I.D. No. 103-00108 Reg. Pd15-053
Company Stone Energy Corporation
Facility Conley Production Region
Initials WMK

1300 Fort Pierpont Dr., Suite 201
Morgantown, WV 26508
Telephone: (304) 225-1600

RECEIVED
SEP 21 2015
WV DEP / DIV OF AIR QUALITY

September 18, 2015

Mr. William F. Durham
Director
WVDEP, Division of Air Quality
601 57th St., SE
Charleston, WV 25304

RE: Permit Determination Request
Stone Energy Corporation
Smith Production Facility, Wetzel County, West Virginia

Dear Mr. Durham,

Stone Energy Corporation is submitting, for your consideration, the attached Permit Determination Application for the Conley Production Facility located in Wetzel County, West Virginia.

If additional information is required, please contact me at (304) 225-1771 or by email at SelfridgeJA@StoneEnergy.com.

Sincerely,

Jennifer Selfridge

Jennifer Selfridge
Environmental Representative

Attachment

Entire Document
NON-CONFIDENTIAL

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th 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. # 103-00108

PDF # 15-083 PERMIT WRITER WTK

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):
Conley Production Facility

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:
211111

4A. MAILING ADDRESS:
1300 Fort Pierpont Dr., Suite 201
Morgantown, WV 26508

4B. PHYSICAL ADDRESS:
Mountaineer Highway (WV 7)
New Martinsville, WV 26155

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**):
From the intersection of WV 7 and WV 2 in New Martinsville, drive east on Mountaineer Highway/ WV 7 for approximately 6.25 miles. Turn right onto the access road, which is also a residential driveway. Use the bridge to drive over the creek and follow the access road to the production facility.

5B. NEAREST ROAD: WV 7

5C. NEAREST CITY OR TOWN: New Martinsville

5D. COUNTY: Wetzel

5E. UTM NORTHING (KM): 4384.106

5F. UTM EASTING (KM): 518.148

5G. UTM ZONE: 17N

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

6B. TITLE: Operations Engineer

6C. TELEPHONE: (304) 225-1631

6D. FAX: N/A

6E. E-MAIL: LandisJL@StoneEnergy.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: No

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: 10/18/2015

10B. DATE OF ANTICIPATED START-UP: 10/31/2015

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 PROCESSE, 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	0.0008	0.0037
PM_{10}	0.0008	0.0037
VOCs	0.0916	0.4012
CO	0.0089	0.0392
NO_x	0.0052	0.0226
SO_2	0.0003	0.0015
Pb	N/A	N/A
HAPs (AGGREGATE AMOUNT)	0.0001	0.0004
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, DIANE CORWIN (*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: OPERATIONS MANAGER DATE: 09/18/2015.

** 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***

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY - PERMITTING SECTION
601 57th Street, SE, Charleston WV 25304
Ph. (304) 926-0475 • www.dep.wv.gov/daq

INSTRUCTIONS FOR PERMIT DETERMINATION FORM (PDF)

These instructions are numbered corresponding to the items found on the PDF. The Permit Determination Form and the Instructions can be found on DAQ's web site at:

www.dep.wv.gov/daq

When using these directions in conjunction with the PDF application, use the check boxes found at the left of each numbered direction to ensure that the PDF application is completed in full. Please send the PDF along with its attachments to the address shown above.

☒ 1. **Name of applicant.** The name of the applicant should be listed as the exact name registered with the WV Secretary of State's Office, Corporate Registration Division. If the applicant is not registered with the WV Secretary of State's Office, such as a sole proprietorship, etc., please use the full name of the business as used on tax forms.

☒ 2. **Name of facility.** If this is the same as in item 1, mark as Not Applicable (N/A). In many cases, the official name and the facility name are different (for example, WV Logging, Inc. vs. Route 20 Sawmill or Joe's Coal Co., Inc. vs. Mine 2A). Also, many businesses have more than one location, so different names are used to denote them.

☒ 3. **North American Industry Classification System (NAICS) Code.** The NAICS Code is a six (6) digit code that describes different businesses and specific processes. NAICS Codes can be found at:

www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2007

☒ 4A. **Mailing Address.** This should be the address where the applicant receives mail.

☒ 4B. **Physical Address.** This may be the same as the mailing address. However, if the applicant uses a post office box to receive its mail, the physical location of the site needs to be provided (a house number used in a street address, a clearly marked mailbox on a rural route, etc). Please provide a detailed explanation in item 5A if needed.

☒ 5A. **Directions to Facility.** Please provide detailed directions on how to reach the facility outlined in the application. These directions should include all road or street designations and allow DAQ personnel to be able to drive to the facility. Also provide a clear copy of a map as **Attachment A** (a copy of a general county highway map will do).

☒ 5B. **Nearest Road.** Please provide the name and/or number of the nearest interstate, state or county route to the proposed or existing facility. If possible, these should be obtained from a WV highway map.

☒ 5C. **Nearest Town.** Please provide the name of the nearest town (incorporated or unincorporated) to the proposed or existing facility. If not available, list the nearest post office.

☒ 5D. **County.** Please provide the name of the county in which the proposed or existing facility is located. If located in more than one county, list the county where the entrance to the facility is located first, followed by the other county or counties.

☒ 5E, 5F, 5G. The **Universal Transverse Mercator (UTM) Coordinates** can be determined from 7.5 minute United States Geological Survey topographical maps. A program to convert longitude and latitude to UTM Coordinates can be found at:

www.ngs.noaa.gov/TOOLS/utm.shtml

☒ 6A. **Individual To Contact If More Information Is Required.** The employee that is assigned to fill out the application and provide corrections to DAQ Permitting should be listed here. Typically, this is an engineer or an environmental technician or coordinator. In the case of small companies, this may be the owner.

☒ 6B, 6C, 6D, 6E. For the person listed in item 6A, please provide his/her official title, direct-dial telephone number, fax number and an e-mail address if available.

☒ 7A. If the application in question is for an existing facility, please provide the eight (8) digit DAQ plant identification number. This can be found on the cover page of the permit issued to the facility pursuant to 45CSR13. It is also found in the upper right-hand corner of the "Certificate to Operate" that DAQ issues registered facilities every year upon payment of fees. (NOTE: Title V facility numbers are NOT to be used here.)

☐ 7B. If the application in question is for an existing facility, please provide each DAQ permit number that relates to part or all of the process outlined in the

application. This permit number will begin with "R13-"as in R13-####. Also, if a prior PDF has been submitted for the process in question, indicate, if possible, the date submitted. A permit determination issued in 1999, for instance, will have the format "PD99-###"; if issued in the year 2000, the designation would be "PD00-###", etc.

☒ 7C. **Is this PDF being submitted as the result of an enforcement action?** If yes, list.

☒ 8A. **Type of Emission Source.** Please check whichever of the boxes provided applies to the source outlined in the PDF application. A "new source" is one that has not yet been constructed (or is under construction, see definition of pre-construction activities in 45CSR13 sections 5.1 thru 5.3). A "modification" is a change that results in an increase or new emission at an existing source. An "administrative update" is a change to any part of an existing permit, from a purely administrative change (Class I), to an addition that results in an increase or new emission at an existing source covered by an DAQ permit (Class II). "Other" is for any situation which does not fit into any of the above, and should be explained fully in item 11B, Detailed Process Description.

☐ 8B. If the Administrative Update option is checked in item 8A, DAQ needs to obtain the applicant's consent to update the existing permit with the information contained in the PDF. This assures the applicant that their existing permit will be updated to reflect changes in this PDF. In this case, the "YES" box should be checked. If the "NO" box is checked, this may result in a delay of review of the process change.

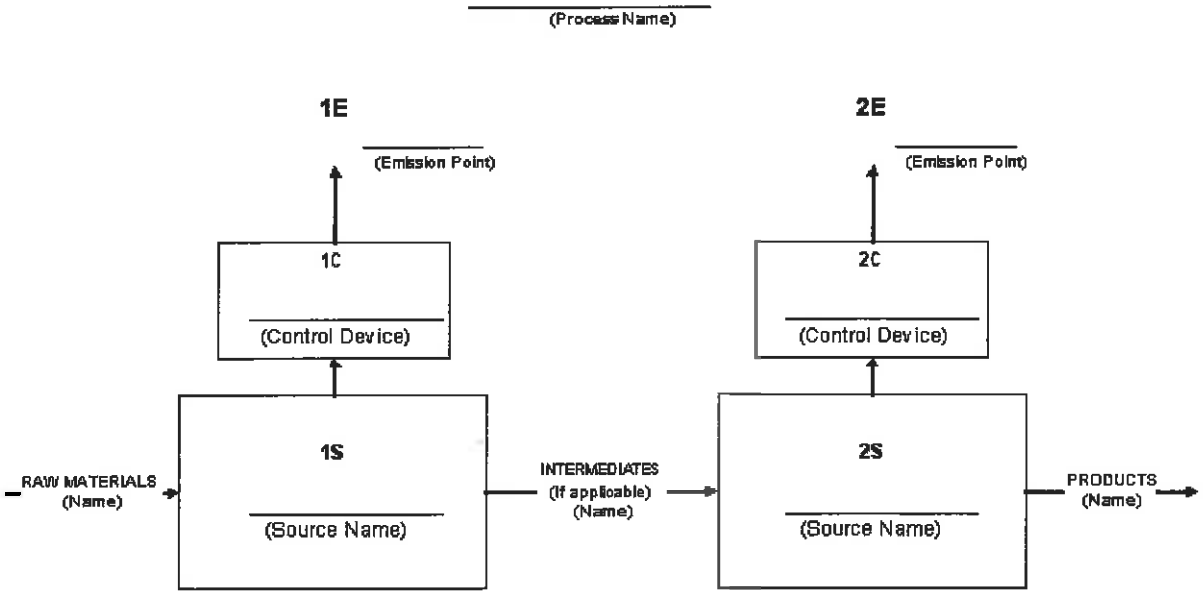
☒ 9. **Is Demolition or Physical Renovation at an Existing Facility Involved?** If YES is checked for item 9, CAUTION. The proposed facility addition or modification may be subject to the provisions of 45CSR15, "Emission Standards for Hazardous Air Pollutants Pursuant to 40 CFR Part 61." If the physical modification of the facility or process will involve the wrecking or removal of a load-bearing structural member, or the altering of one or more facility components in any way, please contact the DAQ's Asbestos Workgroup at (304) 926-0475, for further information. 45CSR15 addresses inspection, emission control standards, transportation, and disposal of asbestos-containing material. Exposure to asbestos fibers, a known carcinogen, represents a potentially serious health hazard for you and a potentially significant financial liability to your employer.

☒ 10A. **Date of Anticipated Installation.** Please provide the anticipated date that the proposed source(s) will begin to be installed or when the proposed changes will begin to occur.

☒ 10B. **Date of Anticipated Start-up.** Please provide the anticipated date that the proposed source(s) will begin to operate. Note that this date includes any de-bugging operations and systems testing that will occur before actual production begins.

☒ 11A. **Provide a Detailed Process Flow Diagram.** Attach a detailed PROCESS FLOW DIAGRAM(S) or schematic(s) (labeled as **ATTACHMENT B**) clearly showing the pieces of equipment (i.e. emission sources), air pollution control devices, and emission points that are associated with the proposed changes. Also, show other major vessels, operations, associated piping, and instrumentation, as appropriate, in an understandable line sequence of operation. Sizing and specifications of equipment should be shown, as appropriate, on schematic drawing. The degree of detail will depend on the complexity of the process(es) used. For example, chemical processes usually require a very detailed PROCESS FLOW DIAGRAM or series of such diagrams. Please clearly label each item. An example of a labeling system for the PROCESS FLOW DIAGRAM is shown below (Figure 1).

Figure 1



Note the different designations above:

- Emission Sources are labeled **1S, 2S, 3S,** etc.
- Control devices are labeled **1C, 2C, 3C,** etc.
- Emission points are labeled **1E, 2E, 3E,** etc.

If the facility has its own designations, these may be used instead.

☒ 11B. **Provide a Detailed Process Description.** Please provide a detailed description of the proposed plant, facility and/or process for which the PDF is being submitted (labeled as **ATTACHMENT C**). Make sure that the designations (1S, 2S, 3S, etc.) and the appropriate source/control device/emission point names are correlated to the Process Flow Diagram (item 11A) and listed with a complete description of each. Include information on all sources or operations from which emissions can potentially occur; the associated or proposed air pollution control devices; and all associated emission points including emergency relief vents. Material handling processes shall include hourly (lb/hr) and yearly (TPY) throughputs, as well as plans to minimize the generation of fugitive emissions to the air. Be sure to clearly outline the sequence of events, equipment use, and operating parameters.

☒ 12. Please Provide Material Safety Data Sheets (MSDS) for all materials processed, used or produced. Label each of these as **ATTACHMENT D1, D2, D3, etc.** corresponding to as many different MSDSs as are required for materials used in the processes outlined in the PDF.

☒ 13A. **Regulated Air Pollutant Emissions.** For a new facility, the plant wide emissions based on the Potential To Emit (PTE) for all pollutant groups outlined in item 13A needs to be calculated and listed here. For an existing facility the proposed change of PTE (i.e. proposed PTE minus permitted PTE) needs to be calculated and listed here. PTE for any given pollutant is typically calculated before air pollution control devices, or as if the process emissions are without control devices. Some consideration for control devices that are inherent in the process may be given after consultation with the DAQ. PTE calculations are typically based on maximum design capacity of the process. Hourly PTE must be calculated and provided in pounds per hour (LB/HR or PPH). Yearly PTE must be calculated in tons per year (TON/YR or TPY) as if the facility or process in question is running 8,760 hours per year (unless some limitation on the process or a specific work practice limits this in some way. Such limitations may be approved only after consultation with the DAQ). The **pollutant** groups listed in item 13A include:

- *Particulate Matter:* **PM** (all compounds of 30 microns in diameter and less);
- *Criteria pollutants:* Particular Matter **PM_{10}** (only compounds under 10 microns in diameter), Volatile Organic Compounds VOCs (defined in 40CFR51, 100(s)), Carbon Monoxide **CO**, Nitrogen Oxides **NOx** (NO, NO_2, NO_3), Sulfur Dioxide **SO_2,** and Lead **Pb** [Note that Lead has a much lower threshold on Table 45-13A]; (VOCs and NOx are precursors for Ozone formation);

- *Hazardous Air Pollutants:* **HAPs** are to be provided in aggregate (combined) form in item 13A but specified individually in the calculations outlined in item 13B; these 188 Hazardous Air Pollutants are listed in Section 112(b) of the 1990 Clean Air Act Amendment (see Appendix 1) and can also be found on the Internet at:
  www.epa.gov/ttn/uatw/orig189.html

- *Toxic Air Pollutants:* **TAPs** (pollutants with much lower triggering thresholds) are to be provided individually; attach additional pages as necessary to provide this information. TAPs are listed in 45CSR27 (see Appendix 2). The thresholds for TAPs in 45CSR27 are on a plant-wide basis (not just for the changes subject to this PDF);

- The *Other* category is provided for all other regulated pollutants not listed above, including Arsenic Compounds (inorganic), Asbestos, Beryllium, Lead or Lead compounds and Mercury, (listed in table 45-13A of 45CSR13, see Appendix 3); Mineral Acids per 45CSR7 (sulfuric acid mist, nitric acid mist and/or vapor, hydrochloric acid mist and/or vapor, phosphoric acid mist and/or vapor), etc. Please, list each "Other" pollutant individually. Attach additional pages as needed. The thresholds for the pollutants listed in Table 45-13A are on a plant-wide basis (not just for the changes subject to this PDF).

☒ 13B. **Please Provide All Supporting Calculations as ATTACHMENT E.** Calculate an hourly and yearly PTE for each process emission point shown in your Detailed Process Flow Diagram (item 11A) for each regulated air pollutant listed in item 13A. Be sure to include individual HAPs (see Appendix 1 for 188 HAPs); individual TAPs (listed in 45CSR27, Appendix 2); and other air pollutants listed in table 45-13A of 45CSR13 (Appendix 3), the Mineral Acids per 45CSR7 etc. Also include how emissions were derived, for example, using emission factors found in the U.S. Environmental Protection Agency's AP-42, A Compilation of Air Pollutant Emission Factors, 5th edition which can be found on the Internet at:

www.epa.gov/ttnchie1/ap42/

For existing sources that are major for the purposes of 45CSR14 or 45CSR19, please provide calculations of actual emissions from the process before the change proposed.

☒ 14. **Certification of Data.** Self-explanatory. Please, use blue ink. NO FAXS ALLOWED.

Attachment E. Supporting Calculations
Table 1. Annual Potential to Emit (PTE) Summary
Conley Production Facility

Criteria PTE							
Source	**PM**	**PM_{10}**	**$PM_{2.5}$**	**VOC**	**CO**	**NO_x**	**SO_2**
Line Heater (LH-1) (tpy)	0.0019	0.0019	0.0019	0.0001	0.0245	0.0206	0.0013
Produced Water Tank (T01) (tpy)	--	--	--	0.0518	--	--	--
Produced Water Tank (T02) (tpy)	--	--	--	0.0518	--	--	--
Generator (GN01) (tpy)	0.0018	0.0018	0.0018	0.0020	0.0147	0.0020	0.0001
Fugitives (tpy)	--	--	--	0.2955	--	--	--
Total Emissions (tpy)	0.0037	0.0037	0.0037	0.4012	0.0392	0.0226	0.0015
Total Emissions (lb/hr)	0.0008	0.0008	0.0008	0.0916	0.0089	0.0052	0.0003

Individual HAP PTE				
Source	**Ethane**	**Formaldehyde**	**Hexane**	**Total HAPs**
Line Heater (LH-1) (tpy)	0.0008	<0.0001	0.0004	0.0004
Generator (GN01) (tpy)	0.0134	0.0039	--	
Total Emissions (tpy)	0.0141	0.0039	0.0004	0.0004
Total Emissions (lb/hr)	0.0032	0.0009	0.0001	0.0001

Attachment E. Supporting Calculations
Table 2. Line Heater (LH-1) Rates and Emissions
Conley Production Facility

Pollutant	Data Source	Emission Factor (lb/MMCF)	Line Heater Emissions (lb/hr)	Line Heater Emissions (tpy)
Criteria Pollutant				
PM, PM_{10}, $PM_{2.5}$	1	7.6	0.0004	0.0019
VOCs	1	0.6	0.0000	0.0001
CO	2	100	0.0056	0.0245
NO_x	2	84	0.0047	0.0206
SO_2	1	5.5	0.0003	0.0013
Hazardous Air Pollutants				
Arsenic	3	2.00E-04	1.12E-08	4.90E-08
Benzene	4	2.10E-03	1.18E-07	5.15E-07
Beryllium	3	1.20E-05	6.72E-10	2.94E-09
Cadmium	3	1.10E-03	6.16E-08	2.70E-07
Chromium	3	1.40E-03	7.83E-08	3.43E-07
Cobalt	3	8.40E-05	4.70E-09	2.06E-08
Dichlorobenzene	4	1.20E-03	6.72E-08	2.94E-07
Ethane	4	3.10	1.73E-04	7.60E-04
Formaldehyde	4	7.50E-02	4.20E-06	1.84E-05
Hexane	4	1.80	1.01E-04	4.41E-04
Lead	3	5.00E-04	2.80E-08	1.23E-07
Manganese	3	3.80E-04	2.13E-08	9.31E-08
Mercury	3	2.60E-04	1.45E-08	6.37E-08
Naphthalene	4	6.10E-04	3.41E-08	1.50E-07
Nickel	3	2.10E-03	1.18E-07	5.15E-07
PAH/POM	4	1.30E-03	7.27E-08	3.19E-07
Selenium	3	2.40E-05	1.34E-09	5.88E-09
Toluene	4	3.40E-03	1.90E-07	8.33E-07
Total HAPs		4.99	0.0003	0.0012

Calculations:

Number of line heaters:	1	
Line Heater Fuel use (MMBtu/hr):	1	
Natural Gas Heat Content (Btu/scf)	1020	AP-42, Chapter 4, Section 4.1.1
Operating Hours, Max. (hr/yr):	500	
Annual Fuel Use (MMcf/yr):	0.490	

Annual Emissions (tpy) =
Annual Fuel Use (MMCF/yr) * Number of Line Heaters * Emission Factor (lb/MMCF) / (2000 lb/1 t)

Source:

(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 Compopunds From Natural Gas Combustion, July 1998

Stone Energy Corporation
Permit Determination Application
Conley Production Facility
Wetzel County, West Virginia

Attachment E. Supporting Calculations
Table 3. Tank Potential to Emit Emissions
Conley Production Facility

Emission Unit	Tank Contents	Control Devices	Tank Throughput (bbl/day)	Flashing EF (lb/bbl)	Flashing Emissions[1,2] (lb/day)	Working and Breathing Emissions[3] (lb/day)	VOC Emissions (lb/hr)	VOC Emissions (tpy)
T01	Produced Water	N/A	22	0.012	0.264	0.0197	0.0118	0.0518
T02	Produced Water	N/A	22	0.012	0.264	0.0197	0.0118	0.0518
Total							0.0236	**0.1035**

Tank	gal/yr	bbl/yr	bbl/day
Produced Water Tank, T01	337260	8030	22
Produced Water Tank, T02	337260	8030	22

Produced Water Tank, Distillate Fuel Oil No. 2			
Losses	**lb/yr**	**tpy**	**lb/day**
Working Loss	5.1016	0.0026	0.0140
Breathing Loss	2.0767	0.0010	0.0057
Total Emissions	7.1783	0.0036	0.0197

Notes:
(1) Flashing EF from FESCO, Mills Wetzel Pad 1, Flash liberation of separator water data
(2) Flashing Emissions calculation:
PTE emissions (lb/day) = Tank Throughput (bbls/day) * Flashing EF (lb/bbl)
(3) Working and Breathing Emissions calculation:
PTE emissions (lb/day) = Tank 4.0.9d Output (lb/yr) / Operating Hours (day/yr)

Attachment E. Supporting Calculations
Table 4. Natural Gas-Fired Generator (GN01) Rates and Emissions
Conley Production Facility

Pollutant	Data Source	Emission Factor (lb/MMBtu)	PTE (lb/hr)	PTE (tpy)
Criteria Pollutant				
PM_{10}, $PM_{2.5}$	1	9.50E-03	0.00041	0.00180
PM	1	9.91E-03	0.00043	0.00188
VOCs	2	0.05 g/hp-hr	0.00047	0.00204
CO	2	0.36 g/hp-hr	0.00335	0.01467
NO_x	2	0.05 g/hp-hr	0.00047	0.00204
SO_2	1	5.88E-04	0.00003	0.00011
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	1	2.53E-05	1.10E-06	0.00000
1,1,2-Trichloroethane	1	1.53E-05	6.63E-07	0.00000
1,1-Dichloroethane	1	1.13E-05	4.89E-07	0.00000
1,2-Dichloroethane	1	1.13E-05	4.89E-07	0.00000
1,2-Dichloropropane	1	1.30E-05	5.63E-07	0.00000
1,3-Butadiene	1	6.63E-04	0.00003	0.00013
1,3-Dichloropropene	1	1.27E-05	5.50E-07	0.00000
Acetaldehyde	1	2.79E-03	0.00012	0.00053
Acrolein	1	2.63E-03	0.00011	0.00050
Benzene	1	1.58E-03	0.00007	0.00030
Butyr/isobutyraldehyde	1	4.86E-05	2.11E-06	0.00001
Carbon Tetrachloride	1	1.77E-05	7.67E-07	0.00000
Chlorobenzene	1	1.29E-05	5.59E-07	0.00000
Chloroform	1	1.37E-05	5.93E-07	0.00000
Ethane	1	7.04E-02	0.00305	0.01336
Ethylbenzene	1	2.48E-05	1.07E-06	0.00000
Ethylene Dibromide	1	2.13E-05	9.23E-07	0.00000
Formaldehyde	1	2.05E-02	0.00089	0.00389
Methanol	1	3.06E-03	0.00013	0.00058
Methylene Chloride	1	4.12E-05	1.78E-06	0.00001
Naphthalene	1	9.72E-05	4.21E-06	0.00002
PAH	1	1.41E-04	0.00001	0.00003
Styrene	1	1.19E-05	5.15E-07	0.00000
Toluene	1	5.58E-04	0.00002	0.00011
Vinyl Chloride	1	7.18E-06	3.11E-07	0.00000
Xylene	1	1.95E-04	0.00001	0.00004
Total HAPs			0.00446	0.01952

Calculations:

Engine Power Output (kW)	55	Engine spec sheet
Engine Power Output (hp)	74	Generator spec sheet
Number of Engines	1	
Fuel Throughput (ft^3/hr)	744	Engine spec sheet
Natural Gas Heat Content (Btu/scf)	1020	AP-42, Chapter 4, Section 4.1.1
BSFC (Btu/hp-hr)	10255.14	= Heat Content * Fuel Throughput / Engine hp
Operating Hours (hr/yr):	500	Generator for emergency use only

Annual Emissions (tpy) = Operating Hours (hr/yr) * Number of Engines * Emission Factor (lb/MMBtu) * Fuel Throughput (ft3/hr) * Heat Content (Btu/scf) * (1 MMBtu/ 1.0E06 Btu) * (1 t/ 2000 lb)

Annual Emissions (tpy) = Operating Hours (hr/yr) * Number of Engines * Emission Factor (g/hp-hr) * Power Output (hp) * (1 lb/ 454 g) * (1 t/ 2000 lb)

Source:

(1) AP-42, Chapter 3.2, Table 3.2-3, Uncontrolled Emission Factors For 4-Stroke Rich-Burn Engines, July 1998

(2) PSI Certified 5.7L Stationary Non-Emergency Engine Family data sheet

Attachment E. Supporting Calculations
Table 5. Fugitive Leak Emissions
Conley Production Facility

Component	Default Average Count[1]	Emission Factor[2] (lb/hr/source)	PTE[3] (tpy)
Valves	23	0.0099	0.999
Connectors	109	0.0004	0.211
Open-Ended Lines	2.5	0.0044	0.048
Pressure Relief Valves	1	0.0194	0.085
Total Gas Emission	--	--	1.343
Total VOC Emission[4]	--	--	**0.296**

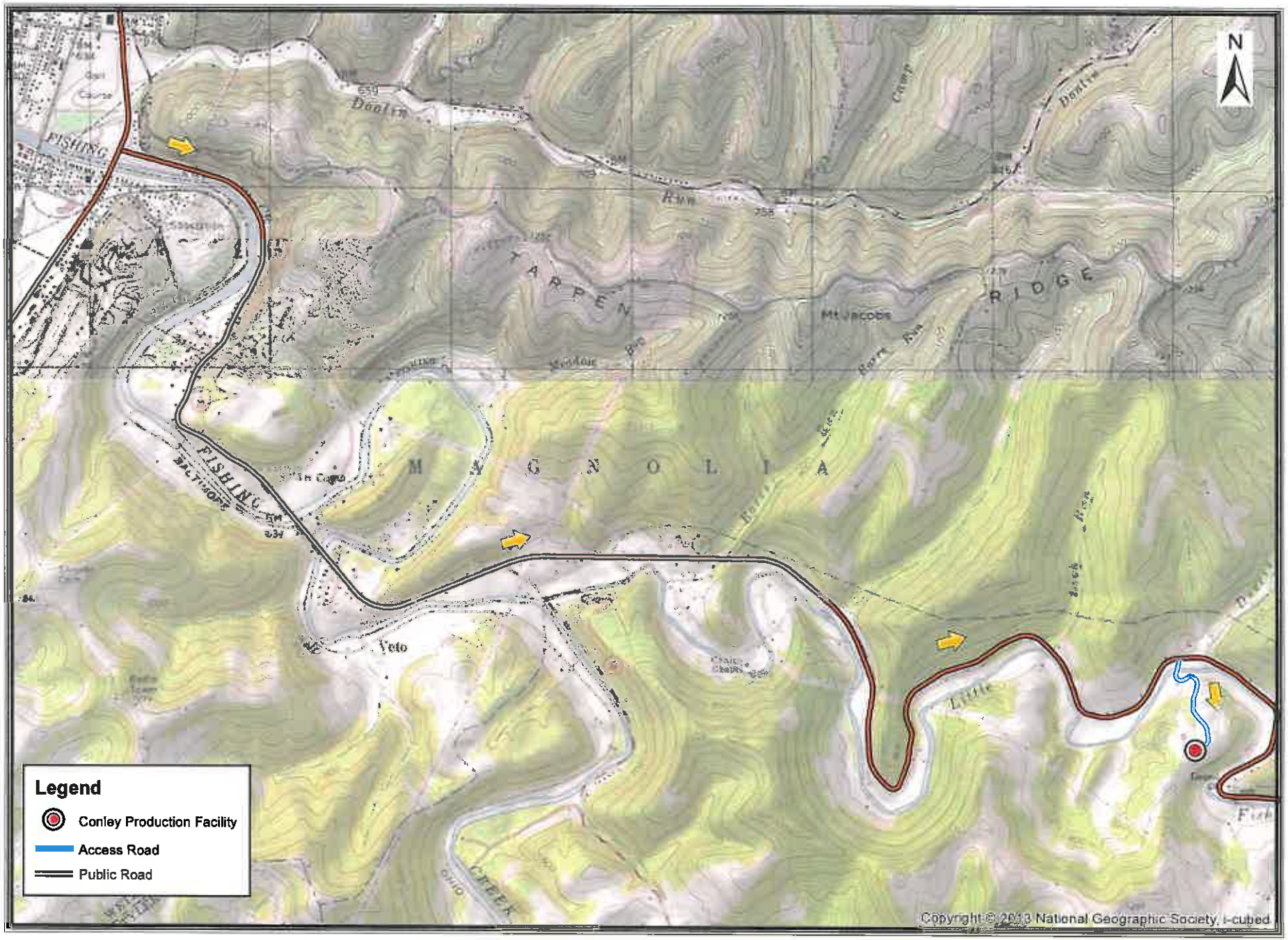
Note:

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

(2) 1995 Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, USEPA. Table 2-4. Oil and Gas Production Operations Average Emission Factors

(3) Annual Emissions (tpy) = Emission Factor (lb/hr/source) * Count * Operating Hours (hr/yr) * 1 ton/2000 lb

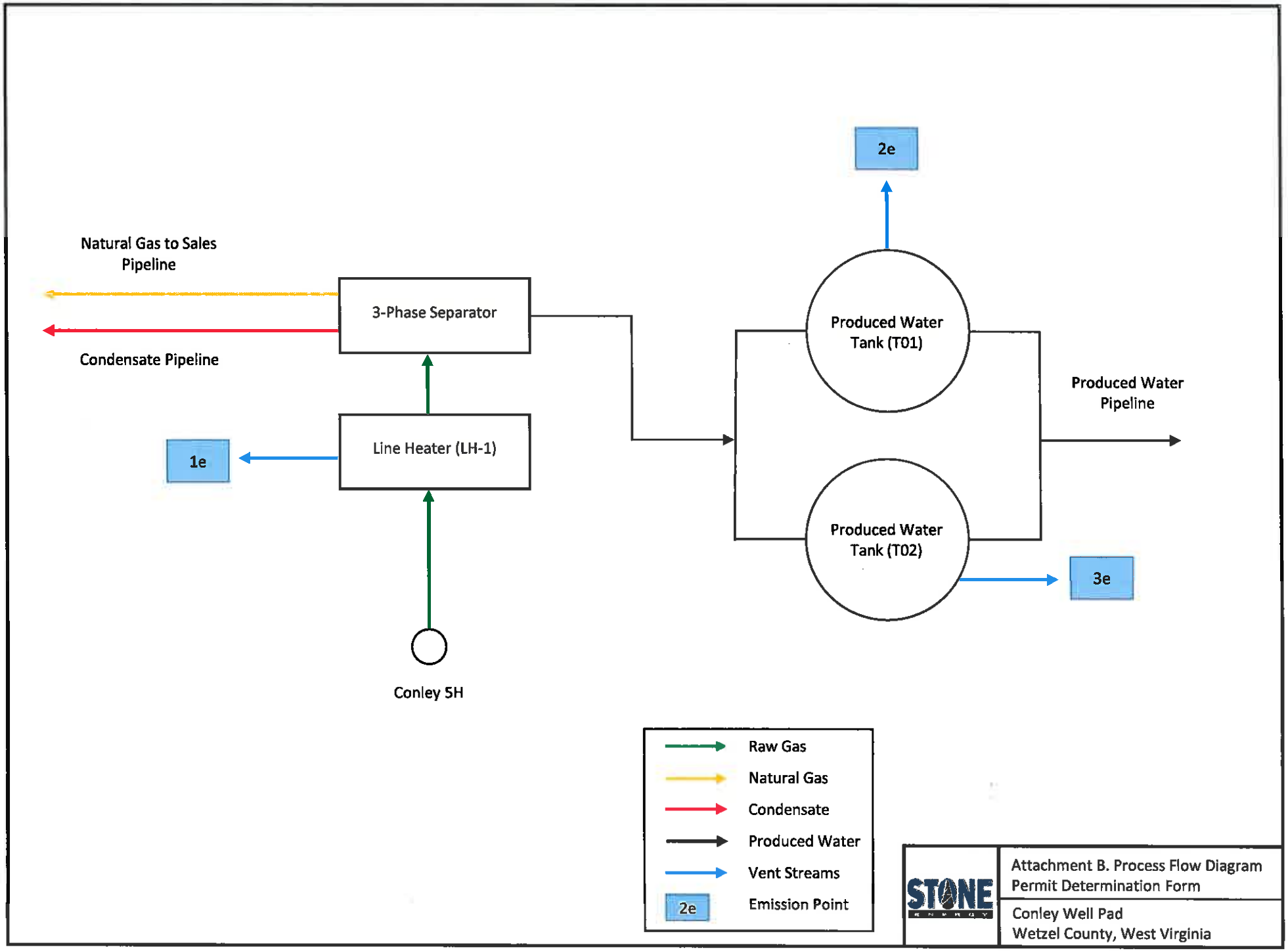
(4) Promax inlet gas composition: VOC wt% = 22.0%



Date: 9/10/2015

Attachment A. Directions to Facility
Conley Production Facility, Wetzel County, West Virginia

Stone Energy Corporation
6000 Hampton Center, Suite B
Morgantown, WV 26505
(304) 225-1600


2e
Natural Gas to Sales Pipeline
3-Phase Separator
Condensate Pipeline
Produced Water Tank (T01)
Produced Water Pipeline
1e
Line Heater (LH-1)
Produced Water Tank (T02)
3e
Conley 5H
Raw Gas
Natural Gas
Condensate
Produced Water
Vent Streams
2e
Emission Point
STONE ENERGY
Attachment B. Process Flow Diagram
Permit Determination Form
Conley Well Pad
Wetzel County, West Virginia

Stone Energy Corporation
Permit Determination Form
Conley Production Facility
Wetzel County, West Virginia

Attachment C. Process Description

Natural gas and associated liquids (condensate and water) will be produced from Conley 5H well. The well stream will pass through a 1.0 MMBtu/hr line heater (LH-1, 1e) where it will undergo heating and pressure reduction. The well stream will then pass through a three-way separator where gas, condensate and water are separated. Gas and condensate are delivered to two separate pipelines under pressure to an off-site facility for further processing. Produced water is pumped to two (2) 400-bbl tanks (T01, T02), where it is then pumped into a produced water pipeline. An EPA-certified, 74 hp, natural gas-fired generator (GN01, 4e) will be used for emergency power.

The two (2) storage tanks (T01/ 2e, T02/ 3e) will be used for produced water storage. Emissions from these tanks combined are estimated to be slightly more than 0.1 TPY VOC. This estimate assumes a production rate of 22 bbl/d and uses the direct flash gas measurements from a pressurized liquid sample from Stone Energy's Mills Wetzel Pad 1. FESCO measured the flash gas to water ratio at 0.012 lb/bbl VOC. USEPA's Tanks 4.0.9d estimation software was used to model the working and breathing losses using Distillate Fuel Oil No. 2 for the tank contents.

The emission estimates for the Conley Production Facility will be approximately 0.40 TPY of VOC and approximately 0.0004 TPY HAPs.

Stone Energy Corporation
Permit Determination Form
Conley Well Pad
Wetzel County, West Virginia

Attachment D. Safety Data Sheets (SDS)

D1. Natural Gas

D2. Condensate

D3. Produced Water

Wellhead Natural Gas

Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations
Revision Date: 06/01/2015 Date of issue: 06/01/2015 Supersedes: 10/08/2014 Version: 2.0

SECTION 1: IDENTIFICATION

1.1. Product Identifier

Product Form: Mixture

Product Name: Wellhead Natural Gas

Synonyms: Raw Gas

1.2. Intended Use of the Product

Use of the substance/mixture: Hydrocarbon

1.3. Name, Address, and Telephone of the Responsible Party

Company

MarkWest Energy Partners, L.P.
1515 Arapahoe Street
Tower 1, Suite 1600
Denver, Colorado 80202-2126
800-730-8388
www.markwest.com

1.4. Emergency Telephone Number

Emergency Number : 800-730-8388, 800-424-9300 (CHEMTREC)

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the Substance or Mixture

Classification (GHS-US)

Simple Asphy	H380
Flam. Gas 1	H220
Compressed gas	H280

Full text of H-phrases: see section 16

2.2. Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US) :

GHS02 GHS04

Signal Word (GHS-US) : Danger

Hazard Statements (GHS-US) : H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.
H380 - May displace oxygen and cause rapid suffocation.

Precautionary Statements (GHS-US) : P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P410+P403 - Protect from sunlight. Store in a well-ventilated place.

2.3. Other Hazards

Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. Contains a small amount of hydrogen sulfide. Hydrogen sulfide is a fatal, and highly flammable gas with a rotten egg odor that quickly causes odor fatigue. Heating of this product and storage under elevated temperatures or over long periods of time may release higher amounts of hydrogen sulfide. Hydrogen sulfide is also an asphyxiant.

2.4. Unknown Acute Toxicity (GHS-US)

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance

Not applicable

3.2. Mixture

Name	Product Identifier	%	Classification (GHS-US)
Methane	(CAS No) 74-82-8	> 75	Simple Asphy, H380 Flam. Gas 1, H220 Compressed gas, H280

Ethane	(CAS No) 74-84-0	< 20	Simple Asphy, H380 Flam. Gas 1, H220 Liquefied gas, H280
Propane	(CAS No) 74-98-6	< 10	Simple Asphy, H380 Flam. Gas 1, H220 Liquefied gas, H280
Carbon dioxide	(CAS No) 124-38-9	< 10	Simple Asphy, H380 Compressed gas, H280
Butane	(CAS No) 106-97-8	< 5	Simple Asphy, H380 Flam. Gas 1, H220 Liquefied gas, H280
Nitrogen	(CAS No) 7727-37-9	< 5	Simple Asphy, H380 Compressed gas, H280
Hydrogen sulfide	(CAS No) 7783-06-4	< 0.0004	Flam. Gas 1, H220 Liquefied gas, H280 Acute Tox. 2 (Inhalation:gas), H330 Eye Irrit. 2A, H319 STOT SE 3, H335 Aquatic Acute 1, H400

SECTION 4: FIRST AID MEASURES

4.1. Description of First Aid Measures

First-aid Measures General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible). If frostbite or freezing occurs, immediately flush with plenty of lukewarm water to GENTLY warm the affected area. Do not use hot water. Do not rub affected area. Get immediate medical attention.

First-aid Measures After Inhalation: When symptoms occur: go into open air and ventilate suspected area. Remove to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER/doctor/physician if you feel unwell.

First-aid Measures After Skin Contact: Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Obtain medical attention if irritation persists. Thaw frosted parts with lukewarm water. Do not rub affected area.

First-aid Measures After Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists.

First-aid Measures After Ingestion: Rinse mouth. Do NOT induce vomiting. Get immediate medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/Injuries: May cause frostbite on contact with the liquid. Natural Gas is an asphyxiant. Lack of oxygen can be fatal.

Symptoms/Injuries After Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness.

Symptoms/Injuries After Skin Contact: Contact with the liquid may cause cold burns/frostbite.

Symptoms/Injuries After Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns.

Symptoms/Injuries After Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating, but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Chronic Symptoms: Contains a small amount of Hydrogen Sulfide, symptoms of chronic exposure that may manifest as long-term or permanent effects are: headaches, dizziness, nausea, coughing, respiratory irritation, eye irritation, skin irritation, pain in the nose, and loss of consciousness.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing Media

Suitable Extinguishing Media: Do not extinguish burning gas if flow cannot be shut off immediately. Extinguish secondary FIRES with appropriate materials.

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire.

5.2. Special Hazards Arising From the Substance or Mixture

Fire Hazard: Extremely flammable gas.

Explosion Hazard: May form flammable/explosive vapor-air mixture. Heating may cause an explosion. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.

Reactivity: Hazardous reactions will not occur under normal conditions.

5.3. Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.

Firefighting Instructions: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. In case of leaking gas fire, eliminate all ignition sources if safe to do so. Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Other Information: Do not allow run-off from fire fighting to enter drains or water courses.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Use special care to avoid static electric charges. Eliminate every possible source of ignition. Keep away from extremely high or low temperatures, ignition sources, and incompatible materials. - No smoking. Avoid breathing (vapor, mist, gas). Use only outdoors or in a well-ventilated area. Ruptured cylinders may rocket. Do not allow product to spread into the environment.

6.1.1. For Non-emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2. For Emergency Responders

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

6.2. Environmental Precautions

Prevent entry to sewers and public waters. Avoid release to the environment.

6.3. Methods and Material for Containment and Cleaning Up

For Containment: If possible, stop flow of product. Use only non-sparking tools.

Methods for Cleaning Up: Clean up spills immediately and dispose of waste safely. Isolate area until gas has dispersed. Use water spray to disperse vapors. For water based spills contact appropriate authorities and abide by local regulations for hydrocarbon spills into waterways. Contact competent authorities after a spill.

6.4. Reference to Other Sections

See Section 8, Exposure Controls and Personal Protection. See Section 13, Disposal Considerations.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Additional Hazards When Processed: Handle empty containers with care because residual vapors are flammable. Extremely flammable gas. Do not pressurize, cut, or weld containers. Do not puncture or incinerate container. Liquid gas can cause frost-type burns.

Precautions for Safe Handling: Keep away from heat, sparks, open flames, hot surfaces. - No smoking. Avoid breathing gas, spray. Use only outdoors or in a well-ventilated area.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product.

7.2. Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Proper grounding procedures to avoid static electricity should be followed. Comply with applicable regulations. Use explosion proof equipment.

Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use. Keep in fireproof place. Keep container tightly closed. Keep/Store away from extremely high or low temperatures, ignition sources, direct sunlight, incompatible materials. Store in original container.

Incompatible Products: Strong acids. Strong bases. Strong oxidizers. Chlorine. Halogenated compounds.

Incompatible Materials: Heat sources. Direct sunlight. Heat. Sources of ignition.

7.3. Specific End Use(s)

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control Parameters

For substances listed in section 3 that are not listed here, there are no established exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), or OSHA (PEL).

Methane (74-82-8)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm

Ethane (74-84-0)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
Propane (74-98-6)		
USA ACGIH	ACGIH TWA (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m³)	1800 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	1000 ppm
USA IDLH	US IDLH (ppm)	2100 ppm (10% LEL)
USA OSHA	OSHA PEL (TWA) (mg/m³)	1800 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	1000 ppm
Carbon dioxide (124-38-9)		
USA ACGIH	ACGIH TWA (ppm)	5000 ppm
USA ACGIH	ACGIH STEL (ppm)	30000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m³)	9000 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	5000 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m³)	54000 mg/m³
USA NIOSH	NIOSH REL (STEL) (ppm)	30000 ppm
USA IDLH	US IDLH (ppm)	40000 ppm
USA OSHA	OSHA PEL (TWA) (mg/m³)	9000 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	5000 ppm
Butane (106-97-8)		
USA ACGIH	ACGIH STEL (ppm)	1000 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m³)	1900 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	800 ppm
Nitrogen (7727-37-9)		
USA ACGIH	ACGIH chemical category	Simple asphyxiant See Appendix F: Minimal Oxygen Content
Hydrogen sulfide (7783-06-4)		
USA ACGIH	ACGIH TWA (ppm)	1 ppm
USA ACGIH	ACGIH STEL (ppm)	5 ppm
USA NIOSH	NIOSH REL (ceiling) (mg/m³)	15 mg/m³
USA NIOSH	NIOSH REL (ceiling) (ppm)	10 ppm
USA IDLH	US IDLH (ppm)	100 ppm
USA OSHA	OSHA PEL (Ceiling) (ppm)	20 ppm

8.2. Exposure Controls

Appropriate Engineering Controls : Gas detectors should be used when flammable gases/vapors may be released. Ensure adequate ventilation, especially in confined areas. Proper grounding procedures to avoid static electricity should be followed. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof equipment.

Personal Protective Equipment : Protective goggles. Protective clothing. Respiratory protection of the dependent type. Insulated gloves.

Materials for Protective Clothing : Chemically resistant materials and fabrics. Wear fire/flame resistant/retardant clothing.

Hand Protection : Wear chemically resistant protective gloves. Insulated gloves.

Eye Protection : Chemical goggles or face shield.

Skin and Body Protection : Wear suitable protective clothing.

Respiratory Protection : If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn.

Other Information : When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on Basic Physical and Chemical Properties

Physical State : Gas

Appearance	: Clear
Odor	: Hydrocarbon
Odor Threshold	: No data available
pH	: No data available
Evaporation Rate	: No data available
Melting Point	: No data available
Freezing Point	: No data available
Boiling Point	: -157 °C (-251 °F)
Flash Point	: -187 °C (-305 °F)
Auto-ignition Temperature	: > 288 °C (> 550 °F)
Decomposition Temperature	: No data available
Flammability (solid, gas)	: Extremely flammable gas
Vapor Pressure	: 40 mm Hg @ 25 °C (77 °F)
Relative Vapor Density at 20 °C	: 0.6
Relative Density	: No data available
Solubility	: No data available
Partition Coefficient: N-Octanol/Water	: No data available
Viscosity	: No data available
Lower Flammable Limit	: 3 %
Upper Flammable Limit	: 17 %

9.2. Other Information No additional information available

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity: Hazardous reactions will not occur under normal conditions.

10.2. Chemical Stability: Extremely flammable gas. Stable under recommended handling and storage conditions.

10.3. Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

10.4. Conditions to Avoid: Direct sunlight, extremely high or low temperatures, ignition sources, combustible materials, incompatible materials.

10.5. Incompatible Materials: Strong acids. Strong bases. Strong oxidizers. Halogenated compounds. Chlorine.

10.6. Hazardous Decomposition Products: Carbon oxides (CO, CO_2). hydrocarbons. May release poisonous hydrogen sulfide.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information On Toxicological Effects

Acute Toxicity: Not classified

Ethane (74-84-0)	
LC50 Inhalation Rat	658 mg/l/4h
Propane (74-98-6)	
LC50 Inhalation Rat	658 mg/l/4h
Butane (106-97-8)	
LC50 Inhalation Rat	30957 mg/m³ (Exposure time: 4 h)
Hydrogen sulfide (7783-06-4)	
LC50 Inhalation Rat	0.99 mg/l (Exposure time: 1 h)
LC50 Inhalation Rat	444 ppm/4h

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Gas can be toxic as a simple asphyxiant by displacing oxygen from the air. Asphyxia by lack of oxygen: risk of death. May cause drowsiness or dizziness.

Symptoms/Injuries After Skin Contact: Contact with the liquid may cause cold burns/frostbite.

Symptoms/Injuries After Eye Contact: This gas is non-irritating; but direct contact with liquefied/pressurized gas or frost particles may produce severe and possibly permanent eye damage from freeze burns.

Symptoms/Injuries After Ingestion: Ingestion is not considered a potential route of exposure. Non-irritating, but solid and liquid forms of this material and pressurized gas may cause freeze burns.

Chronic Symptoms: Contains a small amount of Hydrogen Sulfide, symptoms of chronic exposure that may manifest as long-term or permanent effects are: headaches, dizziness, nausea, coughing, respiratory irritation, eye irritation, skin irritation, pain in the nose, and loss of consciousness.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Hydrogen sulfide (7783-06-4)	
LC50 Fish 1	0.0448 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
LC 50 Fish 2	0.016 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])

12.2. Persistence and Degradability

Wellhead Natural Gas	
Persistence and Degradability	Product is biodegradable.

12.3. Bioaccumulative Potential

Wellhead Natural Gas	
Bioaccumulative Potential	Not expected to bioaccumulate.
Ethane (74-84-0)	
Log Pow	<= 2.8
Propane (74-98-6)	
Log Pow	2.3
Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83
Butane (106-97-8)	
Log Pow	2.89
Hydrogen sulfide (7783-06-4)	
BCF fish 1	(no bioaccumulation expected)
Log Pow	0.45 (at 25 °C)

12.4. Mobility in Soil No additional information available

12.5. Other Adverse Effects

Other Adverse Effects : Can cause frost damage to vegetation.

Other Information : Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

Additional Information: Handle empty containers with care because residual vapors are flammable. Empty gas cylinders should be returned to the vendor for recycling or refilling.

SECTION 14: TRANSPORT INFORMATION

14.1. In Accordance with DOT

Proper Shipping Name : NATURAL GAS, COMPRESSED (with high methane content)

Hazard Class : 2.1

Identification Number : UN1971

Label Codes : 2.1

ERG Number : 115

14.2. In Accordance with IMDG

Proper Shipping Name : NATURAL GAS, COMPRESSED

Hazard Class : 2

Identification Number : UN1971
Label Codes : 2.1
EmS-No. (Fire) : F-D
EmS-No. (Spillage) : S-U

14.3. In Accordance with IATA

Proper Shipping Name : NATURAL GAS, COMPRESSED
Identification Number : UN1971
Hazard Class : 2
Label Codes : 2.1

ERG Code (IATA) : 10L

SECTION 15: REGULATORY INFORMATION

15.1 US Federal Regulations

Wellhead Natural Gas	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard

Methane (74-82-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Ethane (74-84-0)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Propane (74-98-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Carbon dioxide (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Butane (106-97-8)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

Nitrogen (7727-37-9)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Sudden release of pressure hazard

Hydrogen sulfide (7783-06-4)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on the United States SARA Section 302	
Listed on United States SARA Section 313	
SARA Section 302 Threshold Planning Quantity (TPQ)	500
SARA Section 313 - Emission Reporting	1.0 %

15.2 US State Regulations

Methane (74-82-8)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Excluded Volatile Organic Compounds

RTK - U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Ethane (74-84-0)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Delaware - Volatile Organic Compounds Exempt from Requirements
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
U.S. - New Jersey - Excluded Volatile Organic Compounds
RTK - U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Propane (74-98-6)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Idaho - Occupational Exposure Limits - TWAs
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
RTK - U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)

U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - TWAs
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs

Carbon dioxide (124-38-9)

U.S. - Idaho - Occupational Exposure Limits - TWAs
U.S. - Maine - Air Pollutants - Greenhouse Gases (GHG)
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Volatile Organic Compounds Exempt From Requirements
U.S. - Michigan - Occupational Exposure Limits - STELs
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - STELs
U.S. - Minnesota - Permissible Exposure Limits - TWAs
RTK - U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - Oregon - Permissible Exposure Limits - TWAs
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - STELs
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Permissible Exposure Limits - STELs
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs

Butane (106-97-8)

U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Maine - Chemicals of High Concern
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
RTK - U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities

U.S. - Oregon - Permissible Exposure Limits - TWAs
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs

Nitrogen (7727-37-9)

U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Minnesota - Hazardous Substance List
RTK - U.S. - New Jersey - Right to Know Hazardous Substance List
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Washington - Permissible Exposure Limits - Simple Asphyxiants

Hydrogen sulfide (7783-06-4)

U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Acute
U.S. - California - SCAQMD - Toxic Air Contaminants - Non-Cancer Chronic
U.S. - California - Toxic Air Contaminant List (AB 1807, AB 2728)
U.S. - Colorado - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr)
U.S. - Delaware - Accidental Release Prevention Regulations - Sufficient Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Threshold Quantities
U.S. - Delaware - Accidental Release Prevention Regulations - Toxic Endpoints
U.S. - Delaware - Pollutant Discharge Requirements - Reportable Quantities
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Acceptable Ambient Concentrations
U.S. - Idaho - Non-Carcinogenic Toxic Air Pollutants - Emission Levels (ELs)
U.S. - Idaho - Occupational Exposure Limits - Acceptable Maximum Peak Above the Ceiling Concentration for an 8-Hour Shift
U.S. - Idaho - Occupational Exposure Limits - Ceilings
U.S. - Idaho - Occupational Exposure Limits - TWAs
U.S. - Louisiana - Reportable Quantity List for Pollutants
U.S. - Maine - Air Pollutants - Hazardous Air Pollutants
U.S. - Massachusetts - Allowable Ambient Limits (AALs)
U.S. - Massachusetts - Allowable Threshold Concentrations (ATCs)
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Groundwater Reportable Concentration - Reporting Category 2
U.S. - Massachusetts - Oil & Hazardous Material List - Reportable Quantity
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 1
U.S. - Massachusetts - Oil & Hazardous Material List - Soil Reportable Concentration - Reporting Category 2
RTK - U.S. - Massachusetts - Right To Know List
U.S. - Massachusetts - Threshold Effects Exposure Limits (TELs)
U.S. - Massachusetts - Toxics Use Reduction Act
U.S. - Michigan - Occupational Exposure Limits - STELs
U.S. - Michigan - Occupational Exposure Limits - TWAs
U.S. - Michigan - Polluting Materials List
U.S. - Michigan - Process Safety Management Highly Hazardous Chemicals
U.S. - Minnesota - Chemicals of High Concern
U.S. - Minnesota - Hazardous Substance List
U.S. - Minnesota - Permissible Exposure Limits - STELs
U.S. - Minnesota - Permissible Exposure Limits - TWAs
U.S. - Montana - Ambient Air Quality Standards
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour
U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual
U.S. - New Jersey - Discharge Prevention - List of Hazardous Substances
U.S. - New Jersey - Environmental Hazardous Substances List
RTK - U.S. - New Jersey - Right to Know Hazardous Substance List

U.S. - New Jersey - Special Health Hazards Substances List
U.S. - New Jersey - TCPA - Extraordinarily Hazardous Substances (EHS)
U.S. - New Mexico - Air Quality - Ambient Air Quality Standards
U.S. - New York - Occupational Exposure Limits - Ceilings
U.S. - New York - Occupational Exposure Limits - TWAs
U.S. - New York - Reporting of Releases Part 597 - List of Hazardous Substances
U.S. - North Carolina - Control of Toxic Air Pollutants
U.S. - North Dakota - Ambient Air Quality Standards - Maximum Permissible Concentrations
U.S. - North Dakota - Hazardous Wastes - Discarded Chemical Products, Off-Specification Species, Container and Spill Residues
U.S. - Ohio - Accidental Release Prevention - Threshold Quantities
U.S. - Ohio - Extremely Hazardous Substances - Threshold Quantities
U.S. - Oregon - Permissible Exposure Limits - Ceilings
U.S. - Oregon - Permissible Exposure Limits - STELs
U.S. - California - Safer Consumer Products - Initial List of Candidate Chemicals and Chemical Groups
RTK - U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
RTK - U.S. - Pennsylvania - RTK (Right to Know) List
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 1-Hour
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - 24-Hour
U.S. - Rhode Island - Air Toxics - Acceptable Ambient Levels - Annual
U.S. - South Carolina - Toxic Air Pollutants - Maximum Allowable Concentrations
U.S. - South Carolina - Toxic Air Pollutants - Pollutant Categories
U.S. - Tennessee - Occupational Exposure Limits - STELs
U.S. - Tennessee - Occupational Exposure Limits - TWAs
U.S. - Texas - Drinking Water Standards - Secondary Constituent Levels (SCLs)
U.S. - Texas - Effects Screening Levels - Long Term
U.S. - Texas - Effects Screening Levels - Short Term
U.S. - Vermont - Hazardous Waste - Hazardous Constituents
U.S. - Vermont - Permissible Exposure Limits - STELs
U.S. - Vermont - Permissible Exposure Limits - TWAs
U.S. - Virginia - Water Quality Standards - Chronic Freshwater Aquatic Life
U.S. - Virginia - Water Quality Standards - Chronic Saltwater Aquatic Life
U.S. - Washington - Dangerous Waste - Dangerous Waste Constituents List
U.S. - Washington - Dangerous Waste - Discarded Chemical Products List
U.S. - Washington - Permissible Exposure Limits - STELs
U.S. - Washington - Permissible Exposure Limits - TWAs
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 25 Feet to Less Than 40 Feet
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 40 Feet to Less Than 75 Feet
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights 75 Feet or Greater
U.S. - Wisconsin - Hazardous Air Contaminants - All Sources - Emissions From Stack Heights Less Than 25 Feet
U.S. - Wyoming - Process Safety Management - Highly Hazardous Chemicals
U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Fresh Water
U.S. - Alaska - Water Quality Standards - Chronic Aquatic Life Criteria for Marine Water

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date : 06/01/2015

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

GHS Full Text Phrases:

Acute Tox. 2 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 2
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Compressed gas	Gases under pressure Compressed gas
Eye Irrit. 2A	Serious eye damage/eye irritation Category 2A
Flam. Gas 1	Flammable gases Category 1
Liquefied gas	Gases under pressure Liquefied gas
Simple Asphy	Simple Asphyxiant
STOT SE 3	Specific target organ toxicity (single exposure) Category 3

H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H319	Causes serious eye irritation
H330	Fatal if inhaled
H335	May cause respiratory irritation
H380	May displace oxygen and cause rapid suffocation
H400	Very toxic to aquatic life

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

SDS US (GHS HazCom)

Attachment D2. Condensate

Where energy meets innovation.

MATERIAL SAFETY DATA SHEET
NATURAL GAS PIPELINE CONDENSATE

FILE NO.:
MSDS DATE: 02/13/2012

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Natural Gas Pipeline Condensate.

SYNONYMS: Produced Water, Pipeline Drip, Formation Water, Salt Water, Oily Water.

PRODUCT DESCRIPTION: Water extracted from natural gas well production with residual mineral contents and residual hydrocarbons.

PRODUCT CODES: Mixture. See CAS Numbers of Individual Components.

MANUFACTURER: EQT
DIVISION: Waynesburg Operations
ADDRESS: 175 Industry Road
Waynesburg, PA 15370

EMERGENCY PHONE: (800) 926-1759 After hours: (800) 926-1759
CHEMTREC PHONE: (800) 424-9300

CHEMICAL NAME: Water
CHEMICAL FAMILY: Brine Waters
CHEMICAL FORMULA: Mixture
CAS Reg. No.: Mixture

PRODUCT USE: Waste Brine, brine stock for chemical industry, salt brine for ice and snow removal.

PREPARED BY: MSES Consultants, Inc.
609 West Main Street
Clarksburg, WV 26301

SECTION 1 NOTES:

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS No.	% Wt	OSHA PEL	ACGIH TLV
Produced Water	Mixture	> 68	None	N/A
Mineral Variety	N/A	< 32	None	N/A
Gas Condensate	8002-05-9	< 1	500 ppm	N/A
Benzene	71-43-2	< 1	1 ppm	0.5 ppm
Hydrogen Sulfide	7783-06-4	< 1	20 ppm	1 ppm

SECTION 2 NOTES:

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

ROUTES OF ENTRY: Inhalation, ingestion, skin contact

POTENTIAL HEALTH EFFECTS

EYES: Eye contact with vapors may cause eye irritation. Eye contact with liquid may cause irritation and pain. Eye contact with H2S may cause painful irritation and may be indicative of exposure above applicable H2S standards.

SKIN: Skin contact may cause skin irritation and redness. Repeated or prolonged skin contact may cause dermatitis.

INGESTION: Ingestion may cause irritation of the digestive tract that may result in nausea, vomiting and diarrhea. In addition, signs and symptoms of H2S toxicity may be present.

INHALATION: Breathing the mist and vapors may be irritating to the respiratory tract. H2S is irritating and highly toxic if inhaled.

ACUTE HEALTH HAZARDS: Inhalation of high vapor concentrations may have results ranging from dizziness, drowsiness, headache, nausea, to possibly unconsciousness, and death, depending on concentrations and length of exposure. Inhalation of H2S will cause symptoms similar to carbon monoxide poisoning.

CHRONIC HEALTH HAZARDS: Skin, eye and respiratory tract irritation. Gastrointestinal and vascular effects and death may occur at high concentrations. May cause nervous system effects, such as headache, nausea and drowsiness. May contain high concentration of hydrogen sulfide, from which respiratory paralysis and death may occur.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Any condition causing impaired function of the respiratory systems.

CARCINOGENICITY

OSHA: Not Regulated **NTP:** Not Applicable **IARC:** Not Applicable

SECTION 3 NOTES:

SECTION 4: FIRST AID MEASURES

EYES: Flush eyes immediately with clean, low-pressure water for at least 15 minutes, occasionally lifting the eyelids. If pain or redness persists after flushing, seek medical attention. If eye is exposed to hot liquid, cover eyes with cloth and seek medical attention immediately.

SKIN: In case of hot liquid exposure, do not remove clothing or treat, wash only unburned area and seek medical attention immediately.

INGESTION: Do not induce vomiting. If spontaneous vomiting occurs, hold the victim's head lower than hips to prevent aspiration of liquid into the lungs. Have exposed individual rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person. Obtain medical assistance immediately.

INHALATION: Immediately remove person to area of fresh air. Call 911, emergency medical service, or Emergency Phone Numbers(s) provided in Section 1. Give artificial respiration if victim is not breathing. Do not use mouth-to mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult.

SECTION 4 NOTES:

SECTION 5: FIRE-FIGHTING MEASURES

FLASH POINT: > 200° F; > 93° C

AUTOIGNITION TEMPERATURE: N/A

NFPA HAZARD CLASSIFICATION
HEALTH: 1 FLAMMABILITY: 1 REACTIVITY: 0

EXTINGUISHING MEDIA: Water stream, water mist.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate area downwind of source. Stop liquids flow and extinguish fire. If gas source cannot be shut off immediately, equipment and surfaces exposed to the fire should be cooled with water to prevent overheating and explosions. Control fire until the natural gas condensate has burned off.

UNUSUAL FIRE AND EXPLOSION HAZARDS: If large amounts of natural gas condensate are present, they are extremely flammable and they can form flammable mixtures with air. Condensate will burn in the open or be explosive in confined spaces. Its vapors are lighter than air and will disperse.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide, carbon monoxide, and toxic vapors as a result of incomplete combustion.

SECTION 5 NOTES: Generally non-flammable, depending on the amount of natural gas condensate present. If large quantities of natural gas condensate are present, then water may be ineffective on flames and should be used only to keep fire-exposed containers cool. Use water mists to keep the surrounding areas cool.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES:

Small: Evacuate area. Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks. Ventilate area.

Large: Evacuate area. Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks. Non-essential employees should be evacuated from the exposure area. Persons involved in the control and repair of the leak should be provided with all necessary protective equipment and be properly trained for emergency situations involving this material. Stop leaks only when safe to do so. Stay upwind, and out of low areas. Ventilate closed spaces before entering. Use water spray to cool equipment surfaces, and containers exposed to fire and excessive heat.

SECTION 6 NOTES:

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE:

Handling: Use only with adequate ventilation. Wear appropriate personal protective equipment and use exposure controls as indicated in Section 8. Vent slowly to the atmosphere when opening. Avoid all contact with skin and eyes. Avoid breathing product vapors. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Remove contaminated clothing immediately. Wash with soap and water after working with this product.

Storage: Store in a segregated and approved area. Store in vented containers in a well-ventilated area, away from heat and ignition sources. Use appropriate containment to avoid environmental contamination.

OTHER PRECAUTIONS: Bond and ground containers.

SECTION 7 NOTES:

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

VENTILATION : Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below the flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified / controlled areas.

RESPIRATORY PROTECTION: Respiratory protection is not required for normal use. In non-emergency

	situations, use NIOSH approved respiratory protective equipment in situations where airborne concentrations may meet or exceed occupational exposure levels. At excessive concentrations, wear a NIOSH approved full-face self-contained breathing apparatus (SCBA) with supplied air.
EYE PROTECTION:	**Wear splash-proof goggles and/or face shield for protection from spray.**
SKIN PROTECTION:	**Consider wearing long-sleeve, FRC, otherwise normal working clothes should be worn. Wash contaminated clothing prior to reuse. If gloves are required for job operations involving this product, wear nitrile rubber or polyvinylalcohol (PVAL) gloves**
SECTION 8 NOTES:	

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	**Brine water. Colorless to lightly colored. Clear to turbid.**
ODOR:	**Slight hydrocarbon / rotten egg odor if hydrogen sulfide is present.**
PHYSICAL STATE:	**Liquid**
BOILING POINT:	**212° F (100° C)**
MELTING POINT:	**Not determined**
FREEZING POINT:	**< 32° C. < 0° C**
VAPOR PRESSURE (mmHg):	**Not determined**
VAPOR DENSITY (AIR = 1):	**1.2**
SPECIFIC GRAVITY (H2O = 1):	**> 1**
EVAPORATION RATE:	**N/A**
SOLUBILITY IN WATER:	**This material is aqeous.**
PERCENT SOLIDS BY WEIGHT:	**< 32%**
PERCENT VOLATILE:	**< 1% by weight and by volume**
VOLATILE ORGANIC COMPOUNDS (VOC):	**Not determined**
MOLECULAR WEIGHT:	**Not determined**
VISCOSITY:	**Not determined**
SECTION 9 NOTES:	

SECTION 10: STABILITY AND REACTIVITY

STABILITY:	Stable
CONDITIONS TO AVOID (STABILITY):	Generally non-flammable. Can be flammable, depending on the quantity of natural gas liquids present.
INCOMPATIBILITY (MATERIAL TO AVOID):	Oxygen and strong oxidizing material – if natural gas liquids present.
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:	Carbon dioxide, carbon monoxide, and various hydrocarbons formed during incomplete combustion.
HAZARDOUS POLYMERIZATION:	Polymerization will not occur.

SECTION 10 NOTES:

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION:

BENZENE: This product contains benzene, which can cause degeneration in blood forming bone marrow leading to anemia which may further degrade to leukemia, a type of cancer. Acute benzene poisoning causes central nervous system depression. Chronic exposure affects the hematopoietic system causing blood disorders including anemia and pancytopenia. Mutagenic and clastogenic in mammalian and non-mammalian test systems. Reproductive or developmental toxicant only at doses that are maternally toxic, based on tests with animals.

HYDROGEN SULFIDE: This product contains hydrogen sulfide, which may be fatal if inhaled. Inhalation of a single breath at a concentration of 1000 ppm (0.1%) may cause coma. Hydrogen sulfide is corrosive when moist. Skin contact may cause burns. There is a rapid loss of sense of smell on exposure to gas concentrations above 150 ppm, and this means that the extent of exposure may be underestimated. Perception threshold ranges from 0.5 ppt to 0.1 ppm. It is an irritant and asphyxiant.

SECTION 11 NOTES:

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION:

Do not discharge into or allow runoff to flow into sewers and natural waterways. Contain spill material and dike for proper disposal. May be hazardous to waterways/wildlife.

SECTION 12 NOTES:

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:

This product is not a "listed" hazardous waste. But when disposed of in containers may meet the criteria of being an "ignitable" waste. It is the responsibility of the user to determine if the material disposed of meets federal, state, or local criteria to be defined as a hazardous waste and dispose of accordingly.

SECTION 13 NOTES:

SECTION 14: TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION

PROPER SHIPPING NAME: **NOT REGULATED as a Hazardous Material for Transportation.**

SECTION 14 NOTES:

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

US OSHA Hazard Communication Class **This product is hazardous under 29CFR 1910.1200 (Hazard Comm\unication). HCS Class: Irritating Substance.**

USA Right-to-Know – Federal **None of this product's components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).**

SECTION 15 NOTES:

SECTION 16: OTHER INFORMATION

OTHER INFORMATION:

PREPARATION INFORMATION:

MSES Consultants, Inc.
609 West Main Street
Clarksburg, WV 26301

DISCLAIMER: **This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our Company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.**

MATERIAL SAFETY DATA SHEET

1 PRODUCT AND COMPANY IDENTIFICATION

Product Name: Produced Water
Synonyms: Formation Water
Product Description: Water extracted from natural gas well production with residual mineral content and residual hydrocarbons.

Manufacturer Name:
Williams, Inc.
One Williams Center
Tulsa, OK 74172
USA

Emergency Telephone:
888-677-2370

Non-emergency Telephone:
800-688-7507

Intended Use: Industrial use

2 HAZARDS IDENTIFICATION

Emergency Overview
Physical State: Liquid
Color: Clear or opaque
Odor: Slight hydrocarbon

Low hazard for usual industrial or commercial handling by trained personnel.

Potential Health Effects

Inhalation: Breathing the mist may be irritating to the respiratory tract.

Eye Contact: May cause temporary eye irritation.

Skin Contact: None known.

Ingestion: No harmful effects expected in amounts likely to be ingested by accident.

OSHA Regulatory Status: This product is hazardous according to OSHA 29CFR 1910.1200.

3 COMPOSITION / INFORMATION ON INGREDIENTS

General Information: The product contains:

Chemical Name	CAS-No.	Concentration*
Water	7732-18-5	> 95%
Various minerals	Not applicable	2-20%
†Petroleum	8002-05-9	< 1%

* All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
† This chemical is hazardous according to OSHA/WHMIS criteria.

4 FIRST AID MEASURES

Inhalation: If symptomatic, move to fresh air. Get medical attention if symptoms persist.

Eye Contact: Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. Get medical attention if symptoms persist.

Skin Contact: Wash skin with soap and water. Get medical attention if symptoms occur.

Ingestion: First aid is normally not required. However, if greater than 1/2 liter (pint) ingested, seek medical attention.

5 FIRE-FIGHTING MEASURES

Extinguishing Media: Extinguish with foam, carbon dioxide, dry powder or water fog.

Unsuitable Extinguishing Media: Not applicable.

Special Fire Fighting Procedures: Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Unusual Fire & Explosion Hazards: None known.

Hazardous Combustion Products: Carbon Oxides

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions: Wear protective clothing as described in Section 8 of this safety data sheet.

Spill Cleanup Methods: Small Liquid Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Large Spillages: Flush area with plenty of water. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.

7 HANDLING AND STORAGE

Handling: No special precautions are necessary beyond normal good hygiene practices. See Section 8 of the MSDS for additional personal protection advice when handling this product.

Storage: Avoid contact with strong oxidizing agents.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits:

Chemical Name	Source	Type	Exposure Limits	Notes
Petroleum	US. NIOSH Guide	IDLH	1100 ppm	

Engineering Controls: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits.

If exposure limits have not been established, maintain airborne levels to an acceptable level.
Respiratory Protection: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

Eye Protection: Risk of contact: Wear approved safety goggles.

Hand Protection: It is a good industrial hygiene practice to minimize skin contact.

Skin Protection: Normal working cloths should be worn. Wash contaminated clothing prior to resue.

Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental Exposure Controls: Environmental manager must be informed of all major spillages.

9 PHYSICAL AND CHEMICAL PROPERTIES

Color: Clear
Odor: Hydrocarbon
Odor Threshold: No data available.
Physical State: Liquid
pH: Not applicable
Melting Point: No data available.
Freezing Point: <0°C (32°F)
Boiling Point: 100°C (212°F) (Approximate)
Flash Point: Not applicable.
Evaporation Rate: No data available.
Flammability (Solid): No data available.
Flammability Limit - Upper (%): Not applicable.
Flammability Limit - Lower (%): Not applicable.
Vapor Pressure: 0.11 mmHg @60°C
Vapor Density (Air=1): No data available.
Specific Gravity: > 1 (4°C)
Solubility in Water: Soluble
Solubility (Other): No data available.
Partition Coefficient (n-Octanol/water): No data available.
Autoignition Temperature: No data available.
Decomposition Temperature: No data available.
Viscosity: No data available.
Explosive Properties: No data available

10 STABILITY AND REACTIVITY

Stability: Stable under the prescribed storage conditions.

Conditions to Avoid: None known.
Incompatible Materials: Strong oxidizing agents.

Hazardous Decomposition Products: No data available.

11 TOXICOLOGICAL INFORMATION

Specified Substance(s)
Acute Toxicity:

Chemical Name	Test Results
Petroleum	Oral LD50 > (Rat): 4300 mg/kg

Listed Carcinogens:

Chemical Name	IARC	NTP	OSHA	ACGIH
Petroleum	3	Not Listed	Not Listed	Not Listed

IARC: 1 = Carcinogenic to Humans; 2A = Probably Carcinogenic to Humans; 2B = Possibly Carcinogenic to Humans; 3 = Not classifiable as to carcinogenicity to humans; 4 = Probably not carcinogenic to humans; Not listed = Not evaluated by IARC.
ACGIH: A1 = Confirmed Human Carcinogen; A2 = Suspected Human Carcinogen; A3 = Confirmed Animal Carcinogen; A4 = Not classifiable as a human carcinogen; A5 = Not suspected to be a human carcinogen; Not listed = Not evaluated by ACGIH.

Product Information
Acute Toxicity:
Test Results: No test data available for the product.

Other Acute: No additional adverse health effects noted.

Chronic Toxicity: No additional adverse health effects noted.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data available.

Mobility: No data available.

Persistence and Degradability: No data available.

Bioaccumulation Potential: No data available.

13 DISPOSAL CONSIDERATIONS

General Information: Dispose of waste and residues in accordance with local authority requirements.

Disposal Methods: No specific disposal method required.

Container: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14 TRANSPORT INFORMATION

DOT Not regulated.

TDG Not regulated.
IATA Not regulated.

IMDG Not regulated.

15 REGULATORY INFORMATION

Canadian Controlled Products Regulations: This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.

WHMIS Classification: This is not a WHMIS controlled product.

Mexican Dangerous Statement: This product is dangerous according to Mexican regulations.

Inventory Status

This product or all components are listed or exempt from listing on the following inventory: TSCA

US Regulations

CERCLA Hazardous Substance List (40 CFR 302.4): Not regulated.

SARA Title III
Section 302 Extremely Hazardous Substances (40 CFR 355, Appendix A): Not regulated.

Section 311/312 (40 CFR 370):
[X] Acute (Immediate) [ ] Chronic (Delayed) [ ] Fire [ ] Reactive [ ] Pressure Generating

Section 313 Toxic Release Inventory (40 CFR 372): Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
Not regulated.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3): Not regulated.

Drug Enforcement Act: Not regulated.

TSCA

TSCA Section 4(a) Final Test Rules & Testing Consent Orders: Not regulated.

TSCA Section 5(a)(2) Final Significant New Use Rules (SNURs) (40CFR 721, Subpt. E): Not regulated.

TSCA Section 5(e) PMN-Substance Consent Orders: Not regulated.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D): Not regulated.

State Regulations

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): Not regulated.
Massachusetts Right-To-Know List: Petroleum

Michigan Critical Materials List (Michigan Natural Resources and Environmental Protection Act (Act. 451 of 1994)): Not regulated.

Minnesota Hazardous Substances List: Petroleum

New Jersey Right-To-Know List: Petroleum

Pennsylvania Right-To-Know List: Petroleum

Rhode Island Right-To-Know List: Petroleum

16 OTHER INFORMATION

HAZARD RATINGS

	Health Hazard	Fire Hazard	Instability	Special Hazard
NFPA	1	1	0	NONE

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
NFPA Label colored diamond code: Blue - Health; Red - Flammability; Yellow - Instability; White - Special Hazards

	Health Hazard	Flammability	Physical Hazard	Personal Protection
HMIS	1	1	0	--

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
HMIS Label colored bar code: Blue - Health; Red - Flammability; Orange - Physical Hazards; White - Special

Issue Date: 6-May-2009
Supercedes Date: 18-Dec.-2208
SDS No.: 1023421
Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

TANKS 4.0.9d
Emissions Report - Detail Format
Conley T01 - Vertical Fixed Roof Tank
New Martinsville, West Virginia

Tank Identification and Physical Characteristics

Identification
- User Identification: Conley T01
- City: New Martinsville
- 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) : 18.00
- Avg. Liquid Height (ft): 8.00
- Volume (gallons): 15,228.53
- Turnovers: 22.15
- Net Throughput(gal/yr): 337,260.00
- Is Tank Heated (y/n): N

Paint Characteristics
- Shell Color/Shade: White/White
- Shell Condition: Good
- Roof Color/Shade: White/White
- 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

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

Liquid Contents of Storage Tank

Mixture/Component: Distillate fuel oil no. 2
Month: All
Daily Liquid Surf. Temperature (deg F)
- Avg.: 51.94
- Min.: 47.06
- Max.: 56.81

Liquid Bulk Temp (deg F): 50.33

Vapor Pressure (psia)
- Avg. 0.0049
- Min. 0.0041
- Max. 0.0059

Vapor Mol. Weight 130.0000
Liquid Mass Fract.
Vapor Mass Fract.
Mol. Weight 188.00
Basis for Vapor Pressure Calculations Option 1: ..... VP50 = .0045 VP60 = .0065

Detail Calculations (AP-42)

Annual Emission Calculations
Standing Losses (lb): 2.0767
- Vapor Space Volume (cu ft): 1,450.2568
- Vapor Density (lb/cu ft): 0.0001
- Vapor Space Expansion Factor: 0.0340
- Vented Vapor Saturation Factor: 0.9967

Tank Vapor Space Volume:
- Vapor Space Volume (cu ft): 1,450.2568
- Tank Diameter (ft): 12.0000
- Vapor Space Outage (ft): 12.8231
- Tank Shell Height (ft): 20.0000
- Average Liquid Height (ft): 8.0000
- 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): 0.0001
- Vapor Molecular Weight (lb/lb-mole): 130.0000
- Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.0049
- Daily Avg. Liquid Surface Temp. (deg. R): 511.6051
- 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): 509.9983
- Tank Paint Solar Absorptance (Shell): 0.1700
- Tank Paint Solar Absorptance (Roof): 0.1700
- Daily Total Solar Insulation Factor (Btu/sqft day): 1,202.9556

Vapor Space Expansion Factor

Vapor Space Expansion Factor:	0.0340
Daily Vapor Temperature Range (deg. R):	19.5141
Daily Vapor Pressure Range (psia):	0.0018
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0049
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0059
Daily Avg. Liquid Surface Temp. (deg R):	511.6051
Daily Min. Liquid Surface Temp. (deg R):	506.7266
Daily Max. Liquid Surface Temp. (deg R):	516.4836
Daily Ambient Temp. Range (deg. R):	19.1500

Vented Vapor Saturation Factor

Vented Vapor Saturation Factor:	0.9967
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0049
Vapor Space Outage (ft):	12.8231

Working Losses (lb):	5.1016
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0049
Annual Net Throughput (gal/yr.):	337,260.0000
Annual Turnovers:	22.1466
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	15,228.5332
Maximum Liquid Height (ft):	18.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000

Total Losses (lb):	7.1783

Individual Tank Emission Totals
Emissions Report for: Annual

		Losses (lbs)	
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.10	2.08	7.18

TANKS 4.0.9d
Emissions Report - Detail Format
Conley T02 - Vertical Fixed Roof Tank
New Martinsville, West Virginia

Tank Identification and Physical Characteristics

Identification
- User Identification: Conley T02
- City: New Martinsville
- 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) : 18.00
- Avg. Liquid Height (ft): 8.00
- Volume (gallons): 15,228.53
- Turnovers: 22.15
- Net Throughput(gal/yr): 337,260.00
- Is Tank Heated (y/n): N

Paint Characteristics
- Shell Color/Shade: White/White
- Shell Condition: Good
- Roof Color/Shade: White/White
- 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

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

Liquid Contents of Storage Tank

Mixture/Component: Distillate fuel oil no. 2
Month: All
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- Max.: 56.81

Liquid Bulk Temp (deg F): 50.33

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- Min. 0.0041
- Max. 0.0059

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Liquid Mass Fract.
Vapor Mass Fract.
Mol. Weight 188.00
Basis for Vapor Pressure Calculations Option 1: ..... VP50 = .0045 VP60 = .0065

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Roof Outage (Dome Roof)
- Roof Outage (ft): 0.8231
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- Vapor Density (lb/cu ft): 0.0001
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- Liquid Bulk Temperature (deg. R): 509.9983
- Tank Paint Solar Absorptance (Shell): 0.1700
- Tank Paint Solar Absorptance (Roof): 0.1700
- Daily Total Solar Insulation Factor (Btu/sqft day): 1,202.9556

Vapor Space Expansion Factor

Vapor Space Expansion Factor:	0.0340
Daily Vapor Temperature Range (deg. R):	19.5141
Daily Vapor Pressure Range (psia):	0.0018
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0049
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0041
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0059
Daily Avg. Liquid Surface Temp. (deg R):	511.6051
Daily Min. Liquid Surface Temp. (deg R):	506.7266
Daily Max. Liquid Surface Temp. (deg R):	516.4836
Daily Ambient Temp. Range (deg. R):	19.1500

Vented Vapor Saturation Factor

Vented Vapor Saturation Factor:	0.9967
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0049
Vapor Space Outage (ft):	12.8231

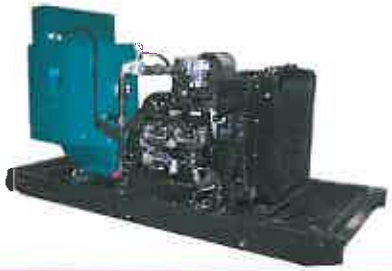
Working Losses (lb):	5.1016
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0049
Annual Net Throughput (gal/yr.):	337,260.0000
Annual Turnovers:	22.1466
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	15,228.5332
Maximum Liquid Height (ft):	18.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000

Total Losses (lb):	7.1783

Individual Tank Emission Totals
Emissions Report for: Annual

		Losses (lbs)	
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	5.10	2.08	7.18

Gaseous Fuel Generator Set
PSI 5.7L Engine Series



Specification Sheet
Model GCMC EPA SI NSPS Certified

NPower

KW(KVA) @ 0.8 P F	
Compression Ratio	60 Hz-1800 RPM 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.

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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], 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.³ 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

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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.

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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
☐ 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	347/600	120/208 Thru 139/240	240/416 Thru 277/480	347/600	120/208 Thru 139/240	240/416 Thru 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.

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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.)	-
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 40°C (104°F) 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

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NPower

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

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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.

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PSI
POWER SOLUTIONS, INC.

GM Industrial Engine Power by Power Solutions, Inc.

5.7L
GM Industrial Engine

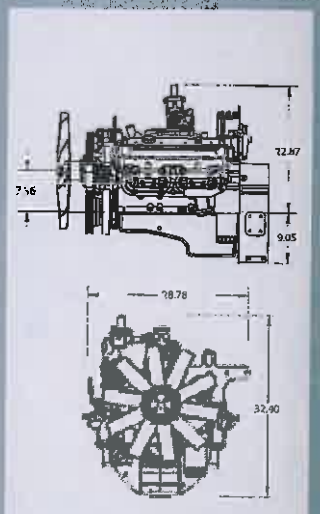
Feature/Benefits

- Designed to work with gasoline, liquid propane gas and natural gas.
- Nodular iron crankshaft has enlarged journal fillet radii for increased durability.
- World-class engine sealing system uses composite cylinder head gaskets with steel cores, a one-piece rear main crankshaft seal, a one-piece oil pan seal and moulded rocker cover seals.
- Hydraulic roller camshaft is optimized for maximum performance.
- Sintered powdered-metal exhaust valve seat inserts for enhanced durability.
- Exhaust valve rotators improve valve and valve seat durability.
- Positive inlet valve stem seals to control oil consumption.
- High Energy Ignition (HEI) distributor and coil and are standard.
- Common rear face on most GM industrial engines for easy hookup with housing.

Options

- Cast iron 4 barrel intake manifold is standard
- An Electronic control Module (ECM) utilizing state-of-the-art hybrid technology and related hardware to optimize fuel and spark requirements is available
- Fuel options LPG, NG
- SAE 3 flywheel housing (cast iron)
- SAE flywheels
- Custom made flywheels for numerous applications
- Cooling fans
- Radiators
- Dry type industrial air cleaners (safety element air cleaners available)
- Electric governor systems available - High Output Camshaft

Power Solutions, Inc.



PSI Offers Turn-Key Certified and Non-Certified Engine Packages

Product Engineering Data

5.7L ENGINE

General Data

Type: 90 5.7L V8
Displacement: 350 cid (5736.50 cc)
Compression Ratio: 9.4:1
Valve Configuration: Pushrod Actuated Overhead Valves
Manufactured: Toluca, Mexico
Valve Lifters: Hydraulic Roller
Bore X Stroke: 4.00 x 3.48 in(101.60 mm x 88.39 mm)
Main Bearing Caps: 2-Bolt
Balance Method: External
Intake Manifold: Carburetor or Mixer
Oil Pan Capacity: 5 qt
Fuel Types: LPG or NG
Engine Rotation: Clockwise (from the front)
Paint Protection: Component Painted
Horsepower: 201 hp @ 3000 rpm (Gasoline), 151 hp @ 3000 rpm (LP and natural gas)
Torque: 320 lb-ft @ 2500 rpm (Gasoline), 272 lb-ft @ 2500 rpm (LP and natural gas)
Shipping Weight: 582 lb (264 kg)

Materials

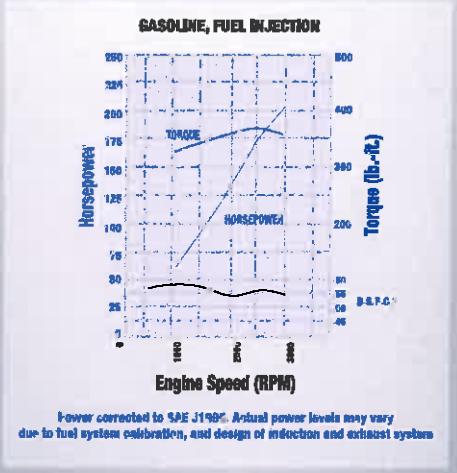
Block: Cast Iron
Cylinder Head: Cast Iron
Intake Manifold: Cast Aluminum
Main Bearing Caps: Cast Iron
Crankshaft: Nodular Iron
Camshaft: Cast Iron
Pistons: High Silicon Content Aluminum
Exhaust Seat: Sintered Powdered Metal Insert

Engine Sealing System

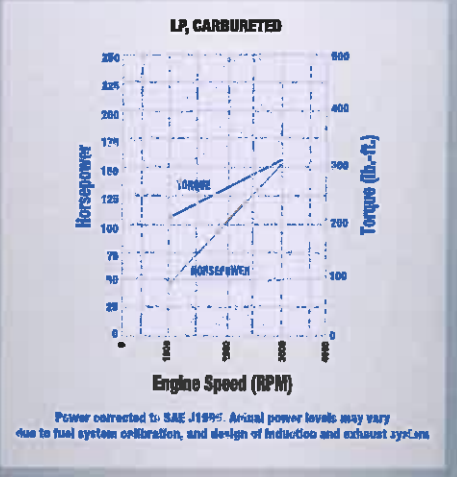
One-piece viton rear main seal
One-piece oil pan gasket
Composite graphite cylinder head gaskets with stainless steel core
Non-asbestos gaskets throughout

Fuel System Options

Closed-Loop Fuel System Kit
Dual Fuel
LPG (Mixer, Throttle Body, Fuel Lock, Regulator)
LPG W/Governor (Same As Above w/Elec. Governor)
LPG W/Governor (Same As Above w/Velocity Governor)
LPG Carb
NG/LPG Carb Dual Fuel
NG Carb
NG (Mixer, Throttle Body & Air Cleaner)
NG W/Governor (Same As Above w/Elec. Governor)
Three Way Catalyst Available



Power corrected to SAE J1995. Actual power levels may vary due to fuel system calibration, and design of induction and exhaust system



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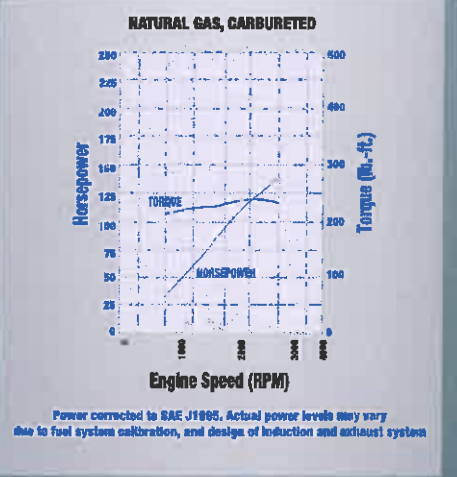

Power corrected to SAE J1995. Actual power levels may vary due to fuel system calibration, and design of induction and exhaust system

PSI
POWER SOLUTIONS, INC.
655 Wheat Lane, Wood Dale, IL 60191
Telephone 630-350-9400
Fax 630-350-9900
www.psiengines.com

GM POWERTRAIN

Information may vary with application. All specifications listed are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

POWER SOLUTIONS INTERNATIONAL

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

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.

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

.012 lb VOC / 661

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

November 12, 2013

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

For: Stone Energy Corporation
6000 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: 36377.021

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	< 0.001	
Nitrogen	2.811	
Carbon Dioxide	1.508	
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	0.518	0.215
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)	0.9985	
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

FESCO, Ltd.

Job Number: 36377.021

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	0.008	0.002	0.020
Isopentane	0.291	0.107	0.994
n-Pentane	0.241	0.088	0.823
2,2 Dimethylbutane	0.014	0.006	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	0.119
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)	0.000	0.000	0.000
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