



July 23, 2015

Mr. William F. Durham  
Director  
WVDEP, Division of Air Quality  
601 – 57<sup>th</sup> Street  
Charleston, West Virginia 25304

**Re: Permit Determination Request  
Stone Energy Corporation  
Martin Well Pad**

Dear Mr. Durham,

SLR International Corporation, on behalf of Stone Energy Corporation, is submitting for your consideration the attached Permit Determination Application for the Martin Well Pad. Due to changes to the production schedule, the number of wells to be completed has been significantly reduced at this site. Therefore, our revised estimates have predicted emissions below permitting thresholds.

If any additional information is needed, please contact me by telephone at (304) 545-8563 or by e-mail at [jhanshaw@slrconsulting.com](mailto:jhanshaw@slrconsulting.com).

Sincerely,  
**SLR International Corporation**

A handwritten signature in blue ink that reads "Jesse Hanshaw". The signature is fluid and cursive, written over the printed name.

Jesse Hanshaw P.E.

Principal Engineer

cc Richard Toothman Sr. Vice President - Appalachia, Stone Energy Corporation



global environmental solutions

Stone Energy Corporation

Martin Well Pad

New Martinsville, West Virginia

**Permit Determination**

SLR Ref 116.01038.00016

July 2015



global environmental solutions

## Permit Determination

### Martin Well Pad New Martinsville, West Virginia

Prepared for:



Stone Energy Corporation  
1300 Fort Pierpont  
Suite 201  
Morgantown, West Virginia 26508

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.

A handwritten signature in blue ink, appearing to read "Lori Smith".

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Lori Smith.  
Senior Engineer

A handwritten signature in blue ink, appearing to read "Jesse Hanshaw".

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Jesse Hanshaw P.E.  
Principal Engineer

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# **APPLICATION FOR PERMIT DETERMINATION**

## **Permit Determination**

**Martin Well Pad  
New Martinsville, West Virginia**

Stone Energy Corporation  
1300 Fort Pierpont, Suite 201  
Morgantown, West Virginia 26508



WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF AIR QUALITY  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Phone: (304) 926-0475  
www.dep.wv.gov/daq

**PERMIT DETERMINATION FORM  
(PDF)**

FOR AGENCY USE ONLY: PLANT I D # \_\_\_\_\_

PDF # \_\_\_\_\_ PERMIT WRITER \_\_\_\_\_

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):

**Stone Energy Corporation**

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

**Martin Well Pad**

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CODE:

**211111**

4A. MAILING ADDRESS:

1300 Fort Pierpont, Suite 201, Morgantown 26508

4B. PHYSICAL ADDRESS:

1.75 miles off Route 7, near New Martinsville, WV

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A):

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

5B. NEAREST ROAD:

Route 7

5C. NEAREST CITY OR TOWN:

**New Martinsville**

5D. COUNTY:

**Wetzel**

5E. UTM NORTHING (KM):

**4,384.807**

5F. UTM EASTING (KM):

**520.077**

5G. UTM ZONE:

**17**

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:

**Jesse Hanshaw**

6B. TITLE:

Principal Engineer

6C. TELEPHONE:

**304-545-8563**

6D. FAX:

**N/a**

6E. E-MAIL:

**jhsanshaw@slrconsulting.com**

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):

**N/a**

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):

**N/a**

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

**N/a**

8A. TYPE OF EMISSION SOURCE (CHECK ONE):

NEW SOURCE     ADMINISTRATIVE UPDATE

MODIFICATION     OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?

YES     NO

9. IS DEMOLITION OR PHYSICAL RENOVATION AT AN EXISTING FACILITY INVOLVED?     YES     NO

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:

**N/a**

10B. DATE OF ANTICIPATED START-UP:

**August 2015**

11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B.

11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C.

12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D. FOR CHEMICAL PROCESSES, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

**13A. REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.015	0.064
PM <sub>10</sub>	0.015	0.064
VOCs	0.221	0.996
CO	0.165	0.725
NO <sub>x</sub>	0.110	0.480
SO <sub>2</sub>	0.001	0.005
Pb	N/a	N/a
HAPs (AGGREGATE AMOUNT)	0.019	0.084
TAPs (INDIVIDUALLY)*	N/a	N/a
OTHER (INDIVIDUALLY)*	N/a	N/a

\* ATTACH ADDITIONAL PAGES AS NEEDED

**13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.**

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

**14. CERTIFICATION OF DATA**

I, **Richard L. Toothman** (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A **RESPONSIBLE OFFICIAL**\*\* (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: \_\_\_\_\_



**TITLE:** Sr. Vice President - Appalachia **Date:** 07 / 27 / 15

\*\* THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL' CAN BE FOUND AT 45CSR13, SECTION 2.23.

**NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS**

- ATTACHMENT A     ATTACHMENT B     ATTACHMENT C     ATTACHMENT D     ATTACHMENT E

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE

[www.dep.wv.gov/daq](http://www.dep.wv.gov/daq)

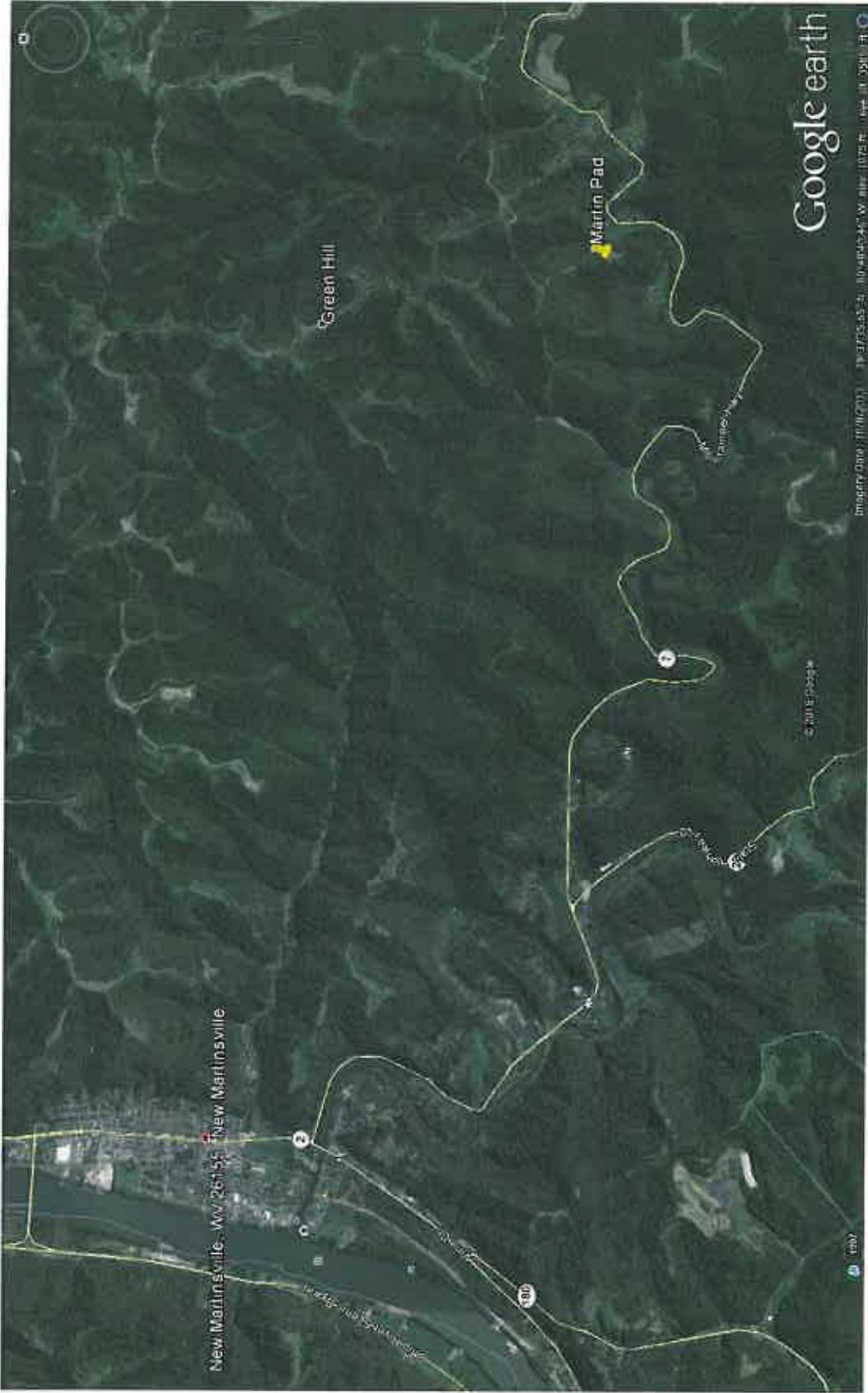
# **ATTACHMENT A**

## **AREA MAP**

### **Permit Determination**

**Martin Well Pad  
New Martinsville, West Virginia**

Stone Energy Corporation  
1300 Fort Pierpont, Suite 201  
Morgantown, West Virginia 26508



	Permit Determination – Attachment A Stone Energy Corporation Martin Pad Wetzel County, West Virginia
Area Map 07/21/2015	Job No: 116.01038.00016

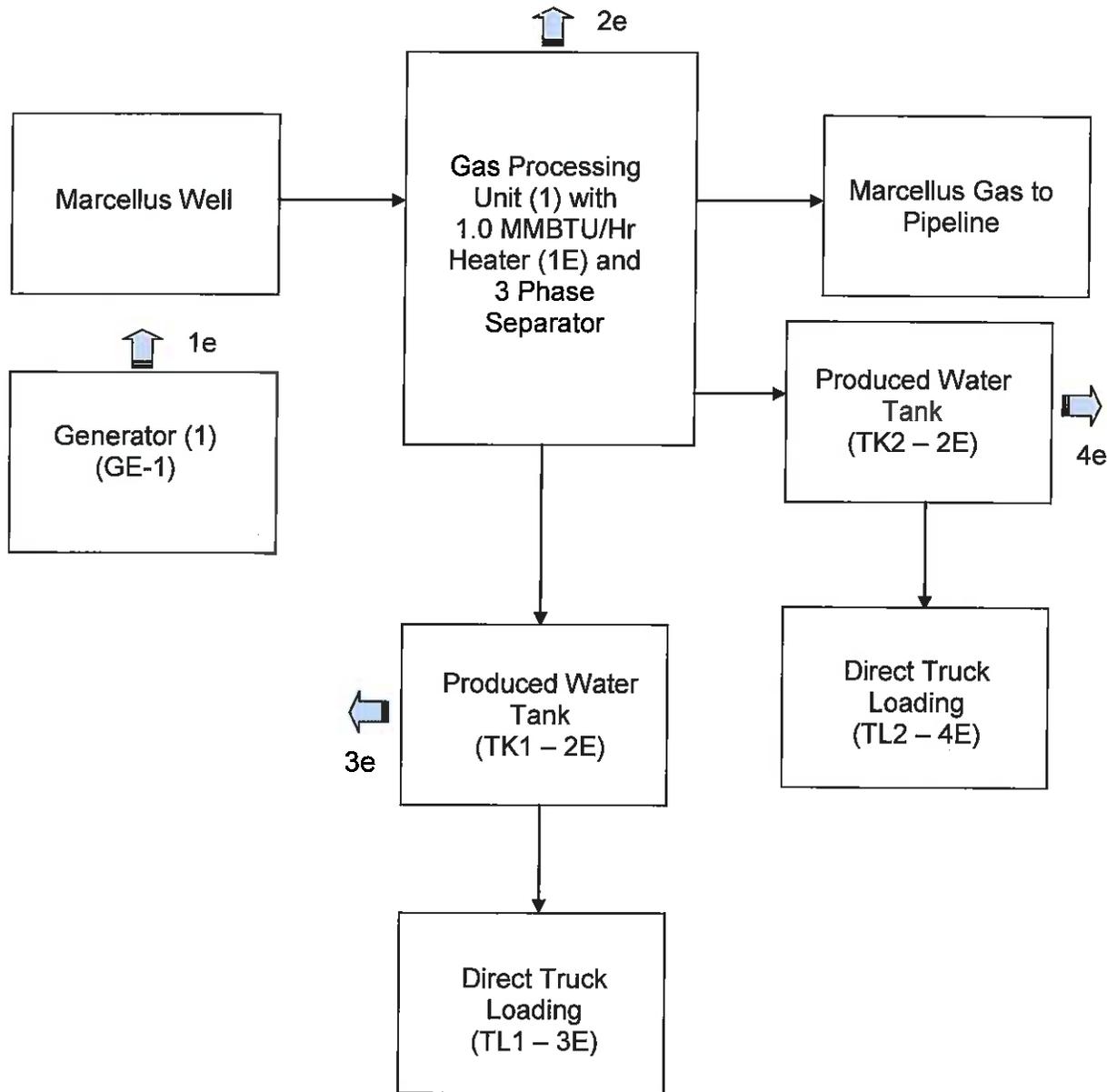
**ATTACHMENT B**

**PROCESS FLOW DIAGRAM**

**Permit Determination**

**Martin Well Pad**  
**New Martinsville, West Virginia**

Stone Energy Corporation  
1300 Fort Pierpont, Suite 201  
Morgantown, West Virginia 26508



**ATTACHMENT C**

**PROCESS DESCRIPTION**

**Permit Determination**

**Martin Well Pad**  
**New Martinsville, West Virginia**

Stone Energy Corporation  
1300 Fort Pierpont, Suite 201  
Morgantown, West Virginia 26508

## PROCESS DESCRIPTION

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### **Background Information**

On April 20, 2015, Stone Energy Corporation (Stone) submitted an application for permit coverage under 45CSR13 for the construction and operation of the Martin natural gas well pad. As a result, a request letter is being submitted concurrently to withdraw this original application. This change became necessary after the production schedule reduced the number of wells to be completed.

### **Proposed**

Based upon the changes to the 2015 production schedule the Martin Well Pad equipment has been significantly reduced. With a simpler, 1 well design, the resulting equipment needs consist of one GPU unit rated at 1.0 MMBtu/hr and two produced water tanks, 400bbl each.

Also, proposed is one 104.7 hp generator that provides prime power to the site's electric pumps. This is a 5.7L Power Solutions unit which has obtained EPA certification for prime power operations. As a result, the unit will be operated and maintained in accordance with the manufacturer's emission related operating practices.

Since the site will be utilizing a condensate pipeline no condensate will be stored onsite. There are two water tanks planned, but due the relatively low water throughput emissions from these tanks were estimated to be slightly less than 0.5 tpy VOC for the combination. The estimate takes into account a maximum water production rate of 100 bbl/d and representative direct measurements for a pressurized liquid sample taken from Stone's Pad #1. This gas to water ratio was measured by FESCO to be 0.012 lb/bbl VOC. The working and breathing losses as well as truck loading were evaluated using conservative assumptions and where found to be insignificant at less than 0.04 tpy VOC.

Due to these reduced equipment needs this well pad's potential to emit has been significantly reduced. As a result, this determination demonstrates the Martin Pad's emissions will be below 1 tpy of each criteria pollutant and less than 0.02 tpy HAPs.

## **ATTACHMENT D**

### **MATERIAL SAFETY DATA SHEETS (MSDS)**

#### **Permit Determination**

**Martin Well Pad  
New Martinsville, West Virginia**

Stone Energy Corporation  
1300 Fort Pierpont, Suite 201  
Morgantown, West Virginia 26508

**UNOCAL MATERIAL SAFETY DATA SHEET**

Product Name: Processed Natural Gas  
Product Code: None

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**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 H<sub>2</sub>S or mercaptans

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

Issue Date: 03/18/03  
Revised Sections: 1, 3

Status: Final Revised

## UNOCAL

Product Name: Processed Natural Gas  
 Product Code: None

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## 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,

Issue Date: 03/18/03  
 Revised Sections: 1, 3

Status: Final Revised

**UNOCAL**

Product Name: Processed Natural Gas  
Product Code: None

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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.

Issue Date: 03/18/03  
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Status: Final Revised

UNOCAL

Product Name: Processed Natural Gas  
Product Code: None

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**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 to 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

Issue Date: 03/18/03  
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Status: Final Revised

**UNOCAL**

Product Name: Processed Natural Gas  
Product Code: None

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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.

Issue Date: 03/18/03  
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Status: Final Revised

UNOCAL

Product Name: Processed Natural Gas  
Product Code: None

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**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 H<sub>2</sub>S 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.

Issue Date: 03/18/03  
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Product Name: Processed Natural Gas  
Product Code: None

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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, Liquefied  
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

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Product Code: None

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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.

Issue Date: 03/18/03  
Revised Sections: 1, 3

Status: Final Revised

**ATTACHMENT E**

**SUPPORTING CALCULATIONS**

**Permit Determination**

**Martin Well Pad**  
**New Martinsville, West Virginia**

Stone Energy Corporation  
1300 Fort Pierpont, Suite 201  
Morgantown, West Virginia 26508

**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
GPU Heater (tpy)	0.033	0.033	0.033	0.003	0.429	0.361	0.024	512.503
Tanks (tpy)	--	--	--	--	--	--	0.476	
Generator Engine	0.032	0.032	0.032	0.002	0.051	0.364	0.051	388.929
Truck Loading (tpy)	--	--	--	--	--	--	0.001	--
Fugitives (tpy)	--	--	--	--	--	--	0.415	5.912
<b>Total Emissions (tpy)</b>	<b>0.064</b>	<b>0.064</b>	<b>0.064</b>	<b>0.005</b>	<b>0.480</b>	<b>0.725</b>	<b>0.966</b>	<b>907.344</b>
<b>Total Emissions (lb/hr)</b>	<b>0.015</b>	<b>0.015</b>	<b>0.015</b>	<b>0.001</b>	<b>0.110</b>	<b>0.165</b>	<b>0.221</b>	<b>207.156</b>

**HAP PTE**

Source	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs Listed (tpy)
GPU Heater (tpy)	0.000	0.000	0.000	0.000	0.008	0.000	0.008
Engines (tpy)	0.005	0.002	0.000	0.001	0.000	0.068	0.076
<b>Total Emissions (tpy)</b>	<b>0.005</b>	<b>0.002</b>	<b>0.000</b>	<b>0.001</b>	<b>0.008</b>	<b>0.068</b>	<b>0.084</b>
<b>Total Emissions (lb/hr)</b>	<b>0.001</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.002</b>	<b>0.016</b>	<b>0.019</b>

**Table 2. GPU Heater (LH-1) 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)
	Factor	Units	Note		
<b>Criteria Pollutants</b>					
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.0075	0.0326
SO <sub>2</sub>	0.6	lb/MMcf	(1)	0.0006	0.0026
NO <sub>x</sub>	100	lb/MMcf	(2)	0.0980	0.4294
CO	84	lb/MMcf	(2)	0.0824	0.3607
VOC	5.5	lb/MMcf	(1)	0.0054	0.0236
<b>Hazardous Air Pollutants</b>					
Arsenic	2.0E-04	lb/MMcf	(3)	0.0000	0.0000
Benzene	2.1E-03	lb/MMcf	(4)	0.0000	0.0000
Beryllium	1.2E-05	lb/MMcf	(3)	0.0000	0.0000
Cadmium	1.1E-03	lb/MMcf	(3)	0.0000	0.0000
Chromium	1.4E-03	lb/MMcf	(3)	0.0000	0.0000
Cobalt	8.4E-05	lb/MMcf	(3)	0.0000	0.0000
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	0.0000	0.0000
Formaldehyde	7.5E-02	lb/MMcf	(4)	0.0001	0.0003
Hexane	1.8E+00	lb/MMcf	(4)	0.0018	0.0077
Lead	5.0E-04	lb/MMcf	(3)	0.0000	0.0000
Manganese	3.8E-04	lb/MMcf	(3)	0.0000	0.0000
Mercury	2.6E-04	lb/MMcf	(3)	0.0000	0.0000
Naphthalene	6.1E-04	lb/MMcf	(4)	0.0000	0.0000
Nickel	2.1E-03	lb/MMcf	(3)	0.0000	0.0000
PAH/POM	1.3E-03	lb/MMcf	(4)	0.0000	0.0000
Selenium	2.4E-05	lb/MMcf	(3)	0.0000	0.0000
Toluene	3.4E-03	lb/MMcf	(4)	0.0000	0.0000
<b>Total HAP</b>	<b>1.9E+00</b>	<b>lb/MMCF</b>		<b>0.0019</b>	<b>0.0081</b>
<b>Greenhouse Gas Emissions</b>					
CO <sub>2</sub>	116.89	lb/MMBtu	(5)	116.8891	511.9742
CH <sub>4</sub>	2.2E-03	lb/MMBtu	(5)	0.0022	0.0097
N <sub>2</sub> O	0.0	lb/MMBtu	(5)	0.0002	0.0010
CO <sub>2</sub> e <sup>(b)</sup>	-	-		117.0099	512.5034

**Calculations:**

(a) Annual emissions (lb/yr) = Annual  
Hours (MMBtu/hr) x MMCF/yr x Number

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

(b) CO<sub>2</sub> equivalent = [(CO<sub>2</sub> emissions)\*(GWP<sub>CO2</sub>)]+[(CH<sub>4</sub> emissions)\*(GWP<sub>CH4</sub>)]+[(N<sub>2</sub>O emissions)\*(GWP<sub>N2O</sub>)]  
Global Warming Potential (GWP)

CO <sub>2</sub>	1	(6)
CH <sub>4</sub>	25	(6)
N <sub>2</sub> O	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 (bbbls/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)
T01	Produced Water	NA	100.0	0.012 (1)	1.20	0.10	0.0543	0.2379
T02	Produced Water	NA	100.0	0.012 (1)	1.20	0.10	0.0543	0.2379
<b>Total</b>							<b>0.1086</b>	<b>0.4758</b>

**Calculations:**

(a) Flashing Emissions

$$\text{PTE emissions (lbs/day)} = [\text{Tank Throughput (bbbls/day)}] \times [\text{Flashing EF (lbs/bbls)}]$$

(b) Working and Breathing Emissions (2)

$$\text{PTE emissions (lbs/day)} = [\text{Tank 4.0 Emissions (lbs/year)}] / [(\text{days/yr})]$$

**Notes:**

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

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

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

Pollutant	Emission Factor	PTE (hr/yr)	FTE <sup>(a)</sup> (tons/yr)
<b>Criteria Pollutants</b>			
PM/PM10/PM2.5	9.50E-03 lb/MMBtu (2)	0.00721	0.03158
SO <sub>2</sub>	5.88E-04 lb/MMBtu (2)	0.00045	0.00195
NO <sub>x</sub>	0.05 g/HP-hr (1)	0.01154	0.05055
CO	0.36 g/HP-hr (1)	0.08310	0.36396
VOC	0.05 g/HP-hr (1)	0.01154	0.05055
<b>Hazardous Air Pollutants</b>			
1,1,2,2-Tetrachloroethane	2.53E-05 lb/MMBtu (2)	0.00002	0.00008
1,1,2-Trichloroethane	1.53E-05 lb/MMBtu (2)	0.00001	0.00005
1,3-Butadiene	6.63E-04 lb/MMBtu (2)	0.00050	0.00220
1,3-Dichloropropene	1.27E-05 lb/MMBtu (2)	0.00001	0.00004
Acetaldehyde	2.79E-03 lb/MMBtu (2)	0.00212	0.00927
Acrolein	2.63E-03 lb/MMBtu (2)	0.00200	0.00874
Benzene	1.58E-03 lb/MMBtu (2)	0.00120	0.00525
Carbon Tetrachloride	1.77E-05 lb/MMBtu (2)	0.00001	0.00006
Chlorobenzene	1.29E-05 lb/MMBtu (2)	0.00001	0.00004
Chloroform	1.37E-05 lb/MMBtu (2)	0.00001	0.00005
Ethylbenzene	2.48E-05 lb/MMBtu (2)	0.00002	0.00008
Ethylene Dibromide	2.13E-05 lb/MMBtu (2)	0.00002	0.00007
Formaldehyde	2.05E-02 lb/MMBtu (2)	0.01558	0.06814
Methanol	3.06E-03 lb/MMBtu (2)	0.00232	0.01017
Methylene Chloride	4.12E-05 lb/MMBtu (2)	0.00003	0.00014
Naphthalene	9.71E-05 lb/MMBtu (2)	0.00007	0.00032
PAH (POM)	1.41E-04 lb/MMBtu (2)	0.00011	0.00047
Styrene	1.19E-05 lb/MMBtu (2)	0.00001	0.00004
Toluene	5.58E-04 lb/MMBtu (2)	0.00042	0.00185
Vinyl Chloride	7.18E-06 lb/MMBtu (2)	0.00001	0.00002
Xylenes	1.95E-04 lb/MMBtu (2)	0.00015	0.00065
<b>Total HAP</b>		<b>0.025</b>	<b>0.10775</b>
<b>Greenhouse Gas Emissions</b>			
CO <sub>2</sub>	116.89 lb/MMBtu (3)	8.87E+01	3.89E+02
CH <sub>4</sub>	2.2E-03 lb/MMBtu (3)	1.67E-03	7.33E-03
N <sub>2</sub> O	2.2E-04 lb/MMBtu (3)	1.67E-04	7.33E-04
CO <sub>2</sub> e <sup>(b)</sup>	-	88.80	388.93

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 [1.10231131 x 10<sup>-6</sup> (ton/gram)]

(b) Annual emissions (tons/yr) = [Emission Factor (lb/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<sub>2</sub> equivalent = [(CO<sub>2</sub> emissions) \* (GWP<sub>CO2</sub>)] + [(CH<sub>4</sub> emissions) \* (GWP<sub>CH4</sub>)] + [(N<sub>2</sub>O emissions) \* (GWP<sub>N2O</sub>)]  
Global Warming Potential (GWP)

CO <sub>2</sub>	1	(8)
CH <sub>4</sub>	25	(8)
N <sub>2</sub> O	298	(8)

**Notes:**

- (1) Emission factors from Data Sheet on PSI Certified 5.7L Stationary Non-Emergency Engine Family
- (2) AP-42, Chapter 3.2, Table 3.2-3. *Natural Gas-fired Reciprocating Engines (7100)*. 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 5. Truck Loading (TL-1) VOC Emissions  
Stone Energy - Martin Gas Facility**

Contents	Volume Transferred	Loading Loss (lb VOC/1000gal) <sup>(a)</sup>	PTE VOC Emissions (lb/yr)	PTE VOC Emissions (tons/yr) <sup>(b)</sup>
Produced Water (fug)	3,650 gal/yr	0.731	0.000	0.001

**Calculations:**

(a) Loading Loss (lb/1000 gal) = 12.46 x [Saturation Factor (0.60)] x [True Vapor Pressure of Liquid Loaded (psia)] x [Molecular Weight of Vapors (lb/lb-mole)] / [Temperature of Bulk Liquid Loaded (°R)]

**Produced Water:**

Saturation factor= 0.60 (1)  
 Produced Water P<sub>vap</sub> (psia)= 1.2 (1)  
 Molecular Weight (lb/lb-mol)= 44.0 (2)  
 Bulk Liquid Temperature (F)= 80.0

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

**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 <sup>(a)</sup> Gas Service (tons/yr)
Valves	9.9E-03 lb/hr/source (1)	0.25
Low Bleed Pneumatic Valves	9.9E-03 lb/hr/source (1)	0.30
Flanges	8.6E-04 lb/hr/source (1)	0.04
Connectors	4.4E-04 lb/hr/source (1)	0.02
Other Points in Gas Service	1.9E-02 lb/hr/source (1)	1.28
<b>Total Gas Released</b>	-	<b>1.89</b>
<b>Total VOC Released (gas service)</b>	(b)	<b>0.41</b>
<b>Calculations:</b>	<b>Total CO2e</b> (c) (3)	<b>5.91</b>

(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=	300	(2)
Other Points in Gas Service =	200	(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

# 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 your 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 104°F 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 (96 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], 77°F (25°C) 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.<sup>3</sup> 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				
<b>Base Engine</b>		Power Solutions International		
<b>Displacement</b>		5.7 L (350 in <sup>3</sup> )		
<b>Overspeed Limit</b>		TBD		
<b>Regenerative Power</b>		TBD		
<b>Cylinder Block Configuration</b>		Cast iron		
<b>Cranking Current</b>		630 amps at ambient temperature of -18°C (0°F)		
<b>Battery Charging Alternator</b>		70 amps		
<b>Battery Type</b>		Group 24		
<b>Starting Voltage</b>		12-volt, negative ground		
<b>Standard Cooling System</b>		50°C (122°F) ambient radiator		
<b>Lube Oil Filter Types</b>		Single spin-on canister-combination full flow with bypass		
<b>Fuel</b>		<b>PRIME</b>		
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
<b>Cooling</b>		<b>Full Load</b>		
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)		
<b>Air</b>		<b>Full Load</b>		
Combustion Air		N/A		
Maximum Air Cleaner Restriction		203 mm H <sub>2</sub> O (8 in H <sub>2</sub> O)		
Alternator Cooling Air (ADS 204D)		0.26 m <sup>3</sup> /s (595 cfm)		
Radiator Cooling Air		N/A		
Maximum Restriction at Radiator Discharge (static)		13 mm H <sub>2</sub> O (0.5 in H <sub>2</sub> O)		
<b>Exhaust</b>		<b>Full Load</b>		
Gas Flow (Full Load)		260 L/sec (550 cfm)		
Gas Temperature		593° C (1100° F)		
Maximum Back Pressure		76 mm Hg (3 in Hg)		
<b>Engine</b>		<b>Full Load</b>		
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 40°C (104°F) ambient environment. Available temperature rise range from 80°C to 150°C (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	
<input type="checkbox"/>	120/208	<input type="checkbox"/>	240/416	<input type="checkbox"/>	220/380
<input type="checkbox"/>	127/220	<input type="checkbox"/>	254/440	<input type="checkbox"/>	347/600
<input type="checkbox"/>	139/240	<input type="checkbox"/>	277/480		
<input type="checkbox"/>	120/240				

### Specifications - Alternator

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

	80° C Alternator			105° C Alternator			125° C Alternator		
<b>Voltage Ranges</b>	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
<b>Motor Starting</b>	Broad Range 480 600			Broad Range 480 600			Broad Range 480 600		
<b>Maximum KVA (90% Sustained Voltage)</b>	N/A	N/A	N/A	231 (Shunt) 272 (PMG)	231 (Shunt) 272 (PMG)	231 (Shunt) 272 (PMG)	N/A	N/A	N/A
<b>Alternator Datasheet No.</b>	N/A	N/A	N/A	ADS204D	ADS204D	ADS204D	N/A	N/A	N/A
<b>Full Load Current</b>	120/240, 1 Ph	120/208V	127/220	139/240	220/380	240/416	254/440	277/480	347/600
<b>(Amps @ Standby Rating)</b>	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 +70°C (-40 to 158°F) HMI -20 to +70°C (-4 to 158°F)	-
Operating Altitude	up to 5000 meters (13,000 ft.)	-
<b>Alternator Data</b>		
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 40°C (104°F) temp change in 8 hours.	-
Current	3-Phase AC	-
Frequency	60 Hz	-
Battery Config	12 VDC	12 VDC
<b>Engine Data</b>		
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



**NPower**

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

Cummins and PowerCommand are registered trademarks of Cummins Inc.  
AmpSentry is a trademark of Cummins Inc.  
LonWorks is a registered trademark of Echelon

**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.



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

Emission Standards for Family Stationary Model

Non-Deteriorated Engine Catalyst Emissions (g/hp-hr) 1800 RPM on NG \*\*

THC	NMHC (VOC)	NOx	CO	CO2
N/A	0.7	1	2	N/A
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.



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

Issue Date:  
10/23/2013

Revision Date:  
N/A

  
Byron J. Bunker, Division Director  
Compliance Division

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.

November 15, 2013



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

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

Date Sampled: 10/25/13

Date Analyzed: 11/02/13

Job Number: J36377

Sample: Mill's Wetzel Pad 1 Well No. 4

FLASH LIBERATION OF SEPARATOR WATER		
	Separator	Stock Tank
Pressure, psig	380	0
Temperature, °F	82	70
Gas Water Ratio (1)	-----	1.33
Gas Specific Gravity (2)	-----	0.732
Separator Volume Factor (3)	1.000	1.000

MW = 21.12  
wt % VOC = 16.41

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

Piston No.: WF-157\*

Base Conditions: 14.65 PSI & 60 °F

Handwritten box containing:  
0.012 lb VOC  
661

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-861-7015

November 12, 2013

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

For: Stone Energy Corporation  
8000 Hampton Center, Suite B  
Morgantown, West Virginia 26505

Sample: Mill's Wetzel Pad 1 Well No. 4  
Gas Liberated from Separator Water  
From 380 psig & 82 °F to 0 psig & 70 °F

Date Sampled: 10/25/13

Job Number: 38377.021

**CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT**

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	2.811	
Carbon Dioxide	1.608	
Methane	76.625	
Ethane	13.003	3.505
Propane	3.074	0.854
Isobutane	0.574	0.189
n-Butane	1.024	0.325
2-2 Dimethylpropane	0.006	0.002
Isopentane	0.291	0.107
n-Pentane	0.241	0.088
Hexanes	0.325	0.135
Heptanes Plus	<u>0.518</u>	<u>0.215</u>
Totals	100.000	5.421

**Computed Real Characteristics Of Heptanes Plus:**

Specific Gravity ----- 3.427 (Air=1)  
Molecular Weight ----- 98.93  
Gross Heating Value ----- 5178 BTU/CF

**Computed Real Characteristics Of Total Sample:**

Specific Gravity ----- 0.732 (Air=1)  
Compressibility (Z) ----- 0.9965  
Molecular Weight ----- 21.12  
Gross Heating Value  
Dry Basis ----- 1214 BTU/CF  
Saturated Basis ----- 1193 BTU/CF

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

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas

Analyst: HB  
Processor: ANB  
Cylinder ID: WF# 11 S

David Dannhaus 361-661-7015

**CHROMATOGRAPH EXTENDED ANALYSIS  
TOTAL REPORT**

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	2.811		3.729
Carbon Dioxide	1.508		3.143
Methane	76.625		58.208
Ethane	13.003	3.505	18.514
Propane	3.074	0.854	6.419
Isobutane	0.574	0.189	1.580
n-Butane	1.024	0.325	2.818
2,2 Dimethylpropane	0.006	0.002	0.020
Isopentane	0.291	0.107	0.994
n-Pentane	0.241	0.088	0.823
2,2 Dimethylbutane	0.014	0.008	0.057
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.027	0.011	0.110
2 Methylpentane	0.099	0.041	0.404
3 Methylpentane	0.064	0.026	0.261
n-Hexane	0.121	0.050	0.494
Methylcyclopentane	0.027	0.009	0.108
Benzene	0.037	0.010	0.137
Cyclohexane	0.039	0.013	0.155
2-Methylhexane	0.034	0.016	0.161
3-Methylhexane	0.035	0.016	0.166
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.039	0.017	0.183
n-Heptane	0.049	0.023	0.232
Methylcyclohexane	0.063	0.026	0.293
Toluene	0.061	0.021	0.266
Other C8's	0.062	0.029	0.324
n-Octane	0.022	0.011	0.118
Ethylbenzene	0.000	0.000	0.000
M & P Xylenes	0.018	0.007	0.090
O-Xylene	0.003	0.001	0.015
Other C9's	0.018	0.009	0.108
n-Nonane	0.008	0.005	0.049
Other C10's	0.000	0.000	0.000
n-Decane	0.003	0.002	0.020
Undecanes (11)	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>
Totals	100.000	5.421	100.000

wt % VOC = 16.41

**Computed Real Characteristics Of Total Sample:**

Specific Gravity -----	0.732	(Air=1)
Compressibility (Z) -----	0.9965	
Molecular Weight -----	21.12	
Gross Heating Value		
Dry Basis -----	1214	BTU/CF
Saturated Basis -----	1193	BTU/CF