr)]x[Power Output (kW or HP)] x [Hours of Operation (hrs/yr)] x [Number of engines]x[1.10231131x10^-6(ton/gram)]

(b) Annual emissions (tons/yr) = [Emission Factor (lbs/MMBtu)] x [Hours of Operation (hrs/yr)] x [BSFC (cf/hr)] x [1/Heat Content (Btu/scf)] / [1,000,000 (BTU/MMBtu)] / [2,000 lb/ton] x [Number of engines]

Engine Power Output (kW) =	55	
Engine Power Output (hp) =	105	
Number of Engines Operating at a Time =	2	(4)
Fuel Throughput (cf/hr) =	744	(5)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(6)
BSFC (Btu/hp-hr)=	7,248.1	(7)
PTE Hours of Operation =	8,760	

(b) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]

Global Warming Potential (GWP)

CO_2	1	(8)
CH_4	25	(8)
N_2O	298	(8)

Notes:

(1) Emission factors from Data Sheet ion PSI Certified 5.7L Stationary Non-Emergency Engine Family

(2) AP-42, Chapter 3.2, Table 3.2-3.*Natural Gas-fired Reciprocating Engines* (7/00). Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines.

(3) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(4) The facility has two identical engines, but only one can operate at a time.

(5) Fuel throughput from manufacturer's specification sheet.

(6) Value obtained from AP-42, section 4.1.1.

(7) Calculated : (Heat Content)/(Fuel Throughput(x) Engine HP)

(8) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 4.1 Natural Gas-Fired Flash Compressor Emissions (CE1 & CE2)
Stone Energy - Martin Gas Facility

Pollutant	Emission Factor			PTE per Engine (lb/hr)	PTE per Engine[(a)] (tons/yr)	PTE x 2 (lb/hr)	PTE x 2 [(a)] (tons/yr)
Criteria Pollutants							
PM/PM10/PM2.5	9.50E-05	lb/MMBtu	(2)	0.0002	0.0008	0.0004	0.0016
SO_2	5.88E-04	lb/MMBtu	(2)	0.0011	0.0049	0.0022	0.0098
NOx	1.00E+00	g/HP-hr	(1)	0.4960	2.1726	0.9921	4.3452
CO	2.00E+00	g/HP-hr	(1)	0.9921	4.3452	1.9841	8.6905
VOC	7.00E-01	g/HP-hr	(1)	0.3472	1.5208	0.6944	3.0417
Hazardous Air Pollutants							
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	(2)	0.0000	0.0002	0.0001	0.0004
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0001	0.0003
1,3-Butadiene	6.63E-04	lb/MMBtu	(2)	0.0013	0.0055	0.0025	0.0111
1,3-Dichloropropene	1.27E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0002
Acetaldehyde	2.79E-03	lb/MMBtu	(2)	0.0053	0.0233	0.0106	0.0466
Acrolein	2.63E-03	lb/MMBtu	(2)	0.0050	0.0220	0.0100	0.0439
Benzene	1.58E-03	lb/MMBtu	(2)	0.0030	0.0132	0.0060	0.0264
Carbon Tetrachloride	1.77E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0001	0.0003
Chlorobenzene	1.29E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0002
Chloroform	1.37E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0001	0.0002
Ethylbenzene	2.48E-05	lb/MMBtu	(2)	0.0000	0.0002	0.0001	0.0004
Ethylene Dibromide	2.13E-05	lb/MMBtu	(2)	0.0000	0.0002	0.0001	0.0004
Formaldehyde	2.05E-02	lb/MMBtu	(2)	0.0391	0.1712	0.0782	0.3425
Methanol	3.06E-03	lb/MMBtu	(2)	0.0058	0.0256	0.0117	0.0511
Methylene Chloride	4.12E-05	lb/MMBtu	(2)	0.0001	0.0003	0.0002	0.0007
Naphthalene	9.71E-05	lb/MMBtu	(2)	0.0002	0.0008	0.0004	0.0016
PAH (POM)	1.41E-04	lb/MMBtu	(2)	0.0003	0.0012	0.0005	0.0024
Styrene	1.19E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0002
Toluene	5.58E-04	lb/MMBtu	(2)	0.0011	0.0047	0.0021	0.0093
Vinyl Chloride	7.18E-06	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0001
Xylenes	1.95E-04	lb/MMBtu	(2)	0.0004	0.0016	0.0007	0.0033
Total HAP				**0.062**	**0.271**	**0.124**	**0.542**
Greenhouse Gas Emissions							
CO_2	116.89	lb/MMBtu	(3)	222.9192	976.3860	445.8384	1952.7721
CH_4	2.2E-03	lb/MMBtu	(3)	0.0042	0.0184	0.0084	0.0368
N_2O	2.2E-04	lb/MMBtu	(3)	0.0004	0.0018	0.0008	0.0037
CO_2e[(b)]	-	-		223.1496	977.3952	446.2992	1954.7904

Calculations: If emission factor note 1 is used, use calculation (a). If emission factor note 2 or 3 is used, use calculation (b).

(a) Annual emissions (tons/yr) = [Emission Factor (g/HP-hr)]x[Power Output (HP)] x [Hours of Operation (hrs/yr)] x [Number of engines]x[1.10231131x10^-6(ton/gram)]

(b) Annual emissions (tons/yr) = [Emission Factor (lbs/MMBtu)] x Brake Specific Fuel Consumption (BTU/HP-hr)] x Power Output (HP)] x [Number of engines] x [8760 (hrs/yr)] x [1 ton/2000 lbs)

Engine Power Output (kW) =	168	
Engine Power Output (hp) =	225	
Number of Engines Operating at a Time =	2	(4)
Average BSFC (BTU/HP-hr) =	8,476	(5)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(6)
Fuel Throughput (ft3/hr) =	1,869.7	(7)
PTE Hours of Operation =	8,760	

(b) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]

Global Warming Potential (GWP)

CO_2	1	(8)
CH_4	25	(8)
N_2O	298	(8)

Notes:

(1) Emission factors from Miratech emissions control equipment specification summary as supporting documents

(2) AP-42, Chapter 3.2, Table 3.2-3. *Natural Gas-fired Reciprocating Engines* (7/00). Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines.

(3) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(4) The facility has two identical engines, but only one can operate at a time.

(5) Fuel consumption from manufacturer's specification sheet.

(6) Value obtained from AP-42, section 4.1.1.

(7) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(8) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 4.2 Natural Gas-Fired Vapor Recovery Compressor Emissions (CE3 & CE4)
Stone Energy - Martin Gas Facility

Pollutant	Emission Factor			PTE per Engine (lb/hr)	PTE per Engine[(a)] (tons/yr)	PTE x 2 (lb/hr)	PTE x 2 [(a)] (tons/yr)
Criteria Pollutants							
PM/PM10/PM2.5	9.50E-05	lb/MMBtu	(2)	0.0001	0.0004	0.0002	0.0008
SO_2	5.88E-04	lb/MMBtu	(2)	0.0006	0.0024	0.0011	0.0049
NOx	1.00E+00	g/HP-hr	(1)	0.2601	1.1394	0.5203	2.2788
CO	2.00E+00	g/HP-hr	(1)	0.5203	2.2788	1.0406	4.5577
VOC	7.00E-01	g/HP-hr	(1)	0.1821	0.7976	0.3642	1.5952
Hazardous Air Pollutants							
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0002
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0001
1,3-Butadiene	6.63E-04	lb/MMBtu	(2)	0.0006	0.0028	0.0013	0.0055
1,3-Dichloropropene	1.27E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0001
Acetaldehyde	2.79E-03	lb/MMBtu	(2)	0.0026	0.0116	0.0053	0.0232
Acrolein	2.63E-03	lb/MMBtu	(2)	0.0025	0.0109	0.0050	0.0218
Benzene	1.58E-03	lb/MMBtu	(2)	0.0015	0.0066	0.0030	0.0131
Carbon Tetrachloride	1.77E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0001
Chlorobenzene	1.29E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0001
Chloroform	1.37E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0001
Ethylbenzene	2.48E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0002
Ethylene Dibromide	2.13E-05	lb/MMBtu	(2)	0.0000	0.0001	0.0000	0.0002
Formaldehyde	2.05E-02	lb/MMBtu	(2)	0.0194	0.0851	0.0389	0.1702
Methanol	3.06E-03	lb/MMBtu	(2)	0.0029	0.0127	0.0058	0.0254
Methylene Chloride	4.12E-05	lb/MMBtu	(2)	0.0000	0.0002	0.0001	0.0003
Naphthalene	9.71E-05	lb/MMBtu	(2)	0.0001	0.0004	0.0002	0.0008
PAH (POM)	1.41E-04	lb/MMBtu	(2)	0.0001	0.0006	0.0003	0.0012
Styrene	1.19E-05	lb/MMBtu	(2)	0.0000	0.0000	0.0000	0.0001
Toluene	5.58E-04	lb/MMBtu	(2)	0.0005	0.0023	0.0011	0.0046
Vinyl Chloride	7.18E-06	lb/MMBtu	(2)	0.0000	0.0000	0.0000	0.0001
Xylenes	1.95E-04	lb/MMBtu	(2)	0.0002	0.0008	0.0004	0.0016
Total HAP				**0.0307**	**0.1346**	**0.0615**	**0.2692**
Greenhouse Gas Emissions							
CO_2	116.89	lb/MMBtu	(3)	110.7847	485.2369	221.5694	970.4738
CH_4	2.2E-03	lb/MMBtu	(3)	0.0021	0.0092	0.0042	0.0183
N_2O	2.2E-04	lb/MMBtu	(3)	0.0002	0.0009	0.0004	0.0018
CO_2e[(b)]	-	-		110.8992	485.7384	221.7984	971.4768

Calculations: If emission factor note 1 is used, use calculation (a). If emission factor note 2 or 3 is used, use calculation (b).

(a) Annual emissions (tons/yr) = [Emission Factor (g/HP-hr)]x[Power Output (HP)] x [Hours of Operation (hrs/yr)] x [Number of engines]x[1.10231131x10^-6(ton/gram)]

(b) Annual emissions (tons/yr) = [Emission Factor (lbs/MMBtu)] x Brake Specific Fuel Consumption (BTU/HP-hr)] x Power Output (HP)] x [Number of engines] x [8760 (hrs/yr)] x [1 ton/2000 lbs)

Engine Power Output (kW) =	88	
Engine Power Output (hp) =	118	
Number of Engine Operating at a Time =	2	(4)
Average BSFC (BTU/HP-hr) =	8,032	(5)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(6)
Fuel Throughput (ft3/hr) =	929.2	(7)
PTE Hours of Operation =	8,760	

(b) CO_2 equivalent = [(CO_2 emissions)*(GWP_{CO2})]+[(CH_4 emissions)*(GWP_{CH4})]+[(N_2O emissions)*(GWP_{N2O})]

Global Warming Potential (GWP)

CO_2	1	(8)
CH_4	25	(8)
N_2O	298	(8)

Notes:

(1) Emission factors from Miratech emissions control equipment specification summary as supporting documents

(2) AP-42, Chapter 3.2, Table 3.2-3. *Natural Gas-fired Reciprocating Engines* (7/00). Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines.

(3) Emission factors are from 40 CFR 98, Subpart C, Table C-1 and C-2.

(4) The facility has two identical engines, but only one can operate at a time.

(5) Fuel consumption from manufacturer's specification sheet.

(6) Value obtained from AP-42, section 4.1.1.

(7) Fuel throughput = BSFC (BTU/HP-hr) x Power (HP) / Heat Content (BTU/scf)

(8) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 5. Truck Loading (TL-1) VOC Emissions
Stone Energy - Martin Gas Facility

Contents	Volume Transferred	Loading Loss [(a)(1)] (lb VOC/1000gal)	PTE VOC Emissions (lb/hr)	PTE VOC Emissions[(b)] (tons/yr)	PTE VOC Emissions Controlled (lb/hr)	PTE VOC Emissions Controlled (tons/yr)
Produced Water	12,264,000 gal/yr	0.731	1.023	4.482	1.023	4.482
Condensate	18,396,000 gal/yr	2.907	6.105	26.742	1.857	8.135
Total			7.129	31.224	2.881	12.617

Calculations:

(a) Loading Loss (lbs/1000 gal) = 12.46x[Saturation Factor (1.45)] x [True Vapor Pressure of Liquid Loaded (psia)] x[Molecular Weight of Vapors(lbs/lb-mole)]/ [Temperature of Bulk Liquid Loaded(°R)] (1)

Produced Water:

Saturation factor=	0.60	(1)
Condensate Pvap (psia)=	1.2	(1)
Molecular Weight (lb/lb-mol)=	44.0	(2)
Bulk Liquid Tempurature (F)=	80.0	

Condensate:

Saturation factor=	0.60	(1)
Condensate Pvap (psia)=	3.5	(1)
Molecular Weight (lb/lb-mol)=	60.0	(2)
Bulk Liquid Tempurature (F)=	80.0	

(b) Annual Emissions(tons/yr) = [Loading Loss (lb VOC/ 1000 gal)]*[Volume Transferred(gal/yr)]/1000/2000

Flare Capture Efficiency =	71%
Flare Destruction Efficency =	98%

Notes:

(1) AP-42 Section 5.2

(1) AP-42 Table 7.1-2

Table 6. Fugitive Leak Emissions
Stone Energy - Martin Gas Facility

Fugitive emissions from valves and fittings are calculated using the major equipment default component count approach from 40 CFR Part 98 because site-specific component counts have not been collected.

Pollutant	Emission Factor			PTE[(a) Gas Service] (tons/yr)
Valves	9.9E-03	lb/hr/source	(1)	0.63
Low Bleed Pneumatic Valves	9.9E-03	lb/hr/source	(1)	0.76
Flanges	8.6E-04	lb/hr/source	(1)	0.25
Connectors	4.4E-04	lb/hr/source	(1)	0.13
Other Points in Gas Service	1.9E-02	lb/hr/source	(1)	3.28
Total Gas Released	-	-		5.05
Total VOC Released (gas service)			(b)	**1.11**
Calculations:		**Total CO2e**	(c) (3)	15.82

(a) Annual emissions (tons/yr) = [Emission Factor (lb/hr/source)] x [Number of Sources] x [Hours of Operation per Year] x [0.0005 tons/ lb]

(b)Promax Inlet Gas Composition used for wt % VOC at 22.0%

(c) Methane wt % taken as 57% from Promax gas inlet composition. CO2e factor of 25 applied for methane conversion

Number of Components in Gas Service

Valves=	166	(2)
Low Bleed Pneumatic Valves=	200	(2)
Connectors=	766	(2)
Other Points in Gas Service =	200	(2)
Maximum Hour of Operation =	8,760	

Pollutant	Emission Factor			PTE[(a) Light Liquid Service] (tons/yr)
Valves	5.5E-03	lb/hr/source	(1)	0.42
Pump Seals in Light Liq Service	2.8E-02	lb/hr/source	(1)	0.04
Flanges	2.4E-04	lb/hr/source	(1)	0.03
Connector	4.6E-04	lb/hr/source	(1)	0.07
Other Points in Light Liq Service	1.7E-02	lb/hr/source	(1)	0.10
Total VOC Release Light Liq Service			(b)	**0.67**

Calculations:

(a) Annual emissions (tons/yr) = [Emission Factor (lb/hr/source)] x [Number of Sources] x [Hours of Operation per Year] x [0.0005 tons/ lb]

(b) used 100 % VOC weight fraction for light liquid

Number of Components in Light Liquid Service

Valves=	200	(2)
Pump Seals in Light Liq Service=	4	(2)
Connectors=	372	(2)
Other Points in Gas Service =	7.5	(2)
Maximum Hour of Operation =	8,760	

Notes:

(1) Emission factors from Table 2-4. Oil and Gas Production Operations Average Emission Factors, EPA's 1995 Protocol for Equipment Leaks Emission Estimates

(2) Default Average Component Counts for Major Onshore Natural Gas Production Equipment from 40 CFR 98, Subpart W, Table W-1B

(3) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Vapor Cobustion Units (VCU-1 & VCU-2) Emissions
Stone Energy - Martin Gas Facility

HAP Pollutant	Volume (scf/hr)	(lb-mol/scf)	Pollutant mol %	Pollutant mol weight (lb/lbmol)	Control Efficiency	Emissions (lbs/hr)	Emissions (tons/yr)	Emissions X 2 (lbs/hr)	Emissions x 2 (tons/yr)
Benzene	4167.00	1/379.4	0.031%	78.11	98.00%	0.0053	0.0233	0.0106	0.0466
Toluene	4167.00	1/379.4	0.059%	92.14	98.00%	0.0119	0.0523	0.0239	0.1046
Ethylbenzene	4167.00	1/379.4	0.003%	106.17	98.00%	0.0007	0.0031	0.0014	0.0061
Xylenes	4167.00	1/379.4	0.025%	106.16	98.00%	0.0058	0.0255	0.0117	0.0511
n-Hexane	4167.00	1/379.4	1.456%	86.18	98.00%	0.2756	1.2073	0.5513	2.4145

Example Formula:

$$\text{emissions (tpy)} = \text{Volume} \times \frac{\text{lb-mol}}{379.4\ \text{scf}} \times \text{mol fraction} \times \frac{\text{pollutant mol weight (lb)}}{\text{lb-mol}} \times (1 - \text{control efficiency}) \times \frac{8760\ \text{hr}}{1\ \text{yr}} \times \frac{1\ \text{ton}}{2000\ \text{lbs}}$$

.

1 lb mol = 379.4 cubic feet
Volume = 4167 scf/hr (from manufacturers spec sheet)
Control Efficiency = 98%
Mol % = Pollutant Mol % from Fesco analysis (attached)
Pollutant mol % is obtained from assuming all gas is flash gas having the gas composition equivalent to a representative condensate flash measurement conducted at Lantz Mills

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu / 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)	Emissions X 2 (lbs/hr)	Emissions x 2 (tons/yr)
CO	0.37	4167.00	2200.00	(1/1,000,000)	3.3919	14.8567	6.7839	29.7134
NOx	0.07	4167.00	2200.00	(1/1,000,000)	0.6234	2.7304	1.2468	5.4608
VOC	0.14	4167.00	2200.00	(1/1,000,000)	1.2834	5.6214	2.5669	11.2429

Example Formula: Emissions (lb/hr) = emission factor x volume x gas heat value x MMBtu/1000000Btu

Emission Factor = AP-42 Table 13.1 emission factor for specific pollutant, the Particulate Matter is assumed negligable for smokeless flares
Volume = 4167 scf/hr
Gas Heat Value = 1020 Btu/scf

Pollutant	Volume	grain H2S/ 100 scf	ppm	Mol Fraction	Mol weight	(lb-mol/scf)	Emissions (lbs/hr)	Emissions (ton/yr)	Emissions X 2 (lbs/hr)	Emissions x 2 (ton/yr)
SO2	4167.00	15.26	232.87	0.0002329	64.00	1/379.4	0.1637	0.7170	0.3274	1.4339

Example Formula:

$$\text{Emissions (lb/hr)} = \text{Volume} \times \text{Mol Fraction} \times \text{Molecular Weight} \times \frac{\text{lb mol}}{379.4\ \text{scf}}$$

$$\frac{1\ grain\ H2S}{100\ scf} = 15.26\ ppm\ of\ H2S$$

H2S conversion taken from supporting Sulfur Measurement Handbook
grain H2S/100 scf = 15.26
Volume = 4167 scf/hr
1 lb mol = 379.4 cubic feet

Data Sheet on PSI Certified 5.7L Stationary Non-Emergency Engine Family

Engine Family	EPSIB5.70NGP *
Engine Displacement (L)	5.7
Long Block Manufacturer	GM Powertrain
Fuel Type	Pipeline NG
Rated Power (hp)	104.73
Rated Speed (rpm)	1800
Exhaust Flow Rate (CFM)	550
Exhaust Temperature (°F)	1350
Catalyst Construction	Honeycomb
Catalyst Material	Ceramic
Number of Catalysts in Enclosure	2
Catalyst Type	3-way
PGM Type	Pd/Rh
Catalyst Enclosure Material	409 SS
Catalyst Enclosure Construction	Welded
Backpressure at Rated Load (in. hg.)	2
Inlet / Outlet Pipe O.D. (in.)	3.5
Catalyst Enclosure Flange to Flange Length (mm)	530
Minimum Catalyst Inlet Temperature (°F)	600
Maximum Catalyst Inlet Temperature (°F)	1550

		THC	NMHC (VOC)	NOx	CO	CO2
Emission Standards for Family Stationary Model		N/A	0.7	1	2	N/A
Non-Deteriorated Engine Catalyst Emissions (g/hp-hr)	1800 RPM on NG **	0.15	0.05	0.05	0.36	739.41

Catalyst Conversion Efficiency at Operating Temperature — Typical is +90%

* Previous model year families as denoted by "A" through "D" in first digit are also applicable to this document

** Data applicable to PSI's "voluntary" certification of "commercial" grade NG. Use of wellhead NG requires site certification and may produce different emission results.

Rev. - A

Gaseous Fuel Generator Set
PSI 5.7L Engine Series

Specification Sheet
Model GCMC EPA SI NSPS Certified

KW(KVA) @ 0.8 P.F	
Compression	60 Hz-1800 RPM
Ratio	Prime
9.1:1 (Note 1)	55 kW (69 kVa)
9.1:1 (Note 2)	55 kW (69 kVa)

Note: (1) Natural Gas Rating

(2) Propane Rating

NOTE: This engine is EPA certified and must be operated as outlined in the supplied O&M manual

Fuel Application Guide	
Compression Ratio	9.1:1
Dry Processed Natural Gas	Yes
Propane (HD-5)	Yes
All gases such as field gas, digester and sewage gas will require an analysis of the specified gas and pre-approval from CNGE. Consult you Cummins Distributor for details.	

Description

The Cummins NPower GC-series industrial generator set is a fully integrated power generation system providing optimum performance, reliability, and versatility for stationary standby power applications.

A primary feature of the GC GenSet is strong motor-starting capability and fast recovery from transient load changes. The torque-matched system includes a heavy-duty PSI 4-cycle spark ignited engine, an AC alternator with high motor-starting kVA capacity, and an electronic voltage regulator with three phase sensing for precise regulation under steady-state or transient loads. The GF GenSet accepts 100% of the nameplate standby rating in one step. *

The standard PowerCommand® digital electronic control is an integrated system that combines engine and alternator controls for high reliability and optimum GenSet performance.

Optional protective housing and component heaters shield the generator set from extreme operating conditions.** Environmental concerns are addressed by low exhaust emission engines, sound-attenuated housings, and exhaust silencers. A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Every production unit is factory tested at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins NPower manufacturing facilities include quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. The PowerCommand control is UL508 Listed.

All Cummins NPower generator sets are backed by a comprehensive warranty program and supported by a worldwide network of 233 locations to assist with warranty, service, parts, and planned maintenance.

Features

PSI Heavy-Duty Engine - Rugged 4-cycle industrial spark ignited engine delivers reliable power, low emissions, and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor-starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads, fault-clearing short-circuit capability, and class H insulation. The alternator electrical insulation system is UL1446 Recognized.

Control Systems - The PowerCommand electronic control is standard equipment and provides total genset system integration, including automatic remote starting/stopping, precise voltage regulation, alarm and status message display, output metering, and auto-shutdown at fault detection,and NFPA 110 compliance. PowerCommand control is Listed to UL508.

Cooling System - Standard cooling package provides reliable running at the rated power level, at up to 104ºF ambient temperature.

Housings - Optional weather-protective housing and sound attenuation housing(s) are available.

Standards - Generators are designed, manufactured and tested to relevant UL, NFPA, ISO and IEC standards. The alternator is certified to CSA 22.2. The controls are CSA C282-M1999 and 22.2 No.14 M91. PowerCommand control is UL508 Listed.

Warranty and Service - Backed by a comprehensive warranty and worldwide distributor service network.

* Adequate fuel pressure and volume must be provided.
** Cold weather heaters are recommended when ambient temperatures are below 32°F.

Generator Set

The general specifications provide representative configuration details. Consult the outline drawing for installation design.

Specifications - General	
Unit Width	1168 mm (46 in) Open set
Unit Height	1347 mm (53 in) Open set
Unit Length	2490 mm (98 in) Open set
Unit Dry Weight	1359 to 1453 kg (2995 to 3203 lbs) - Dependant on selected alternator.
Rated Speed	1800 rpm
Voltage Regulation, No Load to Full Load	N/A
Random Voltage Variation	N/A
Frequency Regulation	Isochronous
Random Frequency Variation	±0.5%
Radio Frequency Interference	Optional PMG excitation operates in compliance with BS800 and VDE level G and N. Addition of RFI protection kit allows operation per MIL-STD-461 and VDE level K.
See outline drawing for installation design specifications.	

Rating Definitions

Prime (Unlimited Running Time) Rating based on: Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

Site Derating Factors

Engine power available up to 100 m (328 ft) at ambient temperatures up to 25°C (77°F). Above 100 m (328 ft) derate at 3% per 305 m (1000 ft), and 1% per 5.5°C (10°F) above 25°C (77°F).

Induction Losses - A derate of 4% must be applied for every 3.4kPa (1 in Hg) increase in air inlet restriction.
A derate of 1% must be applied for every 1 in of Hg increase in exhaust restriction.

Gensets with Weather or Sound Enclosures may reduce ambient capability by 2 to 4.5°C (4 to 8°F) depending on enclosure type and site conditions.

1) Data represents gross engine performance capabilities obtained and corrected in accordance with SAEJ1349 conditions of 29.61 in. Hg.(100KPa) barometric pressure [361 ft. (110m) altitude], 77ºF (25ºC) inlet air temperature, and 0.30 in Hg.(100KPa) water vapor pressure using dry processed natural gas fuel with 905 BTU per standard cubic foot (33.72 kJ/L) lower heating value. Deration may be required due to altitude, temperature or type of fuel. Consult your local Cummins Distributor for details.

2) FUEL SYSTEM

Standard Carburetor – ECOM Make
Low Pressure Dry Processed Natural Gas – (905 BTU/ft.² L.H.V.)
Running Pressure to Engine .....18 to 28 cm (7 to 11 in) WC
Minimum Gas Supply Pipe Size @ Engine (NG) .....2.54 cm (1 in)
Minimum Gas Supply Pipe Size @ Engine (Propane) .....TBD
LP Supply Connection.....TBD

The preceding pipe sizes are only suggestions and piping may vary with temperatures, distance from fuel supply and application of local codes. Gas must be available at adequate volume and pressure for engine at the regulator.

The Genset (engine) performance is based on processed natural gas fuel with 905 BTU per standard cubic foot (33.72 kJ/L) lower heating value. Variations in fuel composition and/or supply pressure must be eliminated during steady state operation. Locate the gas regulator as near to the engine as possible. Some systems may need an accumulator or other device(s) for startup or unstable conditions, contact the Fuel Supply utility for

Engine

PSI heavy-duty spark ignited engines use advanced combustion technology for reliable and stable power, low emissions, and fast response to sudden load changes.

Electronic governing is standard for applications requiring constant (isochronous) frequency regulation such as Uninterruptible Power Supply (UPS) systems, non-linear loads, or sensitive electronic loads.

Specifications - Engine	
Base Engine	Power Solutions International
Displacement	5.7 L (350 in^3)
Overspeed Limit	TBD
Regenerative Power	TBD
Cylinder Block Configuration	Cast iron
Cranking Current	630 amps at ambient temperature of -18°C (0°F)
Battery Charging Alternator	70 amps
Battery Type	Group 24
Starting Voltage	12-volt, negative ground
Standard Cooling System	50°C (122°F) ambient radiator
Lube Oil Filter Types	Single spin-on canister-combination full flow with bypass

Fuel		**PRIME**		
Fuel Consumption	Load	1/2	3/4	Full
(Approximate)	kW	28	41	55
Natural Gas	CFH	483	631	744
Propane Vapor	CFH	173	226	267
Propane Liquid	GPH	5.2	6.7	8.0

Cooling	**Full Load**
Jacket Water Heat Rejection to Coolant	51.5 kW (2930) BTU/min)
Heat Rejection to Charge Air Cooler	N/A
Heat Rejection to Room	N/A
Jacket Water Coolant Capacity (w/radiator)	24.6 L (6.5 USG)
Jacket Water Coolant Flow Rate	117.3 L/min (31 GPM)
Radiator Fan Load	4.5 kW (6.0 hp)

Air	**Full Load**
Combustion Air	N/A
Maximum Air Cleaner Restriction	203 mm H_2O (8 in H_2O)
Alternator Cooling Air (ADS 204D)	0.28 m^3/s (595 cm)
Radiator Cooling Air	N/A
Maximum Restriction at Radiator Discharge (static)	13 mm H_2O (0.5 in H_2O)

Exhaust	**Full Load**
Gas Flow (Full Load)	260 L/sec (550cfm)
Gas Temperature	593° C (1100° F)
Maximum Back Pressure	76 mm Hg (3 in Hg)

Engine	**Full Load**
Gross Engine Power Output	55 kWm (74 hp)
BMEP	N/A
Piston Speed	5.3 m/s (1044 ft/min)
Oil Capacity	6.2 L (6.5 qt)

* Jacket water only.

Alternator

Several alternators are available for application flexibility based on the required motor-starting kVA and other requirements. Larger alternator sizes have lower temperature rise for longer life of the alternator insulation system. In addition, larger alternator sizes can provide a cost-effective use of engine power in across-the-line motor-starting applications and can be used to minimize voltage waveform distortion caused by non-linear loads.

Single-bearing alternators couple directly to the engine flywheel with flexible discs for drive train reliability and durability. No gear reducers or speed changers are used. Two-thirds pitch windings eliminate third-order harmonic content of the AC voltage waveform and provide the standardization desired for paralleling of generator sets. The standard excitation system is a self (shunt) excited system with the voltage regulator powered directly from

Alternator Application Notes

Separately Excited Permanent Magnet Generator (PMG) System - This option uses an integral PMG to supply power to the voltage regulator. A PMG system generally has better motor-starting performance, lower voltage dip upon load application, and better immunity from problems with harmonics in the main alternator output induced by non-linear loads. This option is recommended for use in applications that have large transient loads, sensitive electronic loads (especially UPS applications), harmonic content, or that require sustained short-circuit current (sustained 3-phase short circuit current at approximately 3 times rated for 10 seconds).

Alternator Sizes - On any given model, various alternator sizes are available to meet individual application needs. Alternator sizes are differentiated by maximum winding temperature rise, at the generator set standby rating, when operated in a 40ºC (104°F) ambient environment. Available temperature rise range from 80ºC to 150ºC (176°F to 302°F). Not all temperature rise selections are available on all models. Lower temperature rise is accomplished using larger alternators at lower current density. Lower temperature rise alternators have higher motor-starting kVA, lower voltage dip upon load application, and they are generally recommended to limit voltage distortion and heating due to harmonics induced by non-linear loads.
Alternator Space Heater - is recommended to inhibit condensation.

Available Output Voltages

Three Phase Reconnectable	Single Phase Non-Reconnectable	Three Phase Non-Reconnectable
☐ 120/208 ☐ 240/416	☐ 120/240	☐ 220/380
☐ 127/220 ☐ 254/440		☐ 347/600
☐ 139/240 ☐ 277/480		
☐ 120/240		

Specifications - Alternator

Design	Brushless, 4-pole, drip-proof revolving field
Stator	2/3 pitch
Rotor	Direct-coupled by flexible disc
Insulation System	Class H per NEMA MG1-1.65 or better
Standard Temperature Rise *	105° C *
Exciter Type	Shunt or PMG
Phase Rotation	A (U), B (V), C (W)
Alternator Cooling	Direct-drive centrifugal blower
AC Waveform Total Harmonic Distortion	<5% total no load to full linear load <3% for any single harmonic
Telephone Influence Factor (TIF)	<50 per NEMA MG1-22.43.
Telephone Harmonic Factor (THF)	<3

	80° C Alternator			105° C Alternator			125° C Alternator		
Voltage Ranges	120/208 Thru 139/240 240/416 Thru 277/480	277/480	347/600	120/208 Thru 139/240 240/416 Thru 277/480	277/480	347/600	120/208 Thru 139/240 240/416 Thru 277/480	277/480	347/600
Motor Starting	Broad Range	480	600	Broad Range	480	600	Broad Range	480	600
Maximum KVA (90% Sustained Voltage)	N/A	N/A	N/A	231 (Shunt) 272 (PMG)	231 (Shunt) 272 (PMG)	231 (Shunt) 272 (PMG)	N/A	N/A	N/A
Alternator Datasheet No.	N/A	N/A	N/A	ADS204D	ADS204D	ADS204D	N/A	N/A	N/A
Full Load Current	120/240,1 Ph	120/208V	127/220	139/240	220/380	240/416	254/440	277/480	347/600
(Amps @ Standby Rating)	229	191	180	165	104	95	90	83	66

* Other Temp Rises Available. See options at end of datasheet for more details.

Control System

(optional)

PowerCommand Control 1.1

The PowerCommand Control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Prototype tested; UL, CSA, and CE compliant. Major features include:

Features

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- InPower™ PC-based service tool available for detailed diagnostics.

AC Protection

- Over current warning and shutdown.
- Over and under voltage shutdown.
- Over and under frequency shutdown.
- Over excitation (loss of sensing) fault.
- Field overload.
- Integrated digital electronic voltage regulator.

Digital Voltage Regulation

- 2-phase line-to-line sensing.
- Configurable torque matching.

Engine Protection

- Overspeed shutdown.
- Low oil pressure warning and shutdown.
- High coolant temperature warning and shutdown.
- Low coolant level warning or shutdown.
- Low coolant temperature warning.
- High, low and weak battery voltage warning.
- Fail to start (overcrank) shutdown.
- Fail to crank shutdown.
- Redundant start disconnect.
- Cranking lockout.
- Sensor failure indication.
- Low fuel level warning or shutdown.
- Fuel-in-rupture-basin warning or shutdown.

Operator / Display Panel

- Manual off switch.
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols).
- LED lamps indicating genset running, not in auto, common warning, common shutdown, manual run mode and remote start.

Other Display Data

- Genset model data.
- Start attempts, starts, running hours.
- Fault history.
- RS485 Modbus® interface.
- Data logging and fault simulation (requires InPower service tool).

Control Functions

- Time delay start and cooldown.
- Cycle cranking.
- PCCNet interface.
- (2) Configurable inputs.
- (2) Configurable outputs.
- Remote emergency stop.

PCC Options

- ❑ Auxiliary output relays (2).
- ❑ 120/240 V, 100 W anti-condensation heater.
- ❑ Remote annunciator with (3) configurable inputs and (4) configurable outputs.
- ❑ Remote operator panel.
- ❑ PMG alternator excitation.
- ❑ PowerCommand iWatch web server for remote monitoring and alarm notification (loose).
- ❑ Auxiliary, configurable signal inputs (8) and configurable relay outputs (8).
- ❑ Digital governing.
- ❑ AC output analog meters (bargraph).
  Color-coded graphical display of:
  - 3-phase AC voltage
  - 3-phase current
  - Frequency
  - kVa
- ❑ PowerCommand 2.2 control with AmpSentry protection.

PowerCommand Control Values

	PCC	Genset Reference Values
Ambient Operating Temperature	-40 to +70ºC (-40 to 158ºF) HMI -20 to +70ºC (-4 to 158ºF)	-
Operating Altitude	up to 5000 meters (13,000 ft.)	-
Alternator Data		
Voltage	AC: Single or Three Phase Line-to-line or Line-to-neutral	-
Digital Output Voltage Regulation	Within +/-1.0% any loads between no load to full. Drift = no more than +/-1.5% for 40ºC (104ºF) temp change in 8 hours.	-
Current	3-Phase AC	
Frequency	60 Hz	-
Battery Config	12 VDC	12 VDC
Engine Data		
Voltage	DC	DC
Lube Oil Pressure	Adjustable	Adjustable
Engine Idle Speed	Adjustable	Adjustable

Genset values are for reference only. For unit data see genset data tag.

Generator Set Options

Engine
- ❑ 480/240 V, 1500 W coolant heaters
- ❑ 120/208/240 V, 250 W lube oil heater
- ❑ Electronic governor

Fuel System
- ❑ Flexible fuel connector
- ❑ Fuel strainer

Alternator
- ❑ 105° C rise alternator
- ❑ 120/240 V, 100 W anti-condensation heater

Exhaust System
- ❑ GenSet mounted muffler (Enclosure Models Only)

Generator Set
- ❑ Battery
- ❑ Battery charger
- ❑ PowerCommand Network Communication Module (NCM)
- ❑ Stage I enclosure w/silencer
- ❑ Stage II enclosure w/silencer
- ❑ Remote annunciator panel
- ❑ Spring isolators

Available Products and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Power Generation products and services include:

- Diesel and Spark-Ignited Generator Sets
- Transfer Switches
- Bypass Switches
- Parallel Load Transfer Equipment
- Digital Paralleling Switchgear
- PowerCommand Network and Software
- Distributor Application Support
- Planned Maintenance Agreements

Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available. Contact your distributor/dealer for more information.

Certifications

CSA - The alternator is certified to CSA 22.2. The controls are CSA C282-M1999 and 22.2 No.14 M91.

PTS - The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Products bearing the PTS symbol have been subjected to demanding tests in accordance to NFPA 110 to verify the design integrity and performance under both normal and abnormal operating conditions including short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup.

See your distributor for more information

Cummins NPower LLC
875 Lawrence Drive
DePere, WI 54115
920.337.9750
Fax: 920.337.9746
www.cumminsnpower.com

Important: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2014 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT OF 1990

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Power Solutions International, Inc.
(U.S. Manufacturer or Importer)

Certificate Number: EPSIB5.70NGP-004

Effective Date: 10/23/2013

Expiration Date: 12/31/2014

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 10/23/2013

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: EPSIB5.70NGP
Certificate Number: EPSIB5.70NGP-004
Certification Type: Mobile and Stationary
Fuel : LPG/Propane
Natural Gas (CNG/LNG)
Emission Standards : NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4CO (g/Hp-hr) : 2
VOC (g/Hp-hr) : 0.7
NOx (g/Hp-hr) : 1
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 40 CFR Part 1048, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 1048 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 40 CFR Part 1048. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60, 40 CFR Part 1048. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60, 40 CFR Part 1048.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

MIRATECH

CONFIDENTIAL

MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: TJ-13-1819 Rev(5)

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Cumminns
Model Number:	GTA855
Power Output:	225 bhp
Lubrication Oil:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	945 acfm (cfm)
Exhaust Temperature:	1,250°F

System Details

Housing Model Number:	VXC-1610-05-HSG
Element Model Number:	VX-RE-10XC
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	3.0 inches of WC (Fresh)
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-1610-05-XC1
Material:	Carbon Steel
Approximate Diameter:	16 inches
Inlet Pipe Size & Connection:	5 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	5 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	65 inches
Weight Without Catalyst:	191 lbs
Weight Including Catalyst:	205 lbs
Instrumentation Ports:	1 inlet/1 outlet (1/2" NPT)

Emission Requirements

Exhaust Gases	Engine Outputs (g/ bhp-hr)	Reduction (%)	Warranted Converter Outputs (g/ bhp-hr)	Requested Emissions Targets
NOx	12.10	92%	1.00	1.00 g/bhp-hr
CO	2.90	31%	2.00	2.00 g/bhp-hr
NMNEHC	0.30	0%	0.70	0.70 g/bhp-hr
CH_2O	0.10	0%	1.00	1.00 g/bhp-hr
Oxygen	0.4%			

MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.

USA COMPRESSION

USA Compression Partners, LLC

Date: December 4, 2013
Unit #: 6160
Customer: Stone Energy Corporation

To: Emissions Department
Stone Energy Corporation
6000 Hampton Drive, Suite B & E
Morgantown, WV 26505
304-225-1600

Lease Location: To Be Determined

Please find the below information for the USA Compression unit number listed above:

Package Information	
Compressor Manufacturer:	Ariel
Compressor Model:	JGQ2
Compressor Serial Number:	F-43093
Compressor Cylinders:	7.5" x 5.125" x 3.0"
Driver Manufacturer:	Cummins
Driver Model:	GTA855
Rated HP & Speed	225 HP @ 1800 RPM
Driver Type:	4-stroke Rich Burn
Engine Serial Number:	25388794
Engine Manufacturing Date:	9/1/2013
Engine Catalyst Model:	VXC-1610-05-HSG
Engine Catalyst Element:	VX-RE-10XC
Engine AFR Model:	AFR-1RD-10-TK4
Engine Stack Height:	11' 5"
Engine Stack Diameter:	5"
Operating Information	
Suction Pressure:	50 psig
Discharge Pressure:	825 psig
Design Capacity:	1000 MSCFD
Gas Specific Gravity:	0.72

Emission Output information included in the attached catalyst specification sheet.

G855 & GTA855 Gas Compression Applications

Available for: Oil & Gas, Gas Compression

Overview

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

Specifications

General Specifications

Inline 6-Cylinder, 4-Cycle, Natural Gas

Bore	5.5 in (140 mm)
Stroke	6.0 in (152 mm)
Displacement	14.0 L (855 cubic in)
Engine Power*	157-286 hp (117-213 kW)
Compression ratio	NA: 10:1 TA: 8.5:1
Aspiration	Naturally aspirated or turbocharged aftercooled
Exhaust Type	Watercooled manifold
Weight**	2970 lb (1347 kg)
Coolant capacity	5.5 gal (20.8 L)
Lube oil capacity	15 gal (57 L)
Rotation	Counterclockwise

* Rating dependent

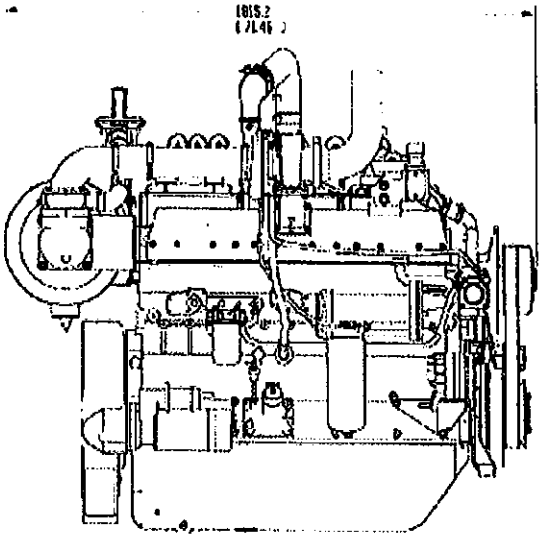
** Weight is approximate and varies with options.

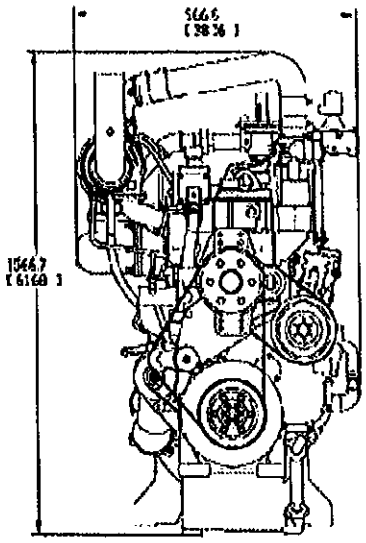
Engine Technical Data

Model	G855	GTA855	GTA855
Curve Number	FR-10523 (2)	FR-10688(2)	FR-10529(2)

Exhaust Type		Dry Manifold	Wet Manifold	Wet Manifold
Output Power (1)				
100%	HP (kW)	188 (140)	225(168)	286 (213)
Max Turn Down	HP (kW)	141 (105	169 (126)	215 (160)
Engine Speed				
100%	RPM	1800	1800	1800
Max Turn Down	RPM	1350	1350	1350
Aftercooler Water Inlet Temperature	°F (°C)	N/A	130 (54.4)	130 (54.4)
Compression Ratio		10:1	8.5:1	8.5:1
Emissions Data – Engine-Out Emissions (1)				
NOx	g/hp-hr (g-kW-hr)	5.9 (7.91)	12.1 (16.23)	7.6 (10.2)
CO	g/hp-hr (g-kW-hr)	26.7 (35.81)	2.9 (3.89)	1.1 (1.48)
THC	g/hp-hr	1.90	1.43	0.52
O2	g/hp-hr	0.54	0.41	4.20
Fuel Consumption (1)				
100%	BTU/hp-hr (MJ/kW-hr)	8605 (12.2)	8478 (12.0)	8224 (11.6)
75%	BTU/hp-hr (MJ/kW-hr)	9870 (14.0)	9077 (12.8)	8631 (12.2)
Heat Rejection (1)				
Jacket Water	BTU/min (kW)	8154 (143.38)	11445 (201.3))	12677 (223)
Aftercooler	BTU/min (kW)	N/A	807 (14.19)	1902 (33.5)
Exhaust	BTU/min (kW)	6674 (99.77)	8137 (143.08)	11792 (207.4)
Exhaust System (1)				
Flow Rate	ft3/min (L/s)	866 (409)	945 (446)	1851 (874)
Stack Temp	°F (°C)	1196 (647)	1304 (707)	1337 (725)
Max Back Pres.	in-Hg	2	2	2
Intake System (1)				
Flow Rate	ft3/min (L/s)	260 (123)	411 (194)	605 (286)
Max Restriction	in-H2O	15	15	15
Gas Pressure	Min - Max in-H2O	10-20	10-20	10-20

General Dimensions





Turbocharged model pictured above

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

*Dimensions are approximate and vary with options.

Disclaimers

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

Engine Finder Specifications

Markets	**Oil & Gas** **Gas Compression**
Power	157 - 286 hp / 117 - 213 kW

Ratings

Model	Curve Number	Rating	Emissions	Combustion

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

(1) NSPS compliant with customer installed Air-fuel ratio (AFR) controller and catalyst.

* Requires EPA site validation testing.

Features

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

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

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

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

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

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

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

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

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

Engine Performance Data

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

Industrial
GTA855
FR10688

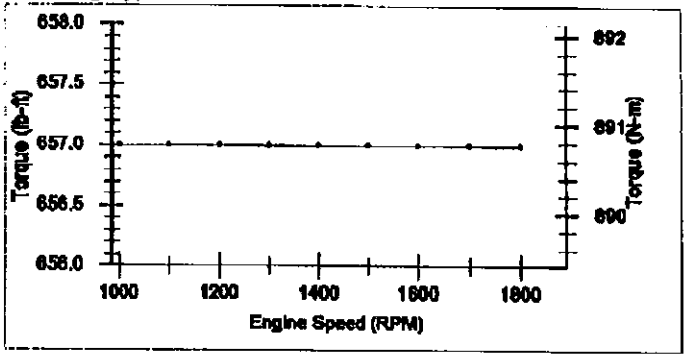
225 BHP (168 kW) @ 1800 RPM
657 lb-ft (891 N-m) @ 1800 RPM

Configuration	CPL Code	Revision
D253007CX02	10183	26-May-2011

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

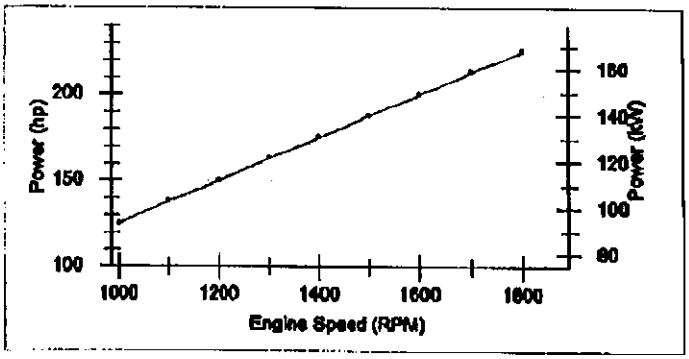
All data is based on the engine operating with fuel system, water pump, and 8 in H2O (1.99 kPa) inlet air restriction with 5 in (127 mm) inner diameter, and with 1.1 in Hg (4 kPa) exhaust restriction with 4 in (102 mm) inner diameter; not included are alternator, fan, optional equipment and driven components.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

Rating Type: Continuous/WMR



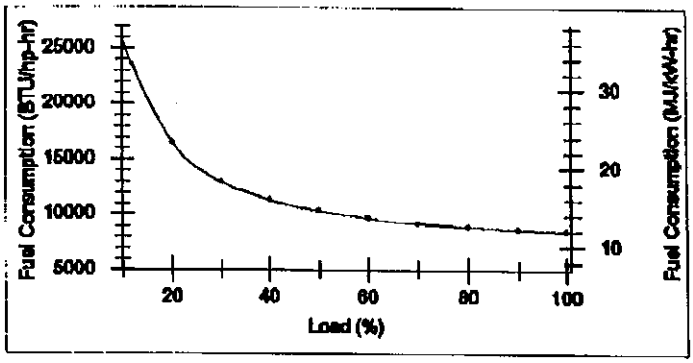
Torque Output

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



Power Output

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



Fuel Consumption @ 1,800 RPM

hp	kW	% Load	BTU/hp-hr	MJ/kW-hr
225	168	100	8,479	12
203	151	90	8,675	12.27
180	134	80	8,921	12.62
158	118	70	9,238	13.07
135	101	60	9,678	13.69
113	84	50	10,323	14.6
90	67	40	11,309	16
68	51	30	12,953	18.33
45	34	20	16,457	23.28
23	17	10	25,282	35.77

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

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

CHIEF ENGINEER:
Alfred S Weber

Bold entries revised after 1-Mar-2010

Intake Air System

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

Low Temperature Aftercooling System

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

Exhaust System

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

Lubrication System

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

Fuel System

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

Performance Data

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

	100% Load		75% Load		50% Load	
Engine Speed	1,800 RPM		1,800 RPM		1,800 RPM	
Output Power	225 hp	168 kW	169 hp	126 kW	113 hp	84 kW
Torque	657 lb-ft	891 N-m	493 lb-ft	668 N-m	330 lb-ft	447 N-m
Intake Manifold Pressure	9 in-Hg	30 kPa	2 in-Hg	7 kPa	-3 in-Hg	-11 kPa
Turbo Comp. Outlet Pressure	22 in-Hg	73 kPa	15 in-Hg	49 kPa	8 in-Hg	28 kPa
Turbo Comp. Outlet Temperature	235 deg F	113 deg C	196 deg F	91 deg C	159 deg F	71 deg C
Inlet Air Flow	411 ft3/min	194 L/s	329 ft3/min	155 L/s	236 ft3/min	111 L/s
Exhaust Gas Flow	945 ft3/min	446 L/s	757 ft3/min	357 L/s	553 ft3/min	261 L/s
Exhaust Gas Temperature	1,304 deg F	707 deg C	1,254 deg F	679 deg C	1,195 deg F	646 deg C
Heat Rejection to Coolant	11,445 BTU/min	201 kW	9,835 BTU/min	173 kW	8,237 BTU/min	145 kW
Heat Reject to Aftercooler Coolant	807 BTU/min	14 kW	584 BTU/min	10 kW	401 BTU/min	7 kW
Heat Rejection to Ambient	1,904 BTU/min	33 kW	1,707 BTU/min	30 kW	1,742 BTU/min	31 kW
Heat Rejection to Exhaust	8,137 BTU/min	143 kW	6,320 BTU/min	111 kW	4,287 BTU/min	75 kW
Fuel Consumption	8,476 BTU/hp-hr	12 MJ/kW-hr	9,077 BTU/hp-hr	13 MJ/kW-hr	10,323 BTU/hp-hr	15 MJ/kW-hr
Air Fuel Ratio (dry)	16.6 vol/vol		16.5 vol/vol		15.6 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	26 deg	26 deg
Total Hydrocarbons	1.43 g/hp-hr		1.35 g/hp-hr		1.49 g/hp-hr	
VOC ppm w/o Catalyst						
VOC ppm with Catalyst						
NOx	12.1 g/hp-hr	16.23 g/kW-hr	10.8 g/hp-hr	14.46 g/kW-hr	8.4 g/hp-hr	11.26 g/kW-hr
NOx ppm w/o Catalyst						
NOx ppm with Catalyst						
CO	2.9 g/hp-hr	3.89 g/kW-hr	4.4 g/hp-hr	5.9 g/kW-hr	4.5 g/hp-hr	6.03 g/kW-hr
CO ppm w/o Catalyst						
CO ppm with Catalyst						
CO2	524 g/hp-hr	703 g/kW-hr	555 g/hp-hr	744 g/kW-hr	588 g/hp-hr	789 g/kW-hr
O2	0.41 %		0.42 %		0.42 %	

Bold entries revised after 1-Mar-2010

Cranking System (Cold Starting Capability)

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

Noise Emissions

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

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

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

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

Change Log

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

End of Report

Bold entries revised after 1-Mar-2010

MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: TJ-11-1965

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Cummins
Model Number:	G 8.3
Power Output:	118 bhp
Lubrication Oil:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	528 acfm (cfm)
Exhaust Temperature:	1,127°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 (Fresh)
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
Diameter:	14 inches
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 Outputs (g/ bhp-hr)	Requested Emissions Targets
NOx	13.00	92%	1.00	1 g/bhp-hr
CO	8.60	77%	2.00	2 g/bhp-hr
NMNEHC	0.00	0%	0.70	.7 g/bhp-hr
Oxygen	0.5%			

MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.

USA COMPRESSION

USA Compression Partners, LLC

Date: January 13, 2014
Unit #: 5020
Customer: Stone Energy Corporation

To: Emissions Department
Stone Energy Corporation
6000 Hampton Drive, Suite B & E
Morgantown, WV 26505
304-225-1600

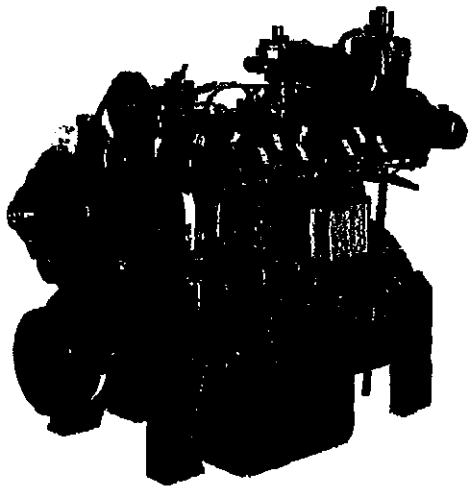
Lease Location: Winter 10

Please find the below information for the USA Compression unit number listed above:

Package Information	
Compressor Manufacturer:	Gardner Denver
Compressor Model:	SSPG99B
Compressor Serial Number:	S 268313
Compressor Cylinders:	N/A
Driver Manufacturer:	Cummins
Driver Model:	G8.3
Rated HP & Speed	118 HP @ 1800 RPM
Driver Type:	4-stroke Rich Burn
Engine Serial Number:	73407486
Engine Manufacturing Date:	8/1/2012
Engine Catalyst Model:	VXC-1408-04-HSG
Engine Catalyst Element:	VX-RE-08XC
Engine AFR Model:	AFR-1RD-10-TK2
Engine Stack Height:	9' 10"
Engine Stack Diameter:	4"
Operating Information	
Suction Pressure:	0 psig
Discharge Pressure:	50 psig
Design Capacity:	500 MSCFD
Gas Specific Gravity:	0.7

Emission Output information included in the attached catalyst specification sheet.

G8.3
Gas Compression Applications



Wellhead compression and artificial lift applications require reliability and durability not found in every small natural gas engine. For dependable operations and world class support, you need the Cummins G8.3 – a high-performance natural gas engine that shares the proven heritage of the Cummins C Series diesel engines and many of the same heavy-duty components. You can depend on the G8.3 to keep maintenance costs down and the gas flowing. Every day.

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

Bore	4.49 in (114 mm)
Stroke	5.32 in (135 mm)
Displacement	8.3 L (505 cubic in)
Engine Power*	99-135 hp (74-101 kW)
Compression Ratio	10.5:1
Aspiration	Naturally aspirated
Exhaust Type	Dry or watercooled manifold
Weight**	1480 lb (671 kg)
Coolant Capacity	2.9 gal (10.9 L)
Lube Oil Capacity	6.5 gal (32.0 L)
Rotation	Counterclockwise

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

Features

Designed for the oil and gas market, the G8.3 delivers exceptional dependability and low cost of operation.

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

Emissions – The G8.3 has catalyst ratings available to allow the engine to be operated as a rich burn engine and can be customer equipped with an AFR and catalyst to meet NSPS emissions requirements.

Air Handling – Naturally aspirated design delivers reliable performance and life.

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

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

Ignition System – Altronic CD1 integral electronic ignition system. Easily accessible spark plug location and single coil per cylinder for lower maintenance costs.

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

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

Rating Details.

Model	Curve Number	Rating	Emissions	Combustion	Exhaust Type Wet / Dry
G8.3	FR-92227	135 hp @ 2200 rpm	(1)	Rich	Wet
G8.3	FR-92223	135 hp @ 2200 rpm	(1)	Rich	Dry
G8.3	FR-92228	116 hp @ 1800 rpm	(1)	Rich	Wet
G8.3	FR-92224	116 hp @ 1800 rpm	(1)	Rich	Dry
G8.3	FR-92229	99 hp @ 1800 rpm	(1)	Rich	Wet
G8.3	FR-92225	99 hp @ 1800 rpm	(1)	Rich	Dry
G8.3	FR-92230	99 hp @ 1500 rpm	(1)	Rich	Wet
G8.3	FR-92226	99 hp @ 1500 rpm	(1)	Rich	Dry

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

Standard Equipment.

Air Inlet System
- Factory installed heavy duty air cleaner

Cooling System
- Gear driven jacket water pump
- Thermostat controlled jacket water circuit
- Coolant filter for added corrosion protection
- Auxiliary coolant pump optional for compressor cooling

Exhaust System
- Tuned dry manifold for optimal exhaust flow

Fuel System
- Impco carburetor
- Maxitrol regulator

Speed Control System
- Belt-driven mechanical governor
- Electronic governor optional

Ignition System
- Altronic CD1 integral electronic ignition system
- Altronic III Shielded ignition optional

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

Safety Shutoff Protection
- Electric fuel valve

Mounting Arrangement
- Four point mounting
- Lift provisions on engine

Flywheels and Flywheel Housings
- Flywheel SAE #3
- Flywheel housing – SAE #3 Cast-iron, machined to accommodate starter mounting
- SAE #2 and SAE #1 FW/FH options available

Electrical System
- 24-volt alternator

Starting System
- 24-volt starter
- Gas starter optional

Power Take-Off
- Front crankshaft pulley
- Front stub shaft optional

Gas/Site Analysis & Engine Selection/Derate Cummins Stationary Natural Gas Engines Date: 1/13/2014	Industrial G8.3 Available FR Number(s) From Selection: FR92224, FR92228	NG 118 HP (88 kW) @1800 RPM & 10.5:1 Compression Ratio Catalyst Fuel Rating Industrial Continuous

Engine (as entered by user)		
Application:	Industrial	
Fuel Type:	NG	
Engine:	G8.3	
Fuel Rating:	Catalyst	
Compression Ratio:	10.5:1	
RPM:	1800	
HP (Natural Gas):	118 HP (88 kW)	
HP (Propane):	NA HP (NA kW)	
Site (as entered by user)		
Ambient Air Temperature:	70° F	
Relative Humidity:	30%	
Altitude:	1500 ft	
Cooling Fan Load:	11 HP	
Generator Efficiency:	93%	
Vapor Pressure (Calculated from Site Conditions Entered):	0.222 inHg	
Dew Point (Calculated from Site Conditions Entered):	37.2° F	
Dry Barometer (Calculated from Site Conditions Entered):	28.11 inHg	
Derate (Natural Gas)		
Advertised NG Rating:	118 HP (88 kW)	
Engine Derate Due to Site Altitude and Temperature:	0%	
Engine Derate Due to Gas Composition:		
Derate Due to Low BTU Fuel:	0%	
Derate Due to Methane Number:	0%	
Total Power Available (%) After All Applicable Derates:	100% of rated	
Total Site Derate due to Altitude, Temperature, and Gas Composition:	0 HP (0 kW)	
Total Available Horsepower from Selected Engine Running on Specified Fuel Composition at Specified Site (includes 11 HP reduction for for cooling fan load):	107 HP (80 kW)	
Derate (Propane)		
Advertised Propane Rating:	NA HP (NA kW)	
Engine Derate Due to Site Altitude and Temperature:	NA%	
Total Power Available (%) After All Applicable Derates:	NA% of rated	
Total Site Derate due to Altitude and Temperature:	NA HP (NA kW)	
Total Available Horsepower from Selected Engine Running on Propane at Specified Site (includes 11 HP reduction for for cooling fan load):	NA HP (NA kW)	
Intake Manifold Requirements for Turbocharged Engines		
Maximum Allowed Intake Manifold Temperature for Selected Engine is na °F with a Maximum Aftercooler Water Inlet (CAC air inlet) of na °F based on FR92224		

Factory Set Points	Factory Supplied	Recommended
Engine Speed Target:	1800 rpm	
Spark Plug Gap:	0.020 in	⚠ NOTICE: A Change to Ignition Timing is Recommended Due to Methane Number of Fuel
Excess Oxygen Target-PV:	na %O2	
Propane Engine Timing Target:	na °BTDC	
Propane Gas over air Press at Carb Low:	na inH2O	
Propane Gas Press at Sec Reg Target:	na inH2O	
Excess Oxygen Target-NG:	0.52% O_2	
Natural Gas Engine Timing Target:	Factory: 28 °BTDC	Recommended Timing: 24 °BTDC
Natural Gas over air Press at Carb Target:	5 inH2O	
Natural Gas Press at Sec Reg Target:	15 inH2O	

FR92224 Created/Revised On: 4/26/2013. Data Files Updated On: 12/4/2013
References include ISO 3046-1, ISO 15550:2002, ASTM 3588, SAE 922359
For Reference and Estimation Purposes Only. This program does not Guarantee Engine Performance

Gas Sample Analysis		
Sample Name:	Name Sample	
Gas Compound:	Mole Fraction	
Hydrogen:	0	
Helium:	0	
Water:	0.131	
Carbon Monoxide:	0	
Nitrogen:	0	
Oxygen:	0	
Hydrogen Sulfide:	0	
Argon:	0	
Carbon Dioxide:	0.146	
Methane:	73.497	
Ethane:	16.291	
Propane:	6.273	
Iso-Butane:	0.726	
n-Butane:	1.752	
Iso-Pentane:	0.373	
n-Pentane:	0.437	
n-Hexane:	0.092	
n-Heptane:	0.024	
n-Octane:	0.006	
n-Nonane:	0.001	
n-Decane:	0	
Total Percent:	99.749%	
Lower Heating Value (LHV):	1171.9 Btu	
Specific Gravity (SG):	0.7485	
Wobbe Index (LHV/$\sqrt{SG}$):	1355 Btu/scf	
H/C Ratio:	3.4247	
Motor Octane Number:	108.4	
Methane Number:	53.2	
Fuel Flow Data		
BTU/HP-HR:	8266	
Maximum Fuel Flow (SCFH):	832	
Maximum Fuel Flow Calculation is Based on 100% Continuous Rating of 118 HP at 1800 RPM and 10.5:1 Compression Ratio from FR92224		
Gas Regulator Details		
The Industrial G8.3 uses a Maxitrol Regulator		Notes:

FR Differences for Selected Engine

Description of FR Differences for Selected Engine

	FR92224	FR92228
Exhaust Manifold	Dry	Wet
Excess Oxygen Target-NG	0.52	0.5
Exhaust Stack Temp High	1300	1150

Engine Performance Data

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

Industrial
G8.3
FR92228

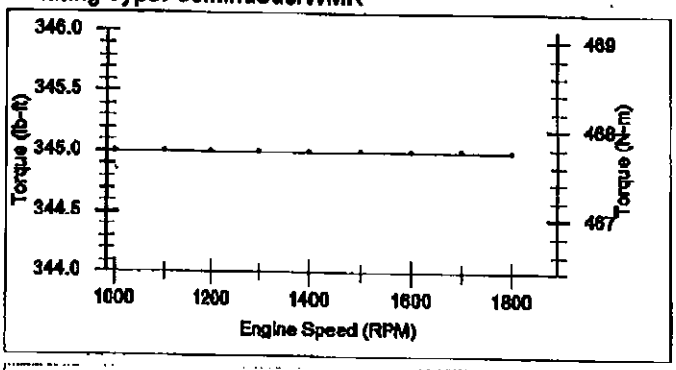
118 BHP (88 kW) @ 1800 RPM
344 lb-ft (466 N-m) @ 1800 RPM

Configuration	CPL Code	Revision
D551013CX03	2482	13-May-2011

Compression Ratio: 10.5:1
Fuel System: Field Gas, Dry Processed Nat Gas
Emission Certification: Non-certified, Catalyst
Displacement: 505 in3 (8.3 L)
Aspiration: Naturally Aspirated

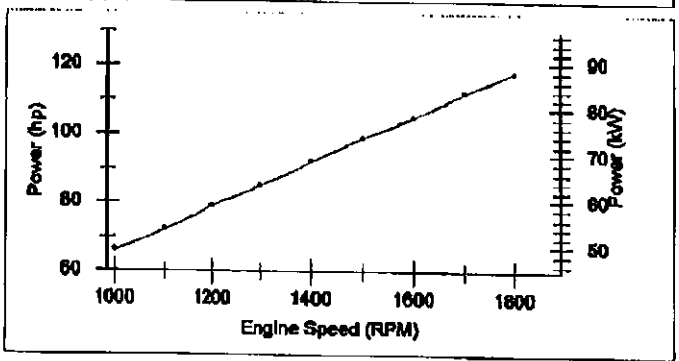
All data is based on the engine operating with fuel system, water pump, and 6 in H2O (1.49 kPa) inlet air restriction with 3 in (76 mm) inner diameter, and with 1 in Hg (3 kPa) exhaust restriction with 3 in (76 mm) inner diameter; not included are alternator, fan, optional equipment and driven components. 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



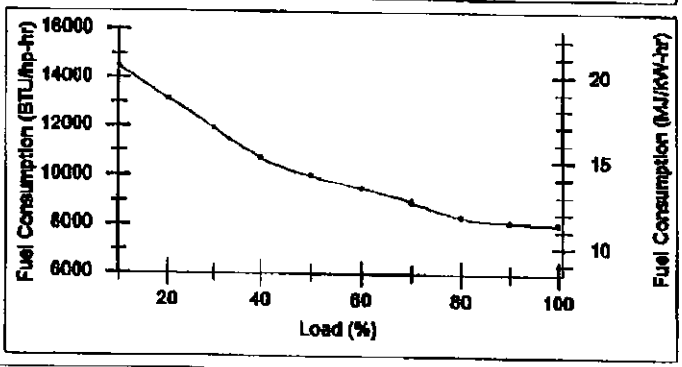
Torque Output

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	14,466	20.46

Data represents gross engine capabilities obtained and corrected in accordance with SAE J1995 using dry processed natural gas fuel with 936 BTU per standard cubic foot lower heating value. Deration may be required due to altitude, temperature and type of fuel. Consult Cummins Customer Engineering with operating questions.

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

CHIEF ENGINEER:
Alfred S Weber

Bold entries revised after 1-Mar-2010

Intake Air System

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

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	5,586 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	8,669 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		18.1 vol/vol	
Ignition timing (BTDC)	26 deg	26 deg	26 deg	26 deg	25 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

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 Inlets, Exhaust, Cooling System and Driven Components)

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

Altitude ft (m)	Ambient Temp deg F (deg C)					
	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

(740) 401-4000 Fax (740) 401-4005
100 AYERS BLVD. BELPRE, OHIO 45714
www.ediplungerlift.com

(423) 697-2292 (423) 520-2292 Fax (432)697-2310
P.O. Box 4185 MIDLAND, TEXAS 79704
2404 COMMERCE MIDLAND, TEXAS 79703
www.hy-bon.com

DATE: **12/18/2013**

TO: **Bill King**

MODEL: **The Abutec 20 & Abutec 100 Vapor Combustor Unit**

Bill:

In response to your inquiry, HY-BON Engineering, Co. is pleased to offer the following proposal for a HY-BON enclosed Vapor Combustor Unit (VCU). There are two models: ***Abutec 20*** (up to 22 mcfd) and ***Abutec 100*** (up to 100 mcfd) Medium Temperature Flares (MTF). Our VCU design incorporates HY-BON's 60+ years' experience with tank vapors with a combustor design which is highly effective, tested and certified "99% plus" for destruction of vent emissions from oil and condensate tank batteries, loading operations and storage facilities. The following items will show the advantages and benefits of incorporating this equipment into the Storage Tank facility:

ADVANTAGES OF USING HY-BON's UNIQUE Combustor Technology:

- **Operating Temperatures** up to 2100 degrees Fahrenheit
- **Compact & Easy to Install Design** (UNIT ARRIVES FULLY ASSEMBLED AND TESTED)
- **Completely Enclosed Combustion** prevents the environment from being exposed to IR radiation, heat and light. Low risk of fire.

Economically Efficient Vapor Elimination:

- Our enclosed VCU is a stainless steel enclosed flare design capable of meeting industry's regulations while offering you significant cost savings. This flare is proven throughout the world and is scalable to your application.
- Highest Destruction Removal Efficiency (DRE) in the industry
- Our Combustors are tested and certified according to EPA 40 CFR 60, Quad O. The MTF model achieves 99%+ DRE

- Offers “Alternate Operating Scenario” for Permit Compliance during maintenance of Vapor Recovery Units and other site operations.

Other relative points to note for the *Abutec 20* and *Abutec 100*:

- CDM Compliant
- EPA 40 CFR 60, Quad O Compliant
- Completely Enclosed Combustion
- Low Capital and Operating Costs
- Meets 40 CFR 60.18 regulations
- 99%+ Destruction Efficiency (third party verified)
- Very High Turndown Ratio
- Only requires 220 btu/ft^3 gas to maintain combustion
- Fully automated system based on pressure, with data logging on temperature, pressure, run time (additional parameters optional).
- Output via thumb drive, to a SCADA system, or wireless connection to company computer or IPHONE.
- High Temperature Flares (HTF) with 99.99% DRE are also available

Stack/Vent Height

- Stack/Vent height is important in dispersion of emissions and permitting.
- Effective stack height shall be calculated by the equation specified in 30 TAC §111.151(c) http://www.tceq.state.tx.us/assets/public/permitting/air/Announcements/og_pro_010018106.pdf
- The ***Abutec 20*** stack height is normally 12 ft**.** and ***Abutec 100*** is normally 16 ft. stack height but both come with an extension option of 20 ft. stack height.

Technical Summary:

Flare Gas Stream: *Abutec 20 Mscfd*
Type: Enclosed Tank Battery Flare Composition: 2200 btu/ft3 gas
Temperature: Ambient to 100°F +/- 20 deg°F
Flow Rate: up to 22,110 scfd (standard cubic feet per day) or 15 scfm
Auxiliary Fuel Requirements: Propane or Site Gas
Burner Size: 2.39 million BTU/hr (0.7 MW)
Inlet Pressure Requirements: 2-4 oz/in2 (3.5-7.0 “w.c.")
Turndown Ratio: 2:1
Mechanical
Design Wind Speed: 100 mph
Ambient Temperature: -30 deg°F up to 120 deg°F
Electrical Area Classification: General Area Classification (non-hazardous)
Elevation: Up to 3,000 ft ASL – please advise if higher elevation
Process

Smokeless Capacity: 100% Operating Temperature 1400 deg°F to 2100 deg°F (1500 deg°F Nominal); Retention Time 0.3 sec Flare Inlet Pressure 2-4 oz/in2 (3.5-7.0 "w.c.")

Utilities

Pilot Gas Process Gas

Electricity 1 Phase, 60 Hz, 120V / 10A (Solar Option) Auxiliary Fuel N/A

Emissions

Destruction Efficiency: 99% DRE

Flare Gas Stream: *Abutec 100 Mscfd*

Type: Enclosed Tank Battery Flare

Composition: 2200 btu/ft3 gas

Temperature: Ambient to 100°F +/- 20 deg°F

Flow Rate: up to 100,000 scfd (standard cubic feet per day) or 69.5 scfm

Auxiliary Fuel Requirements: Propane or Site Gas

Burner Size: 9.21 million BTU/hr (2.7 MW), Inlet Pressure Requirements 2-4 oz/in2 (3.5-7.0 "w.c.") Turndown Ratio 5:1

Mechanical

Design Wind Speed: 100 mph

Ambient Temperature: -30 deg°F up to 120 deg°F

Electrical Area Classification: General Area Classification (non-hazardous)

Elevation: Up to 3,000 ft ASL – please advise if higher elevation

Process

Smokeless Capacity: 100%

Operating Temperature: 1400 deg°F to 2100 deg°F (1500 deg°F Nominal); Retention Time 0.3 sec

Flare Inlet Pressure: 2-4 oz/in2 (3.5-7.0 "w.c.")

Utilities

Pilot Gas Process Gas

Electricity 1 Phase, 60 Hz, 120V / 10A (Solar Option) Auxiliary Fuel N/A

Emissions

Destruction Efficiency: 99% DRE

EPA Federal Environmental Compliance:

- The recent publication of the Federal Register applies the Quad O New Point Source regulations that state that all Storage Tank facilities constructed on or after August 23, 2011 will need to be at or below 6 Tons of VOC's per year.
  - Includes new source performance standards for VOC's and sulfur dioxide and new air toxics standards for oil and natural gas production and natural gas transmission.
  - "Condensate & crude oil storage tanks – Effects every tank battery (and all major modifications) installed since August 2011 with the "potential to emit" 6 tons or more of VOC's. This equates to 20 to 50 barrels of oil a day throughput, or 1 to 10 barrels of condensate – *basically every new tank battery in the United States.*
  - Requires all crude oil and condensate tanks to control their air toxics by at least 95 percent. In addition, emissions from these tanks will be counted towards determining whether a facility is a major source.
  - These new regulations require, by federal statute, a VRU, Combustor or a Flare on every new or modified oil and condensate tank battery across the United States installed or modified between August 23, 2011 and April 12, 2013. Each site must be in compliance

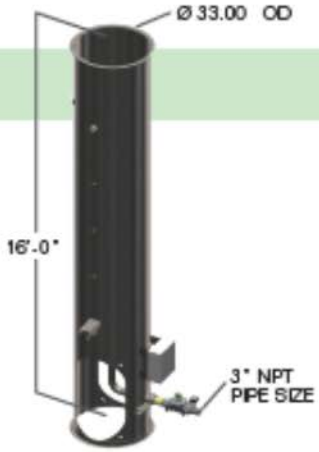
by April 15, 2015 for Group 1 Tanks. New Tanks (Group 2) installed after April 12, 2013 must be in compliance after April 15, 2014.

- The use of a HY-BON Enclosed Vapor Combustor, when combined with a HY-BON Vapor Recovery Tower and/or, HY-BON Vapor Recovery Unit (VRU) is considered a “Total Solutions Approach” to reducing emissions.

QUAD O COMPLIANT ENCLOSED VAPOR COMBUSTORS

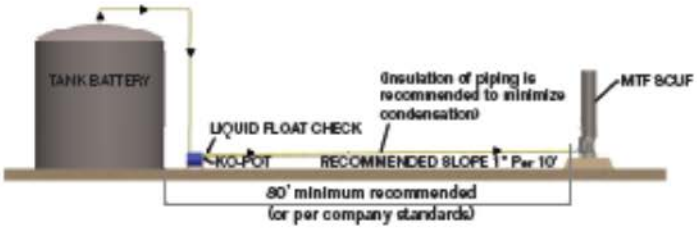
ABUTEC 20

- Flow – 0 – 20MSCFD
- Inlet pressure – as low as 2oz/in² and up to 120psig



ABUTEC 100

- Flow – 20 – 100MSCFD
- Inlet pressure – as low as 2oz/in² and up to 120psig



December 23, 2013

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

For: Stone Energy Corporation
6000 Hampton Center, Suite B
Morgantown, West Virginia 26505

Date Sampled: 12/03/13

Date Analyzed: 12/13/13

Sample: Lantz Mills No. 1H

Job Number: J36999

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Fuel Scrubber HC Liquid	Stock Tank
Pressure, psig	437	0
Temperature, °F	146	70
Gas Oil Ratio (1)	------	440
Gas Specific Gravity (2)	------	1.368
Separator Volume Factor (3)	1.3691	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.7304
Oil API Gravity at 60 °F	68.70
Reid Vapor Pressure, psi (5)	3.84

Quality Control Check			
	Sampling Conditions	Test Samples	
Cylinder No.	------	W-1106*	W-1018
Pressure, psig	437	389	336
Temperature, °F	146	70	70

(1) - Scf of flashed vapor per barrel of stock tank oil
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
(4) - Fraction of first stage separator liquid
(5) - Absolute pressure at 100 deg F
Analyst: T. G.
* Sample used for flash study
Base Conditions: 14.85 PSI & 60 °F

69.1 wt % VOC

MW = 39.02

Emiss Factor
30.8 lb VOC
661

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

December 18, 2013

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

For: Stone Energy Corporation
6000 Hampton Center, Suite B
Morgantown, West Virginia 26505

Sample: Lantz Mills No. 1H
Gas Evolved from Hydrocarbon Liquid Flashed
From 437 psig & 146 °F to 0 psig & 70 °F

Date Sampled: 12/03/13 Job Number: 36999.001

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	0.048	
Carbon Dioxide	0.085	
Methane	32.474	
Ethane	22.774	6.139
Propane	17.426	4.839
Isobutane	4.247	1.401
n-Butane	8.801	2.797
2-2 Dimethylpropane	0.138	0.053
Isopentane	3.732	1.376
n-Pentane	3.238	1.183
Hexanes	4.016	1.668
Heptanes Plus	3.021	1.340
Totals	100.000	20.794

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.543	(Air=1)
Molecular Weight	101.09	
Gross Heating Value	5422	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.368	(Air=1)
Compressibility (Z)	0.9851	
Molecular Weight	39.02	
Gross Heating Value		
Dry Basis	2290	BTU/CF
Saturated Basis	2251	BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: 0.126 Gr/100 CF, 2.0 PPMV or 0.0002 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: HB
Processor: ANB
Cylinder ID: FL# 8 S

David Dannhaus 361-661-7015

CHROMATOGRAPH EXTENDED ANALYSIS
TOTAL REPORT - GPA 2286

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	0.048		0.034
Carbon Dioxide	0.085		0.096
Methane	32.474		13.352
Ethane	22.774	6.139	17.550
Propane	17.426	4.839	19.693
Isobutane	4.247	1.401	6.326
n-Butane	8.801	2.797	13.110
2,2 Dimethylpropane	0.138	0.053	0.255
Isopentane	3.732	1.376	6.901
n-Pentane	3.238	1.183	5.987
2,2 Dimethylbutane	0.208	0.088	0.459
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.266	0.110	0.587
2 Methylpentane	1.275	0.533	2.816
3 Methylpentane	0.811	0.334	1.791
n-Hexane	1.456	0.603	3.216
Methylcyclopentane	0.116	0.040	0.250
Benzene	0.031	0.009	0.062
Cyclohexane	0.168	0.058	0.362
2-Methylhexane	0.400	0.187	1.027
3-Methylhexane	0.398	0.183	1.022
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.413	0.181	1.050
n-Heptane	0.449	0.209	1.153
Methylcyclohexane	0.314	0.127	0.790
Toluene	0.059	0.020	0.139
Other C8's	0.424	0.199	1.198
n-Octane	0.092	0.048	0.269
Ethylbenzene	0.003	0.001	0.008
M & P Xylenes	0.022	0.009	0.060
O-Xylene	0.003	0.001	0.008
Other C9's	0.092	0.047	0.298
n-Nonane	0.013	0.007	0.043
Other C10's	0.019	0.011	0.069
n-Decane	0.003	0.002	0.011
Undecanes (11)	0.002	0.001	0.008
Totals	100.000	20.794	100.000

69.1 wt % VOC
~69
68.968

Computed Real Characteristics Of Total Sample:

Specific Gravity	1.368	(Air=1)
Compressibility (Z)	0.9851	
Molecular Weight	39.02	

Gross Heating Value

Dry Basis	2290	BTU/CF
Saturated Basis	2251	BTU/CF

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Stone_Martin_T01
City:	Morgantown
State:	West Virginia
Company:	Stone Energy Corporation
Type of Tank:	Vertical Fixed Roof Tank
Description:	Produced Water - 400 BBL

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,800.00
Turnovers:	365.00
Net Throughput(gal/yr):	6,132,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	12.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Stone_Martin_T01 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	61.20	50.26	72.14	54.65	0.0068	0.0046	0.0096	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Stone_Martin_T01 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	5.6395
Vapor Space Volume (cu ft):	1,224.0621
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0801
Vented Vapor Saturation Factor:	0.9961
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,224.0621
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.8231
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000

Roof Outage (ft):	0.8231
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8231
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0068
Daily Avg. Liquid Surface Temp. (deg. R):	520.8667
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.3183
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0801
Daily Vapor Temperature Range (deg. R):	43.7657
Daily Vapor Pressure Range (psia):	0.0051
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0068
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0046
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0096
Daily Avg. Liquid Surface Temp. (deg R):	520.8667
Daily Min. Liquid Surface Temp. (deg R):	509.9253
Daily Max. Liquid Surface Temp. (deg R):	531.8081
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9961
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0068
Vapor Space Outage (ft):	10.8231
Working Losses (lb):	32.1148
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0068
Annual Net Throughput (gal/yr.):	6,132,000.0000
Annual Turnovers:	365.0000
Turnover Factor:	0.2489
Maximum Liquid Volume (gal):	16,800.0000
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	37.7543

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Stone_Martin_T01 - Vertical Fixed Roof Tank
Morgantown, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	32.11	5.64	37.75

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Stone_Martin_T02
City:	Morgantown
State:	West Virginia
Company:	Stone Energy Corporation
Type of Tank:	Vertical Fixed Roof Tank
Description:	Produced Water - 400 BBL

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,800.00
Turnovers:	365.00
Net Throughput(gal/yr):	6,132,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	12.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Stone_Martin_T02 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	All	61.20	50.26	72.14	54.65	0.0068	0.0046	0.0096	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Stone_Martin_T02 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	5.6395
Vapor Space Volume (cu ft):	1,224.0621
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0801
Vented Vapor Saturation Factor:	0.9961
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,224.0621
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.8231
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000

Roof Outage (ft):	0.8231
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8231
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0068
Daily Avg. Liquid Surface Temp. (deg. R):	520.8667
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.3183
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0801
Daily Vapor Temperature Range (deg. R):	43.7657
Daily Vapor Pressure Range (psia):	0.0051
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0068
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0046
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0096
Daily Avg. Liquid Surface Temp. (deg R):	520.8667
Daily Min. Liquid Surface Temp. (deg R):	509.9253
Daily Max. Liquid Surface Temp. (deg R):	531.8081
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9961
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0068
Vapor Space Outage (ft):	10.8231
Working Losses (lb):	32.1148
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0068
Annual Net Throughput (gal/yr.):	6,132,000.0000
Annual Turnovers:	365.0000
Turnover Factor:	0.2489
Maximum Liquid Volume (gal):	16,800.0000
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	37.7543

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Stone_Martin_T02 - Vertical Fixed Roof Tank
Morgantown, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	32.11	5.64	37.75

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Stone_Martin_T03
City:	Morgantown
State:	West Virginia
Company:	Stone Energy Corporation
Type of Tank:	Vertical Fixed Roof Tank
Description:	Condensate - 400 BBL

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,800.00
Turnovers:	273.75
Net Throughput(gal/yr):	4,599,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	12.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Stone_Martin_T03 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	61.20	50.26	72.14	54.65	8.3283	6.7954	10.1219	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Stone_Martin_T03 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	4,488.0563
Vapor Space Volume (cu ft):	1,224.0621
Vapor Density (lb/cu ft):	0.0894
Vapor Space Expansion Factor:	0.6492
Vented Vapor Saturation Factor:	0.1731
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,224.0621
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.8231
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000

Roof Outage (ft):	0.8231
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8231
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0894
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Daily Avg. Liquid Surface Temp. (deg. R):	520.8667
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.3183
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.6492
Daily Vapor Temperature Range (deg. R):	43.7657
Daily Vapor Pressure Range (psia):	3.3266
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	6.7954
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	10.1219
Daily Avg. Liquid Surface Temp. (deg R):	520.8667
Daily Min. Liquid Surface Temp. (deg R):	509.9253
Daily Max. Liquid Surface Temp. (deg R):	531.8081
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.1731
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	8.3283
Vapor Space Outage (ft):	10.8231
Working Losses (lb):	15,115.8557
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Annual Net Throughput (gal/yr.):	4,599,000.0000
Annual Turnovers:	273.7500
Turnover Factor:	0.2763
Maximum Liquid Volume (gal):	16,800.0000
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	19,603.9120

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Stone_Martin_T03 - Vertical Fixed Roof Tank
Morgantown, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 15.0)	15,115.86	4,488.06	19,603.91

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Stone_Martin_T04
City:	Morgantown
State:	West Virginia
Company:	Stone Energy Corporation
Type of Tank:	Vertical Fixed Roof Tank
Description:	Condensate - 400 BBL

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,800.00
Turnovers:	273.75
Net Throughput(gal/yr):	4,599,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	12.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Stone_Martin_T04 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	61.20	50.26	72.14	54.65	8.3283	6.7954	10.1219	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Stone_Martin_T04 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	4,488.0563
Vapor Space Volume (cu ft):	1,224.0621
Vapor Density (lb/cu ft):	0.0894
Vapor Space Expansion Factor:	0.6492
Vented Vapor Saturation Factor:	0.1731
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,224.0621
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.8231
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000

Roof Outage (ft):	0.8231
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8231
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0894
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Daily Avg. Liquid Surface Temp. (deg. R):	520.8667
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.3183
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.6492
Daily Vapor Temperature Range (deg. R):	43.7657
Daily Vapor Pressure Range (psia):	3.3266
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	6.7954
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	10.1219
Daily Avg. Liquid Surface Temp. (deg R):	520.8667
Daily Min. Liquid Surface Temp. (deg R):	509.9253
Daily Max. Liquid Surface Temp. (deg R):	531.8081
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.1731
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	8.3283
Vapor Space Outage (ft):	10.8231
Working Losses (lb):	15,115.8557
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Annual Net Throughput (gal/yr.):	4,599,000.0000
Annual Turnovers:	273.7500
Turnover Factor:	0.2763
Maximum Liquid Volume (gal):	16,800.0000
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	19,603.9120

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Stone_Martin_T04 - Vertical Fixed Roof Tank
Morgantown, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 15.0)	15,115.86	4,488.06	19,603.91

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Stone_Martin_T05
City:	Morgantown
State:	West Virginia
Company:	Stone Energy Corporation
Type of Tank:	Vertical Fixed Roof Tank
Description:	Condensate - 400 BBL

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,800.00
Turnovers:	273.75
Net Throughput(gal/yr):	4,599,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	12.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Stone_Martin_T05 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	61.20	50.26	72.14	54.65	8.3283	6.7954	10.1219	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Stone_Martin_T05 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	4,488.0563
Vapor Space Volume (cu ft):	1,224.0621
Vapor Density (lb/cu ft):	0.0894
Vapor Space Expansion Factor:	0.6492
Vented Vapor Saturation Factor:	0.1731
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,224.0621
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.8231
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000

Roof Outage (ft):	0.8231
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8231
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0894
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Daily Avg. Liquid Surface Temp. (deg. R):	520.8667
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.3183
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.6492
Daily Vapor Temperature Range (deg. R):	43.7657
Daily Vapor Pressure Range (psia):	3.3266
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	6.7954
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	10.1219
Daily Avg. Liquid Surface Temp. (deg R):	520.8667
Daily Min. Liquid Surface Temp. (deg R):	509.9253
Daily Max. Liquid Surface Temp. (deg R):	531.8081
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.1731
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	8.3283
Vapor Space Outage (ft):	10.8231
Working Losses (lb):	15,115.8557
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Annual Net Throughput (gal/yr.):	4,599,000.0000
Annual Turnovers:	273.7500
Turnover Factor:	0.2763
Maximum Liquid Volume (gal):	16,800.0000
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	19,603.9120

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Stone_Martin_T05 - Vertical Fixed Roof Tank
Morgantown, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 15.0)	15,115.86	4,488.06	19,603.91

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Stone_Martin_T06
City:	Morgantown
State:	West Virginia
Company:	Stone Energy Corporation
Type of Tank:	Vertical Fixed Roof Tank
Description:	Condensate - 400 BBL

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.00
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	16,800.00
Turnovers:	273.75
Net Throughput(gal/yr):	4,599,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Good
Roof Color/Shade:	Red/Primer
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	12.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Stone_Martin_T06 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	61.20	50.26	72.14	54.65	8.3283	6.7954	10.1219	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Stone_Martin_T06 - Vertical Fixed Roof Tank
Morgantown, West Virginia

Annual Emission Calcaulations	
Standing Losses (lb):	4,488.0563
Vapor Space Volume (cu ft):	1,224.0621
Vapor Density (lb/cu ft):	0.0894
Vapor Space Expansion Factor:	0.6492
Vented Vapor Saturation Factor:	0.1731
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,224.0621
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	10.8231
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000

Roof Outage (ft):	0.8231
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8231
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0894
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Daily Avg. Liquid Surface Temp. (deg. R):	520.8667
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.3183
Tank Paint Solar Absorptance (Shell):	0.8900
Tank Paint Solar Absorptance (Roof):	0.8900
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.6492
Daily Vapor Temperature Range (deg. R):	43.7657
Daily Vapor Pressure Range (psia):	3.3266
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	6.7954
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	10.1219
Daily Avg. Liquid Surface Temp. (deg R):	520.8667
Daily Min. Liquid Surface Temp. (deg R):	509.9253
Daily Max. Liquid Surface Temp. (deg R):	531.8081
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.1731
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	8.3283
Vapor Space Outage (ft):	10.8231
Working Losses (lb):	15,115.8557
Vapor Molecular Weight (lb/lb-mole):	60.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	8.3283
Annual Net Throughput (gal/yr.):	4,599,000.0000
Annual Turnovers:	273.7500
Turnover Factor:	0.2763
Maximum Liquid Volume (gal):	16,800.0000
Maximum Liquid Height (ft):	20.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	19,603.9120

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Stone_Martin_T06 - Vertical Fixed Roof Tank
Morgantown, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 15.0)	15,115.86	4,488.06	19,603.91

Sulfur Concentration Conversion Factors

Galvanic

1 Grain	= 0.0648 grams	
1cu ft.	= 28.316 liters	= 0.28316m^3
Molecular wt. H_2S	= 34.08	
Molecular wt. S	= 32.064	
1 gram mole gas	= 22.414 litres	@0°C & 14.75 PSI @-STP
1 gram mole gas	= 23.718 litres	@60° & 14.73 ST(commonSTP)
1 grain H_2S/100 SCF	= 22.88 mg/m^3	
1 grain H_2S/100 SCF	= 15.05 ppmv H_2S	@0°C & 14.75 PSI @ STP
1 grain H_2S/100 SCF	= 15.26 ppmv H_2S	@ 60°F & 14.73 PSI @STP
1 grain Sulf/100 SCF	= 15.99 ppmv/Sulfur	@ 0°C & 14.75 PSI @STP
1 grain Sulf/100 SCF	= 16.92 ppmv/ Sulfur	@ 60°F & 14.73 PSI @ STP
1 grain H_2S/100 SCF(Methane)	= 32 ppm wt./wt.	@ 0°C & 14.75 PSI @STP
1 grain H_2S/100 SCF(Methane)	= 33.9 ppm wt./wt.	@ 60°F & 14.73 PSI @ STP

Dow Gas Conditioning Fact Book

Multiply U.S.	By	To Obtain
Grains per Gallon	17.1	Parts per Million by weight
Grains H_2S per 100 SCF	0.001588	Mole percent H_2S
Grains H_2S per 100 SCF	1588 X 10 -8	Mole Fraction
Grains H_2S per 100 SCF	15	ppm (w/v)
Mole Percent H_2S	615	Grains H_2S per 100 SCF

Conversion Factors Commonly used by pipeline transmission companies for H_2S in Natural Gas

ppm to mg/m_3	multiply by 1.4331
mg/m_3 to grains/100SCF	multiply by 0.0437
ppm to grains/100 SCF	multiply by 0.0626285
grains/100 SCF to mg/m^3	multiply by 22.88277
mg/m^3 to ppm	multiply by 0.69778
grains/100SCF to ppm	multiply by 15.967

Specification for Sulfur Levels

Tariff Limits - H_2S

TCPL	23mg/m^3 OR 1 grain/100 SCF/100 SCF OR 16 ppm
NOVA	23mg/m^3 OR 1 grain/100 SCF/100 SCF OR 16 ppm
TRANS GAS	6mg/m^3 OR .26grain/100 SCF OR 4.2 ppm

Tariff Limits - Total Sulfur

TCPL	460 mg/m^3 OR 20.1 grains or 321 ppm
NOVA	115 mg/m^3 OR 5.03 grains OR 80 ppm
TRANS GAS	23mg/m^3 OR 1.00 grains OR 16 ppm

Total Sulfur Limits by Environment Canada

Gasoline	360 ppm,	Recommended interim measure as of January 1, 1997
	30 ppm by 2005	Canadian Environmental Protection Act, Registration SOR/97-110
Diesel	0.05 wt%	

Total Sulfur Limits by United States Environmental Protection Agency
Code of Federal Regulations, Title 40, Part 79, Section 79.55

Methane Base Fuel Specification	16 ppmv
Propane Base Fuel Specification	123 ppmw
Methanol Base Fuel Properties	40 ppmw
Ethanol Base Fuel Properties	40 ppmw
Gasoline Base Fuel Properties	339 ppmw
Diesel Base Fuel Properties	0.05 wt%

ATTACHMENT O

MONITORING/RECORDKEEPING/REPORTING/ TESTING PLANS

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

Monitoring

The company will at a minimum monitor hours of operation, visual emissions, site production throughputs, and planned and unplanned maintenance of permitted equipment comprising the facility.

Recordkeeping

The company will retain records for five (5) years, two (2) years on site, certified by a company official at such time that the DAQ may request said records.

The company will keep records of the items monitored, such as station throughput, hours of operation, planned maintenance activities, unplanned maintenance activities, and complaints regarding the facility.

Maintenance records will be kept in accordance with JJJJ on the engines.

Reporting

The company will report any control equipment malfunctions, emission limit or opacity deviations. The initial stack testing results will be reported in accordance with JJJJ.

Testing

Visual Emission (VE) testing will be conducted periodically. Initial engine testing will be conducted in accordance with JJJJ for the four (4) compressor engines.

ATTACHMENT P

PUBLIC NOTICE

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Stone Energy Corporation has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Rule 13 construction permit for a well pad facility located at the Martin site. Directions to the site are as follows: From the intersection of Rt. 7 and Rt. 2 southeast of New Martinsville, travel approximately 8.5 miles east on Rt. 7. The access road for the facility is located on the left. Go approximately 0.5 miles to facility. The latitude and longitude coordinates are: 39.61278 and -80.76611.

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

Pollutant	Tons/yr
NOx	16.48
CO	47.30
VOC	32.88
SO_2	1.48
PM_{10}	0.40
$PM_{2.5}$	0.40
Benzene	0.10
Toluene	0.13
Ethylbenzene	0.01
Xylenes	0.06
n-Hexane	2.50
Formaldehyde	0.66
Total HAPs	3.43

Startup of operation is planned to begin on or about the 15th day of July, 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the 29th day of April, 2014.

By: Stone Energy Corporation
Brian Burns
Civil Engineer, Appalachia Operations
1300 Fort Pierpont, Suite 201
Morgantown, WV 26508

ATTACHMENT Q

NOT APPLICABLE (SEE NOTE)

Note: No information contained within this application is claimed confidential.

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

ATTACHMENT R

NOT APPLICABLE (SEE NOTE)

Note: No delegation of authority.

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

ATTACHMENT S

NOT APPLICABLE (SEE NOTE)

Note: Not a Title V Permit Revision.

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015

ATTACHMENT T

PERMIT APPLICATION FEE

Rule 13 Permit Application

Martin Well Pad, New Facility
New Martinsville, West Virginia

Stone Energy Corporation
1300 Fort Pierpont, Suite 201
Morgantown, West Virginia

April 2015