



CNX Gas Company LLC
Pond Fork Station
Greenwood, West Virginia
Permit Determination
SLR Ref: 116.00894.00071

October 2017



Pond Fork Station Permit Determination

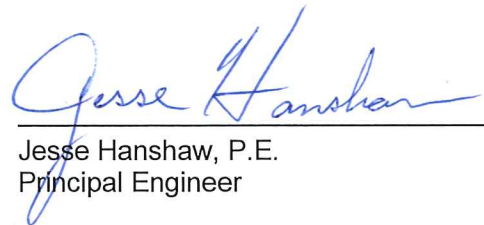
Prepared for:

CNX Gas Company LLC
1000 Consol Energy Drive
Canonsburg, PA 15317

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



Chris Boggess
Associate Engineer



Jesse Hanshaw, P.E.
Principal Engineer



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SECTION 1.
TECHNICAL SUPPORT DOCUMENT

Permit Determination

**Pond Fork Station
Greenwood, West Virginia**

CNX Gas Company LLC
1000 Consol Energy Drive
Canonsburg, PA 15317

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1.1 INTRODUCTION

Pond Fork Station is used as a booster station for wells located within the surrounding area. It is currently a non-permitted site operating with (1) 4SRB 70 hp Compressor Engine (Continental TM-27) and (1) 50 bbl pipeline liquids tank. There is also (1) well located within a quarter mile of the site, but it has no emission points. Emission calculations within this determination account for the tank, as well as the reciprocating internal combustion engine (RICE).

The details of this evaluation are provided in section 2.0 with supporting calculations and ProMax Simulations conducted for worst case operating scenarios.

1.2 SITE HISTORY

The site is being evaluated to identify any after the fact permitting obligations that may be triggered as a result of applicable engine standards under the Federal NSPS provisions of 40CFR60 Subpart JJJJ.

1.3 DESCRIPTION OF FACILITY

CNX Gas Company LLC is submitting a permit determination to evaluate existing equipment at and around Pond Fork Station. Emission sources included within the determination include: (1) 4SRB 70 hp Compressor Engine (Continental TM-27) manufactured in 10-1-2007 and (1) 50 bbl pipeline liquids tank.

DESCRIPTION OF PROCESS

Natural gas, produced from wells in the area, is sent through Pond Fork Station to boost the pressure before entering the gathering pipeline. The incoming gas stream is first run through an inlet separator to reduce pipeline liquids in the gas. Liquids removed by the separator, and by the suction pots on the compressor, are sent to a 50 bbl pipeline liquids tank (T-1).

Description of Emission Calculations

The tank was estimated to have a worst case throughput of 5 bbl/day per tank. The tank emissions were estimated using ProMax with representative samples of gas and condensate taken from the Minnie Lee No.1 well site. The Minnie Lee No.1 condensate composition is viewed as a worst case representation. This estimate predicts approximately 0.13 tpy of VOCs originating from the tank. These emissions included flashing losses as well as working and breathing losses. The amount of condensate produced at the station is minimal and therefore all produced liquids are sent to the storage vessel (T-1) and hauled from the site via 100 bbl tank truck.

1.4 FEDERAL AND STATE REQUIREMENT

APPLICABLE REGULATIONS

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

Federal and State:

40 CFR 61 – This facility is subject to the asbestos inspection and notification requirements. However, there has been no demolition or renovation activity at this site.

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

The company is applying for a permit determination to assure all permitting thresholds are evaluated with respect to minor source permit requirements, as a result all commonly owned emissions sources are aggregated as one facility if located within ¼ miles from the booster station.

WV Code § 22-5-4 (a) (14)

The Secretary can request any pertinent information such as annual emission inventory reporting. This station is not required to submit an annual air emission inventory.

45 CSR 17 - Fugitive Particulate Emissions

The site shall minimize fugitive PM so that emissions do not travel offsite.

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

The compressor engine (CE-1) at the station was manufactured on 10-1-2007, which predates the July 1, 2008 applicability date for engines less than 500 hp. Therefore, the compressor engine is not subject to emissions limits according to 40 CFR§60.4230(a)(4)(iii). Additionally, the compressor was installed as a booster at the Pond Fork location on 4-30-13 and therefore evaluated for applicability requirements for installing previous model year engines. This engine was found to be exempt from these requirements as a relocated unit according to §60.4236(e).

40 CFR 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

The natural gas compressor engine (CE-1) is a 4SRB Continental TM-27 engine manufactured in 2007; therefore, per 40CFR63.6590(c)(1) the requirements of this regulation are to comply with new SI engines standards in accordance with 40CFR60, Subpart JJJJ.

NON-APPLICABILITY DETERMINATIONS

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

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

No heat exchangers are in use at Pond Fork Station or any of the surrounding wells.

45 CSR 10 - Emission of Sulfur Oxides

No fuel burning units are in use at Pond Fork Station or any the surrounding wells.

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

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

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

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

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

The tank (T-1) is below the size capacity threshold of 75 meters cubed (m³) [19,813 gallons] defined within the applicability section 60.110b(a) of this Federal standard.

40 CFR 60 Subpart OOOO - Storage Vessel and Reciprocating Compressor Requirements

The existing storage vessel was installed in 2012 so it was after Aug. 23, 2011 the new source date for this NSPS. However, VOC emissions have been predicted to be below the affected source threshold of 6 tpy VOC per storage vessel. Additionally reciprocating compressors at well sites are considered exempt from the packing requirement of the Regulation.

40 CFR 60 Subpart OOOOa - Storage Vessel NSPS Requirements

The existing storage vessels predate the applicability date of this regulation, September 18, 2015.

40 CFR 60 Subpart OOOOa – Fugitive Component Monitoring

The site is classified as a well facility, which will not be subject to the monitoring requirement of this section since the existing site predates the applicability date of September 18, 2015 as defined under this Federal regulation.

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

There is no dehydration unit at this site.

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

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

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

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

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

This subpart is not applicable because there are no boilers located at the station or at the surrounding well pads.

40 CFR 82 Subpart F - Ozone Depleting Substances

The purpose of this subpart is to reduce emissions of class I and class II refrigerants and their substitutes. The facility does not utilize class I and class II refrigerants nor any substitutes.

Aggregation Discussion (Facility Determination)

Pond Fork Station is operated solely by CNX Gas Company LLC. All sites within a quarter mile of this facility have been evaluated for additional emissions. Only one conventional well was identified as having shared equipment within ¼ mile from the Pond Fork booster station.

SECTION 2. APPLICATION FOR PERMIT DETERMINATION

Permit Determination

**Pond Fork Station
Greenwood, West Virginia**

CNX Gas Company LLC
1000 Consol Energy Drive
Canonsburg, PA 15317

October 2017



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. # _____
 PDF # _____ PERMIT WRITER: _____

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

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

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

4A. MAILING ADDRESS:
1000 Consol Energy Drive Canonsburg, PA 15317

4B. PHYSICAL ADDRESS:

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A):
 Traveling North on I-64 W, take the interstate 64 W/Interstate 77 N exit toward Charleston. Merge onto I-64W/I-77 N and travel 2.3 miles. Take exit 42 to merge onto WV-16 S/WV-97 W/ Robert C Byrd Dr. for 3.1 miles. Take the WV-54 S ramp to Mullens. In 0.5 miles turn right onto WV-54 S/WV-97 W and travel 3.1 miles. Turn right onto WV-305 N/Central Ave. and travel 3.0 miles. Turn left onto WV-3 W and travel 1.4 miles. Continue onto WV-99 W for 14 miles. Turn right onto WV-85 N and travel 7.2 miles. Turn left (Southwest) onto the access road and travel 0.51 miles. Turn left (Southwest) and travel 0.14 miles, the station will be located straight ahead.

5B. NEAREST ROAD:
 WV-85 N

5C. NEAREST CITY OR TOWN:
 Greenwood

5D. COUNTY:
 Boone

5E. UTM NORTHING (KM):
 4,187.488

5F. UTM EASTING (KM):
 443.954

5G. UTM ZONE:
 17

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

6B. TITLE:
 HSE Field – Conventional WV Gas Operations

6C. TELEPHONE:
 304-884-2219

6D. FAX:

6E. E-MAIL:
 JerodDuelley@consolenergy.com

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

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:
N/A

10B. DATE OF ANTICIPATED START-UP:
After the Fact

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

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

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

13A. REGULATED AIR POLLUTANT EMISSIONS:

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

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

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

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.02	0.06
PM₁₀	0.02	0.06
VOCs	0.23	1.01
CO	0.58	2.52
NO_x	0.35	1.54
SO₂	<0.01	0.01
Pb	<0.01	<0.01
HAPs (AGGREGATE AMOUNT)	0.02	0.09
TAPs (INDIVIDUALLY)*		
Formaldehyde	0.02	0.06
Benzene	0.01	0.01
OTHER (INDIVIDUALLY)*		

* 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, **CRAIG NEAL** (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: VICE PRESIDENT GAS OPERATIONS

DATE: _____ / _____ / _____

** 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

ATTACHMENT A

AREA MAP

Permit Determination

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Attachement - A


CNX Gas Company LLC
Pond Fork Station

Coordinates of Site:
Lat: 37.83310, Lon: -81.63691

Legend

-  0.25 Mile Barrier
-  300' Barrier

 Well Site 11367

 Pond Fork Station

Google earth

© 2017 Google

85

Pond Fork Rd



2000 ft

ATTACHMENT B

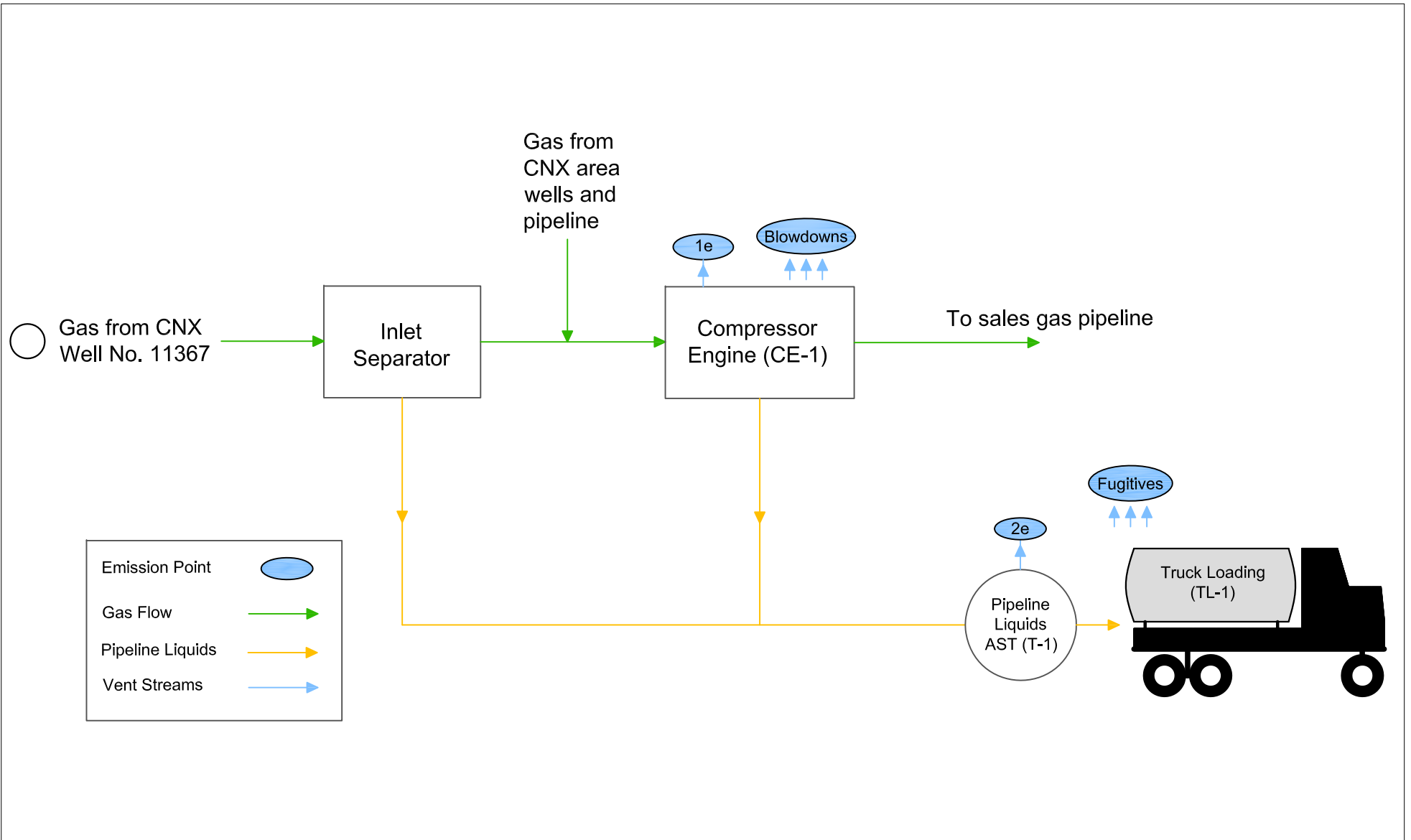
PROCESS FLOW DIAGRAM

Permit Determination

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CNX Gas Company LLC

Attachment B - Process Flow Diagram

Pond Fork Station

Sept 2017

ATTACHMENT C

PROCESS DESCRIPTION

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October 2017

PROCESS DESCRIPTION

The existing facility is a non-permitted site operating (1) 4SRB 70 hp Compressor Engine (Continental TM-27) manufactured in 2007, and associated separation equipment. The site has (1) 50 bbl pipeline liquid tank. Additionally, (1) Well is located within a quarter mile of the station, but it has no emission points to consider. CNX Gas Company LLC is submitting a permit determination to evaluate the existing equipment.

DESCRIPTION OF PROCESS

Natural gas, produced from wells in the area, is sent through Pond Fork Station to boost the pressure before reentering the sales gas pipeline. The incoming gas stream is first run through an inlet separator to reduce pipeline liquids in the gas. Liquids removed by the separator, and by the suction pot separators on the compressor, are sent to a 50 bbl pipeline liquids tank (T-1).

ATTACHMENT D
SAFETY DATA SHEETS

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Canonsburg, PA 15317

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Safety Data Sheet (SDS)

Section 1 – Identification

1(a) Product Identifier used on Label: Condensate

1(b) Other Means of Identification: Natural Gas Condensate, Produced Hydrocarbons, Drip Gas, Natural Gasoline, Petroleum Crude Oil Condensates

1(c) Recommended Use of the Chemical and Restrictions on Use: Used as a petrochemical feedstock, home heating fuel and refinery blending.

1(d) Name, Address, and Telephone Number:

CONSOL Energy Inc.
1000 CONSOL Energy Drive
Canonsburg, PA 15317





General information: (724) 485-4000

1(e) Emergency Phone Number: Chemtrec (800) 424-9300

Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: Condensate is considered a hazardous material according to the criteria specified in REACH [REGULATION (EC) No 1907/2006] and CLP [REGULATION (EC) No 1272/2008] and OSHA 29 CFR 1910.1200 Hazard Communication Standard. The categories of Health Hazards as defined in “GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS), Third revised edition ST/SG/AC.10/30/Rev. 3” United Nations, New York and Geneva, 2009 have been evaluated. Refer to Section 3, 8 and 11 for additional information.

2(b) Signal Word, Hazard Statement(s), Symbol(s) and Precautionary Statement(s):

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)
	Flammable Liquid - 2	Danger	<p>Highly Flammable liquid and vapor Toxic if inhaled Causes skin irritation and serious eye irritation May cause genetic defects, cancer and damage fertility or the unborn child May cause damage to central and peripheral nervous system, lungs, liver and red blood cells Causes damage to the blood, spleen, and liver through prolonged or repeat exposures May be fatal if swallowed and enters airways</p>
	Germ Cell Mutagenicity - 1B Carcinogenicity - 1A Toxic Reproduction - 1B Specific Target Organ Toxicity (STOT) Following Single Exposure - 2 STOT following Repeated Exposure - 1 Aspiration - 1		
	Acute Toxicity Hazard - 3		
	Skin Corrosion/Irritation - 2 Eye Damage/ Irritation - 2A		

Precautionary Statement(s)

Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep container tightly closed.
Ground/Bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Do not breathe dust/fume/gas/mist/ vapors/spray.
If exposed, concerned or feel unwell: Get medical advice/attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

If on skin: Wash with plenty of water If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
If swallowed: Immediately call a poison center/doctor/ Do NOT induce vomiting.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
If exposed or concerned: Call a poison center or doctor. Get medical attention if you feel unwell.
Store in well-ventilated place. Keep cool. Use only outdoors or in a well-ventilated area. Store locked up.
Dispose of contents in accordance with federal, state and local regulations.

Section 2 – Hazard(s) Identification (continued)

2(c) Hazards not Otherwise Classified: None Known or Found

2(d) Unknown Acute Toxicity Statement (mixture): None Known or Found

Section 3 – Composition/Information on Ingredients

3(a-c) Chemical Name, Common Name (synonyms), CAS Number and Other Identifiers, and Concentration:

Chemical Name	CAS Number	EC Number	% weight
Natural Gas Condensate	64741-47-5	265-047-3	100
Natural Gas Condensate is a petroleum substance comprised of a complex mixture of hydrocarbons. Major classes of hydrocarbons contained in the substance are listed below:			
Hydrocarbons Aromatic	Mixture	Mixture	~ 5
Hydrocarbons Naphthalenes	Mixture	Mixture	~ 8
Hydrocarbons (total Paraffin and isoparaffin)	Mixture	Mixture	~ 65
Benzene	71-43-2	200-753-7	~ 0.1

EC - European Community

CAS - Chemical Abstract Service

Section 4 – First-aid Measures

4(a) Description of Necessary Measures: If exposed, concerned or feel unwell: Get medical advice/attention.

- **Inhalation:** If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor.
- **Eye Contact:** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
- **Skin Contact:** If on skin: Wash with plenty of water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
- **Ingestion:** If swallowed: Immediately call a poison center/doctor/ DO NOT induce vomiting.

4(b) Most Important Symptoms/Effects, Acute and Delayed (chronic):

Acute Effects:

- **Inhalation:** Aspiration hazard, May be fatal if enters airways. May cause CNS and peripheral depression and damage to liver lungs and red blood cells.
- **Eye:** Causes irritation to eyes and mucous membranes.
- **Skin:** Causes irritation to skin.
- **Ingestion:** Aspiration hazard. May be fatal if swallowed.

Delayed (chronic) Effects:

- May cause genetic defects or cancer. May damage fertility or cause damage to the unborn child. Causes damage to the hematopoietic (blood) system, spleen, and liver through prolonged or repeat exposures.

4(c) Immediate Medical Attention and Special Treatment: If exposed, concerned or feel unwell: Get medical advice/attention.

Additional Information:

Primary Entry Routes: Inhalation, Ingestion, skin and eye contact.

Target Organs: Central nervous system, blood, eyes, skin lungs, and liver. Causes damage to the hematopoietic (blood) system, spleen, and liver.

Carcinogenicity: IARC, NTP, ACGIH and OSHA list benzene as a carcinogen.

Section 5 – Fire-fighting Measures

5(a) Suitable (and unsuitable) Extinguishing Media: In case of fire: Use foam, dry powder or carbon dioxide for extinction. Do not use a solid stream of water as it may scatter and spread the fire.

5(b) Specific Hazards Arising from the Chemical: Vapors are heavier than air and may accumulate in low areas. Fire will produce irritating, corrosive and toxic gasses.

5(c) Special Protective Equipment and Precautions for Fire-Fighters: Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause formation of acrid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used. Evacuate area. Remove pressurized gas cylinders from the immediate vicinity. Cool containers exposed to flames with water until well after the fire is out. Close the valve if no risk is involved. Fight fire from a protected location. Prevent buildup of vapors or gases to explosive concentrations.

Section 6 - Accidental Release Measures

6(a) Personal Precautions, Protective Equipment and Emergency Procedures: Spills of condensate will create a fire hazard and may form an explosive atmosphere. Stay up wind and away from the spill. Clean-up personnel should be protected against contact with eyes and skin. Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations.

6(b) Methods and Materials for Containment and Clean Up: Collect with sand or oil absorbing materials. Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Section 7 - Handling and Storage

7(a) Precautions for Safe Handling: Keep away from heat/sparks/open flames/hot surfaces. No smoking. Ground/Bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge.

7(b) Conditions for Safe Storage, Including Any Incompatibilities: Store in well-ventilated place. Keep cool. Take precautions to avoid static discharges around stored condensate. Ground storage tanks and transfer piping. Use only outdoors or in a well-ventilated area. If feasible, store locked up.

Section 8 - Exposure Controls / Personal Protection

8(a) Occupational Exposure Limits (OELs): The following exposure limits are offered as reference, for an experience industrial hygienist to review.

Ingredients	OSHA PEL ¹	ACGIH TLV ²	NIOSH REL ³	IDLH ⁴
Benzene	1.0 ppm "STEL" 5.0 ppm	0.5 ppm (1.6 mg/m ³), skin "STEL" 2.5 ppm (8 mg/m ³)	0.1 ppm (0.32 mg/m ³) "STEL" 1.0 ppm (3.2 mg/m ³)	500 ppm

1. OSHA PEL are 8-hour TWA concentrations unless otherwise noted. A Short Term Exposure Limit (STEL) is defined in the benzene standard as: The employer shall assure that no employee is exposed to an airborne concentration of benzene in excess of five (5) ppm as averaged over any 15 minute period.
2. TLVs established by the ACGIH are 8-hour TWA concentrations unless otherwise noted. ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes. A Short Term Exposure Limit (STEL) is defined as the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures.
3. The NIOSH-REL- Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
4. The IDLHs are used by NIOSH as part of the respirator selection criteria and were first developed in the mid 1970's by NIOSH. The Documentation for IDLHs is a compilation of the rationale and sources of information used by NIOSH during the original determination of 387 IDLHs and their subsequent review and revision in 1994.

8(b) Appropriate Engineering Controls: Local exhaust ventilation should be used to control the emission of air contaminants. General dilution ventilation may assist with the reduction of air contaminant concentrations. Emergency eye wash stations and deluge safety showers should be available in the work area.

8(c) Individual Protection Measures:

- **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use only a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Half-mask negative-pressure, air-purifying respirator equipped with organic vapor cartridge is acceptable for concentrations up to 10 times the exposure limit. Full-face negative-pressure air purifying respirator equipped with organic vapor cartridges is acceptable for concentrations up to 50 times the exposure limit. Protection by air purifying both negative-pressure and powered air respirators is limited. Use a positive-pressure-demand, full-face, supplied air respirator or self contained breathing apparatus (SCBA) for concentrations above 50 times the exposure limit. If exposure is above the IDLH (Immediately dangerous to life or health) for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.

Warning! Air-purifying respirators both negative-pressure, and powered-air do not protect workers in oxygen-deficient atmospheres.

- **Eyes:** Employees should be required to wear chemical safety glasses to prevent eye contact. A face shield should be used when appropriate to prevent contact with splashed materials. Chemical goggles, face shields or glasses should be worn to prevent eye contact. Contact lenses should not be worn where industrial exposure to this material is likely.
- **Skin:** Persons handling this product should wear appropriate clothing to prevent skin contact. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse. Wear protective gloves. Chemical goggles, face shields or glasses should be worn to prevent eye contact. Contact lenses should not be worn where industrial exposure to this material is likely. Wash skin that has been exposed with soap and water.
- **Other Protective Equipment:** An eyewash fountain and deluge shower should be readily available in the work area.

Section 9 - Physical and Chemical Properties

9(a) Appearance (physical state, color, etc.): Colorless to amber liquid

9(j) Upper/lower Flammability or Explosive Limits: 10% / 1%

9(b) Odor: gasoline - like

9(k) Vapor Pressure: 200-500 mmHg@68°F

Section 9 - Physical and Chemical Properties (continued)

9(c) Odor Threshold: NA
9(d) pH: NA
9(e) Melting Point/Freezing Point: NA
9(f) Initial Boiling Point and Boiling Range: 96.8 - 258 °F (36-125.6 °C)
9(g) Flash Point: <-50°F (<-45.6 °C)
9(h) Evaporation Rate: NA
9(i) Flammability (liquid): Highly Flammable
 NA - Not Applicable
 ND - Not Determined for product as a whole

9(l) Vapor Density (Air = 1): ND
9(m) Relative Density: 6.25 lbs/gal (Bulk Density)
9(n) Solubility(ies): ND
9(o) Partition Coefficient n-octanol/water: ND
9(p) Auto-ignition Temperature: ND
9(q) Decomposition Temperature: ND
9(r) Viscosity: ND

Section 10 - Stability and Reactivity

10(a) Reactivity: Not Determined (ND) for product as a whole.
10(b) Chemical Stability: Stable under normal storage and handling conditions.
10(c) Possibility of Hazardous Reaction: No Data Found
10(d) Conditions to Avoid: Storage with incompatible materials. Avoid heat, flame, or ignition sources.
10(e) Incompatible Materials: Strong acids and oxidizing agents.
10(f) Hazardous Decomposition Products: Can produce carbon dioxide and carbon monoxide.

Section 11 - Toxicological Information

11(a-e) Information on Toxicological Effects: The following toxicity data have been determined using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL:

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU*	OSHA			
Acute Toxicity Hazard (covers Categories 1-5)	NA**	3 ^a		Danger	Toxic if inhaled
Skin Corrosion/Irritation (covers Categories 1A, 1B, 1C and 2)	2	2 ^b		Warning	Causes skin irritation
Eye Damage/ Irritation (covers Categories 1, 2A and 2B)	NA**	2A ^c		Warning	Causes serious eye irritation
Skin/Dermal Sensitization (covers Category 1)	NA**	NA**	NA**	NA**	NA**
Germ Cell Mutagenicity (covers Categories 1A, 1B and 2)	1B	1B ^d		Danger	May cause genetic defects
Carcinogenicity (covers Categories 1A, 1B and 2)	1B	1A ^e		Danger	May cause cancer
Toxic Reproduction (covers Categories 1A, 1B and 2)	NA**	1B ^f		Danger	May damage fertility or the unborn child
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	NA**	2 ^g		Warning	May cause CNS and Peripheral depression, and damage lung liver (vacuolated hepatocytes) and red blood cells
STOT following Repeated Exposure (covers Categories 1 and 2)	NA**	1 ^h		Warning	May cause damage to the Hematopoietic system, spleen, liver through prolonged or repeat exposures
Aspiration (covers category 1)	1	1		Danger	May be fatal if swallowed and enters the airway

* Natural Gas Condensate has been harmonized as - Base classification: High Benzene Naphtha, flashpoint < 23°C and initial boiling point ≥ 35°C, benzene or 1,3-butadiene ≥ 0.1%, naphthalene < 25% .

** Not Applicable - Many categories have conclusive but not sufficient for classification information.

Section 11 - Toxicological Information (continued)

11(a-e) Information on toxicological effects (continued):

a. The following LC₅₀ or LD₅₀ has been established for **Condensate** as a mixture:

- Rat (4 hr) LC₅₀ >5.2 mg/L
- Rat (4 hr) LC₅₀ >5.81 mg/L
- Rat (4 hr) LC₅₀ >5.2 mg/L

b. The following **Skin Corrosion/Irritation** information was found for **Condensate** as a mixture:

- Rabbit – Slightly irritating.
- Rabbit - Irritating but not corrosive.

c. The following **Eye Damage/Irritation** information was found for **Condensate** as a mixture:

- Rabbit – Slightly irritating.

d. No **Germ Cell Mutagenicity** data available for **Condensate** as a mixture. The following **Germ Cell Mutagenicity** information was found for the components:

- Benzene - Positive with activation. Positive In vitro Clastogenicity.

e. No **Carcinogenicity** data available for **Condensate** as a mixture. The following **Carcinogenicity** information was found for the components:

- Benzene - Listed as class 1 carcinogen by the NTP, IARC, EPA and ACGIH.

f. No **Reproductive Toxicity** data available for **Condensate** as a mixture. The following **Reproductive Toxicity** information was found for the components:

- Benzene - NOAEC for both adult and offspring toxicity and female fertility. 300ppm (960 mg/m³). NOAEC for maternal toxicity and teratogenicity was 100 ppm (320 mg/m³). The NOAEC for slight fetotoxicity was 40 ppm (128 mg/m³).

g. No **Specific Target Organ Toxicity (STOT) following Single Exposure** data available for **Condensate** as a mixture. The following STOT following Single Exposure information was found for the components:

- Benzene - CNS and peripheral Depression, lung liver (vacuolated hepatocytes) and red blood cells may be effected.

h. No **Specific Target Organ Toxicity (STOT) following Repeated Exposure** data available for **Condensate** as a mixture. The following STOT following Repeated Exposure data is available for the components:

- Benzene - Spleen hematopoiesis, Liver, lung kidney effects are specific to male Rat. Early signs and symptoms of chronic overexposure include effects on CNS & the GI tract (headache, loss of appetite, drowsiness, nervousness, & pallor) but the major manifestation of toxicity is aplastic anemia. Bone marrow depression may occur resulting in leucopenia, anemia, or thrombocytopenia (leukemogenic action). With continued exposure the disease states may progress to pancytopenia resulting from bone marrow aplasia. Evidence has linked benzene in the etiology of leukemia.

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources includes: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure indices (BEIs) with Other Worldwide Occupational Exposure Values 2009, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCSID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCOEL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS).

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Found

12(b) Persistence & Degradability: Loss due to volatility. Not readily biodegradable but is inherently biodegradable by microorganisms.

12(c) Bioaccumulative Potential: No Data Found

12(d) Mobility (in soil): Will float on water and will volatilize in air.

12(e) Other adverse effects: No Data Found

Additional Information:

Hazard Category: Not Reported

Signal Word: No Signal Word

Hazard Symbol: No Symbol

Hazard Statement: No Statement

Section 13 - Disposal Considerations

Disposal: Waste code D001: Waste Flammable material with a flash point <140°F. This material and its container must be disposed of as hazardous waste. Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste. **European Waste Catalogue (EWC):** 05-01-99 (waste from petroleum refining).

Container Cleaning and Disposal: Containers should be completely empty prior to discarding. Dispose of contents in accordance with federal, state and local regulations. Observe safe handling precautions.

Please note this information is for Condensate in its original form. Any alterations can void this information.

Section 14 - Transportation Information

14(a-g) Transportation Information:

US DOT under 49 CFR 172.101 regulates **Condensate** as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

Shipping Name: RQ, UN3295, Hydrocarbon, Liquid, N.O.S. PGIII (Benzene) Shipping Symbols: Flammable Liquid Hazard Class: 3 UN No.: UN3295 Packing Group: III DOT/IMO Label: 3 Special Provisions (172.102): 144,B1,IB3,T4,TP1,TP29	Packaging Authorizations a) Exceptions: 150 b) Non-Bulk: 203 c) Bulk: 242	Quantity Limitations a) Passenger, Aircraft, or Railcar: 60L b) Cargo Aircraft Only: 220L Vessel Stowage Requirements a) Vessel Stowage: A b) Other: NA DOT Reportable Quantities: 10 lbs.
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IMDG and RID classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

ADR regulates **Condensate** as a hazardous material.

Shipping Name: Hydrocarbons, Liquid, N.O.S. Classification Code: 3 UN No.: 3295 Packing Group: III ADR Label: Flammable Liquid Special Provisions: 223 Limited Quantities: 5L Excepted Quantities (EQ): E1	Packaging a) Packing Instructions: P001, LP01 b) Special Packing Provisions: NA c) Mixed Packing Provisions: NA	Portable Tanks & Bulk Containers a) Instructions: T4 b) Special Provisions: TP1, TP29
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IATA regulates **Condensate** as a hazardous material.

Shipping Name: Hydrocarbons, Liquid, N.O.S. Class/Division: 3 Hazard Label (s): Flammable Liquid UN No.: 3295 Packing Group: 1 Excepted Quantities (EQ): E3	Passenger & Cargo Aircraft Limited Quantity (EQ)		Cargo Aircraft Only Pkg Inst: 303 Max Net Qty/Pkg: 30 L	Special Provisions: A3 ERG Code: 3H
	Pkg Inst: Forbidden	Pkg Inst: 302 Max Net Qty/Pkg: 1L		

Pkg Inst – Packing Instructions

Max Net Qty/Pkg – Maximum Net Quantity per Package

ERG – Emergency Response Drill Code

TDG Classification: **Condensate** does have a TDG classification.

Section 15 - Regulatory Information

Regulatory Information: *The following listing of regulations relating to a CONSOL Energy Inc. product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.*

This product and/or its constituents are subject to the following regulations:

OSHA Regulations: Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): The product, **Condensate** as a whole is not listed. However, individual components of the product are listed: Refer to Section 8, Exposure Controls and Personal Protection

EPA Regulations: **Condensate** is not listed as a whole. However, individual components of the product are listed:

Components	Regulations
Benzene	SARA 313, CERCLA, RCRA, SDWA, CWA, CAA

SARA Potential Hazard Categories: Immediate Acute Health Hazard, Delayed Chronic Health Hazard, Fire Hazard

Regulations Key:

- CAA Clean Air Act (42 USC Sec. 7412; 40 CFR Part 61 [As of: 8/18/06])
- CERCLA Comprehensive Environmental Response, Compensation and Liability Act (42 USC Secs. 9601(14), 9603(a); 40 CFR Sec. 302.4, Table 302.4, Table 302.4 and App. A)
- CWA Clean Water Act (33 USC Secs. 1311; 1314(b), (c), (e), (g); 136(b), (c); 137(b), (c) [as of 8/2/06])
- RCRA Resource Conservation Recovery Act (42 USC Sec. 6921; 40 CFR Part 261 App VIII)
- SARA Superfund Amendments and Reauthorization Act of 1986 Title III Section 302 Extremely Hazardous Substances (42 USC Secs. 11023, 13106; 40 CFR Sec. 372.65) and Section 313 Toxic Chemicals (42 USC Secs. 11023, 13106; 40 CFR Sec. 372.65 [as of 6/30/05])
- TSCA Toxic Substance Control Act (15 U.S.C. s/s 2601 et seq. [1976])
- SDWA Safe Drinking Water Act (42 U.S.C. s/s 300f et seq. [1974])

Section 313 Supplier Notification: This product, **Condensate** contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372:

CAS #	Chemical Name	Percent by Weight
71-43-2	Benzene	0.1

Section 15 - Regulatory Information (continued)

Regulatory Information (continued):

State Regulations: The product, **Condensate** as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations:

Pennsylvania Right to Know: Contains regulated material in the following categories:

- Environmental Hazards: Benzene
- Special Hazardous Substance: Benzene

California Prop. 65: This product contains materials known to the State of California to cause cancer. Benzene

New Jersey: Contains regulated material in the following categories: Hazardous Substance: Benzene

Minnesota: Benzene

Massachusetts: Benzene

Other Regulations:

WHMIS Classification (Canadian): **Condensate** is not listed as a whole. However individual components are listed.

Ingredients	WHMIS Classification
Benzene	D-2A, D-2B, B-2

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

Section 16 - Other Information

Prepared By: CONSOL Energy Inc.

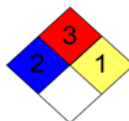
Issue Date: 8/12/2013

Additional Information:

HMIS Classification

Health Hazard	2
Fire Hazard	3
Physical Hazard	1

NFPA



HEALTH = 2, Temporary or minor injury may occur.

FIRE = 3, Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 °F and boiling points above 100 °F, as well as liquids with flash points between 73 °F and 100 °F. (Classes IB & IC).

PHYSICAL HAZARD = 1, Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

HEALTH = 2, Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.

FIRE = 3, Liquids and solids that can be ignited under almost all ambient conditions.

INSTABILITY = 1, Normally stable, but can become unstable at elevated temperatures and pressures or may react with water with some release of energy, but not violently.

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	Regulations Concerning the International Carriage of Dangerous Goods by Road
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
CPL	Classification, Labeling and Packaging
DOT	Department of Transportation
EC	European Community
EU	European Union
EWC	European Waste Catalogue
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract
GHS	Globally Harmonized System
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IDLH	Immediately Dangerous to Life or Health
IMDG	International Maritime Dangerous Goods
LC50	Median Lethal Concentration

mg/m³	milligram per cubic meter of air
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NOAEC	No Observed Adverse Effect Concentration
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
REACH	Registration, Evaluation, Authorization and Restriction of Chemical substances.
RID	Regulations Concerning the International Carriage of Dangerous Goods by Rail
REL	Recommended Exposure Limits
SDS	Safety Data Sheet
SARA	Superfund Amendment and Reauthorization Act
SCBA	Self-contained Breathing Apparatus
STEL	Short Term Exposure Limit
TDG	Transport Dangerous Goods
TLV	Threshold Limit Value
TWA	Time-weighted Average

Section 16 - Other Information (continued)

ABBREVIATIONS/ACRONYMS (continued):

MSHA	Mine Safety and Health Administration
mg/L	milligram per liter

WHMIS	Workplace Hazardous Materials Information System
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Disclaimer: This information is taken from sources or based upon data believed to be reliable. Our objective in sending this information is to help you protect the health and safety of your personnel and to comply with the OSHA Hazard Communication Standard and Title III of the Superfund Amendment and Reauthorization Act of 1986. CONSOL Energy Inc. makes no warranty as to the absolute correctness, completeness, or sufficiency of any of the foregoing, or any additional, or other measures that may be required under particular conditions. CONSOL Energy Inc. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY, OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADE.

UNOCAL MATERIAL SAFETY DATA SHEET

Product Name: Processed Natural Gas
Product Code: None

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Processed Natural Gas
Product Code: None
Synonyms: Dry Gas
Generic Name: Natural Gas
Chemical Family: Paraffin hydrocarbon
Responsible Party: Unocal Corporation
Union Oil Company of California
14141 Southwest Freeway
Sugar Land, Texas
77478

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

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:

For Chemical Emergencies:

Spill, Leak, Fire or Accident

Call CHEMTREC

North America: (800)424-9300

Others: (703)527-3887(collect)

For Health Emergencies:

California Poison

Control System

(800)356-3129

Health Hazards: Use with adequate ventilation.

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

< Physical Form: Gas

< Appearance: Colorless

< Odor: Odorless in the absence of H₂S or mercaptans

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

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Revised Sections: 1, 3

Status: Final Revised

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 Product Code: None

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2. COMPOSITION/INFORMATION ON INGREDIENTS

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

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

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Not expected to be an eye irritant.

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

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

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

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

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

Cancer: No data available.

Target Organs: No data available.

Developmental: Limited data - See Other Comments, below.

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

Pre-Existing Medical Conditions: None known.

4. FIRST AID MEASURES

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

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

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

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

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Status: Final Revised

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Product Code: None

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5. FIRE FIGHTING MEASURES

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

Personal Protective Equipment (PPE):

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

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

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Product Code: None

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

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

Flash Point: Not applicable (gas)

Flammable/Explosive Limits (%): No data

Autoignition Temperature: 800-1000°F

Appearance: Colorless

Physical State: Gas

Odor: Odorless in the absence of H₂S or mercaptans

Vapor Pressure (mm Hg): No data

Vapor Density (air=1): <1

Boiling Point: -259°F

Freezing/Melting Point: No data

Solubility in Water: Slight

Specific Gravity: 0.30+ (Air=1)

Percent Volatile: 100 vol.%

Evaporation Rate (nBuAc=1): N/A (Gas)

10. STABILITY AND REACTIVITY

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

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

Incompatible Materials: Avoid contact with strong oxidizing agents.

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

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Product Name: Processed Natural Gas

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Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

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

12. DISPOSAL CONSIDERATIONS

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

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

13. TRANSPORT INFORMATION

DOT Proper Shipping Name / Technical Name: Hydrocarbon Gas, Liquified
N.O.S. (Methane)

Hazard Class or Division: 2.1

ID #: UN1965

14. REGULATORY INFORMATION

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

--None--

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

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Status: Final Revised

Revised Sections: 1, 3

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Product Name: Processed Natural Gas
Product Code: None

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

--None Known--

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

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

15. DOCUMENTARY INFORMATION

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

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

Status: Final Revised

ATTACHMENT E

EMISSION CALCULATIONS

Permit Determination

**Pond Fork Station
Greenwood, West Virginia**

CNX Gas Company LLC
1000 Consol Energy Drive
Canonsburg, PA 15317

October 2017

**Table 1. Annual Potential To Emit (PTE) Summary
CNX Gas Company - Pond Fork Station**

Criteria Pollutants

Proposed Facility Wide PTE - Criteria Pollutants

Source	PM	PM10	PM2.5	SO2	NOx	CO	VOC	CO2e
Engines (ton/yr)	0.053	0.053	0.053	0.002	1.534	2.514	0.020	322.016
Tanks (ton/yr)	-	-	-	-	-	-	0.134	-
Truck Loading (ton/yr)	-	-	-	-	-	-	0.041	-
Compressor Blowdowns (ton/yr)	-	-	-	-	-	-	0.231	-
Fugitives (ton/yr)	-	-	-	-	-	-	0.578	13.429
Total Emissions (ton/yr)	0.053	0.053	0.053	0.002	1.534	2.514	1.004	335.445
Total Emissions (lb/hr)	0.012	0.012	0.012	0.000	0.350	0.574	0.229	76.586

Hazardous Air Pollutants (HAPs)

Proposed Facility Wide PTE - HAPs

Source	Acetaldehyde	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs
Engines (ton/yr)	0.0077	0.0043	0.0015	0.0001	0.0005	-	0.056	0.089
Tanks (ton/yr)	-	-	-	-	-	-	-	-
Truck Loading (ton/yr)	-	-	-	-	-	-	-	-
Compressor Blowdowns (ton/yr)	-	-	-	-	-	-	-	-
Fugitives (ton/yr)	-	-	-	-	-	-	-	-
Total Emissions (ton/yr)	0.008	0.004	0.002	0.000	0.001	0.000	0.056	0.089
Total Emissions (lb/hr)	0.002	0.001	0.000	0.000	0.000	0.000	0.013	0.020

Table 2. Reciprocating Engine / Integral Compressor Emissions (CE-1)
Continental- TM-27
CNX Gas Company - Pond Fork Station

Pollutant	Maximum Hourly Emissions			Annual Emissions	
	Emission Factor		PTE per Engine (lb/hr)	Emission Factor	PTE per Engine (tons/yr)
Criteria Pollutants					
PM/PM10/PM2.5**	1.94E-02 lb/MMBtu	(1)	0.012 (a)	1.94E-02 lb/MMBtu	(1) 0.05 (c)
SO ₂	0.25 grains S / 100 ft ³	(2)	0.000 (e)	0.25 grains S / 100 ft ³	(2) 0.002 (f)
NO _x	2.27E+00 lb/MMBtu	(1)	1.43 (a)	2.27E+00 lb/MMBtu	(1) 1.53 (c)
CO	3.72E+00 lb/MMBtu	(1)	2.34 (a)	3.72E+00 lb/MMBtu	(1) 2.51 (c)
VOC	2.96E-02 lb/MMBtu	(1)	0.02 (a)	2.96E-02 lb/MMBtu	(1) 0.02 (c)
VOCs does not include formaldehyde					
Hazardous Air Pollutants					
1,1,2-Tetrachloroethane	2.53E-05 lb/MMBtu	(1)	0.000 (a)	2.53E-05 lb/MMBtu	(1) 0.000 (c)
1,1,2-Trichloroethane	1.53E-05 lb/MMBtu	(1)	0.000 (a)	1.53E-05 lb/MMBtu	(1) 0.000 (c)
1,3-Butadiene	6.63E-04 lb/MMBtu	(1)	0.000 (a)	6.63E-04 lb/MMBtu	(1) 0.002 (c)
1,3-Dichloropropene	1.27E-05 lb/MMBtu	(1)	0.000 (a)	1.27E-05 lb/MMBtu	(1) 0.000 (c)
Acetaldehyde	2.79E-03 lb/MMBtu	(1)	0.002 (a)	2.79E-03 lb/MMBtu	(1) 0.008 (c)
Acrolein	2.63E-03 lb/MMBtu	(1)	0.002 (a)	2.63E-03 lb/MMBtu	(1) 0.007 (c)
Benzene	1.58E-03 lb/MMBtu	(1)	0.001 (a)	1.58E-03 lb/MMBtu	(1) 0.004 (c)
Carbon Tetrachloride	1.77E-05 lb/MMBtu	(1)	0.000 (a)	1.77E-05 lb/MMBtu	(1) 0.000 (c)
Chlorobenzene	1.29E-05 lb/MMBtu	(1)	0.000 (a)	1.29E-05 lb/MMBtu	(1) 0.000 (c)
Chloroform	1.37E-05 lb/MMBtu	(1)	0.000 (a)	1.37E-05 lb/MMBtu	(1) 0.000 (c)
Ethylbenzene	2.48E-05 lb/MMBtu	(1)	0.000 (a)	2.48E-05 lb/MMBtu	(1) 0.000 (c)
Ethylene Dibromide	2.13E-05 lb/MMBtu	(1)	0.000 (a)	2.13E-05 lb/MMBtu	(1) 0.000 (c)
Formaldehyde	2.05E-02 lb/MMBtu	(1)	0.013 (a)	2.05E-02 lb/MMBtu	(1) 0.056 (c)
Methanol	3.06E-03 lb/MMBtu	(1)	0.002 (a)	3.06E-03 lb/MMBtu	(1) 0.008 (c)
Methylene Chloride	4.12E-05 lb/MMBtu	(1)	0.000 (a)	4.12E-05 lb/MMBtu	(1) 0.000 (c)
Naphthalene	9.71E-05 lb/MMBtu	(1)	0.000 (a)	9.71E-05 lb/MMBtu	(1) 0.000 (c)
PAH (POM)	1.41E-04 lb/MMBtu	(1)	0.000 (a)	1.41E-04 lb/MMBtu	(1) 0.000 (c)
Styrene	1.19E-05 lb/MMBtu	(1)	0.000 (a)	1.19E-05 lb/MMBtu	(1) 0.000 (c)
Toluene	5.58E-04 lb/MMBtu	(1)	0.000 (a)	5.58E-04 lb/MMBtu	(1) 0.002 (c)
Vinyl Chloride	7.16E-06 lb/MMBtu	(1)	0.000 (a)	7.16E-06 lb/MMBtu	(1) 0.000 (c)
Xylenes	1.95E-04 lb/MMBtu	(1)	0.000 (a)	1.95E-04 lb/MMBtu	(1) 0.001 (c)
Total HAP			0.020		0.089
Greenhouse Gas Emissions					
CO ₂	116.89 lb/MMBtu	(4)	73.44 (a)	116.89 lb/MMBtu	(4) 321.68 (c)
CH ₄	2.2E-03 lb/MMBtu	(4)	0.00 (a)	2.2E-03 lb/MMBtu	(4) 0.01 (c)
N ₂ O	2.2E-04 lb/MMBtu	(4)	0.00 (a)	2.2E-04 lb/MMBtu	(4) 0.00 (c)
CO ₂ e ^(g)	-	-	73.52	-	322.02

** PM emission factor includes condensables and filterables

Calculations:

Maximum Hourly Emissions - If emission factor note 1 or 4 is used, use calculation (a). If emission factor note 3 is used, use calculation (b).

(a) Maximum Hourly Emissions (lb/hr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000 Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr)

(b) Maximum Hourly Emissions (lb/hr) = Emission factor (g/hp-hr) * Engine Power Output (hp) * (1 lb/453.6 g)

Annual Emissions - If emission factor note 1 or 4 is used, use calculation (c). If emission factor note 3 is used, use calculation (d).

(c) Annual emissions (tons/yr) = Emission factor (lb/MMBtu) * (1MMBtu/1000000Btu) * Engine Power Output (hp) * Average BSFC (Btu/hp-hr) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

(d) Annual emissions (tons/yr) = Emission factor (g/hp-hr) * Engine Power Output (hp) * (1 lb/453.6 g) * Annual Hours of operation (hr/yr) * (1ton/2000lbs)

SO₂ Emissions - If emission factor note 2 is used, use calculations (e) and (f) for hourly and annual emissions, respectively.

(e) Maximum Hourly Emissions SO₂ Calculation (lb/hr) = (0.25 grain S/100ft³) * Fuel throughput (ft³/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO₂/lbmol S) * (64.07 lb SO₂/lbmol SO₂)

(f) Annual Emissions SO₂ Calculation (ton/yr) = (0.25 grain S/100ft³) * Fuel throughput (ft³/hr) * (1lb/7000 grains) * (lbmol S/32.06 lb S) * (lbmol SO₂/lbmol S) * (64.07 lb SO₂/lbmol SO₂) * Annual hours of operation (hr/yr) * (1ton/2000lbs)

MAXIMUM HOURLY EMISSION INPUTS	
Engine Power Output (kW) =	52
Engine Power Output (hp) =	70
Number of Engines =	1
Average BSFC (BTU/HP-hr) =	8,976 (5)
Heat Content Natural Gas(Btu/scf) =	1,116.0 (6)
Fuel Throughput (ft ³ /hr) =	563.0 (7)
PTE Hours of Operation =	8,760

(g) CO₂ equivalent = [(CO₂ emissions)*(GWP_{CO2})]+[(CH₄ emissions)*(GWP_{CH4})]+[(N₂O emissions)*(GWP_{N2O})]
 Global Warming Potential (GWP)

CO ₂	1	(8)
CH ₄	25	(8)
N ₂ O	298	(8)

Notes:

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

(2) AP-42, Chapter 5.3, Section 5.3.1

(3) Emission Factors based on similar engine manufacturer's specification sheets

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

(5) Fuel consumption based on similar engine manufacturer's specification sheet.

(6) Value supplied from client based on gas composition in area field

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

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

**Table 3. Tank Emissions
CNX Gas Company - Pond Fork Station**

Emission Unit ID	Tank Capacity (gal)	Tank Contents	Control Devices	Tank Throughput (bbls/day)	VOC Emission Factor (lbs/bbls)	VOC Emissions (lbs/yr) ^(a)	VOC Emissions (lb/hr) ^(b)	VOC Emissions (tons/yr) ^(c)
T-1	2100	Pipeline Liquids	None	5.00	1.47E-01 (1)	267.98	0.031	0.134
Totals						267.98	0.03	0.13

Calculations:

(a) VOC Emissions (lb/yr) = Tank Throughput (bbls/day) * VOC Emission Factor (lbs/bbls) * (365days/yr)

(b) VOC Emissions (lb/hr) = VOC Emissions (lbs/yr) * (yr/8760hr)

(c) VOC Emissions (ton/yr) = VOC Emissions (lbs/yr) * (1ton/2000lbs)

Notes:

(1) VOC emission factor includes Flashing/Working/Breathing losses as calculated from the Promax Model Simulation report

**Table 4. Truck Loading (TL-1) VOC Emissions
CNX Gas Company - Pond Fork Station**

Contents	Volume Transferred ³	PTE VOC Emissions (lb/hr)	PTE VOC Emissions (ton/yr) ^(a)
Pipeline Liquids	76,650 gal/yr	9.44E-03	4.14E-02
Total		9.44E-03	4.14E-02

Calculations:

(a) PTE VOC Emissions (ton/yr) given as calculated in the Promax Model simulation report

	<u>Pipeline liquids</u>	
Saturation factor	0.60	Note ⁽¹⁾
Pvap (psia)	6.77	Note ⁽²⁾
Molecular Weight Vap (lb/lbmol)	25.35	Note ⁽²⁾
Bulk Liquid Temperature (F)	49.08	Note ⁽²⁾

Notes:

- (1) AP-42 Section 5.2, Table 5.2-1 Saturation Factors for Calculating Petroleum Liquid Loading Losses, Submerged loading - dedicated normal service
- (2) Input parameters as defined by the Promax Model simulation report
- (3) Annual rates based on maximum throughput of 5 bbls/day per tank

**Table 5. Fugitive Leak Emissions
CNX Gas Company - Pond Fork Station**

Pollutant	Emission Factor			PTE ^(a) Gas Service
				(tons/yr)
Valves	9.9E-03	lb/hr/source	(1)	2.00
Connectors	8.6E-04	lb/hr/source	(1)	0.74
Open-Ended Lines	4.4E-03	lb/hr/source	(1)	0.01
Pressure Relief Valves	1.9E-02	lb/hr/source	(1)	0.00
Compressors	1.9E-02	lb/hr/source	(1)	0.08
Total Gas Released	-	-		2.75
Total VOC Released (gas service)			(b)	0.58
Calculations:			CO2e	13.43

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

(b) Gas sample from station's gas analysis assumed to be worst case at **21 wt %** VOC from 2012 fractional gas analysis measurements

Number of Components in Gas Service

Valves=	46	(2)
Pressure Relief Valves=	0	(2)
Connectors=	197	(2)
Open-Ended Lines=	1	(2)
Compressors=	1.000	(2)

Maximum Hour of Operation = 8,760

Global Warming Potential (GWP)

CO ₂	1	(3)
CH ₄	25	(3)
N ₂ O	298	(3)

(1) Emission factors from 1995 EPA Protocol for Equipment Leak Emission Estimates, Table 2-4 Oil and Gas Production

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

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

Table 6. Reciprocating Engine / Integral Compressor Emissions (E01) Blowdown Venting
Continental- TM-27
CNX Gas Company - Pond Fork Station

Pollutant	Maximum Hourly Emissions		Annual Emissions	
	Emission Factor	PTE per Engine Event (lb/hr)	Emission Factor	Annual PTE (tons/yr)
Criteria Pollutants				
VOC	7.70E+00 lb/Event (1)	7.70 (a)	7.70E+00 lb/Event (1)	0.23 (a)

(1) - 7.7 lbs VOC/ Engine blowdown event; based on 717 scf/event of 20.45 MW gas with 20.2 wt % VOC

(a) - Worst case blowdowns per year equal normal rate 6 times 10 = 60 Events/yr



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ProMax[®] 4.0

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Simulation Report

Project: Pond Fork Compressor Station Tank Run.pmx

Licensed to SLR International Corporation and Affiliates

Client Name: CNX Gas

Location: Pond Fork Station

Job: Tank Emission Estimate

ProMax Filename: N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station

ProMax Version: 4.0.16071.0

Simulation Initiated: 9/21/2017 8:12:49 AM

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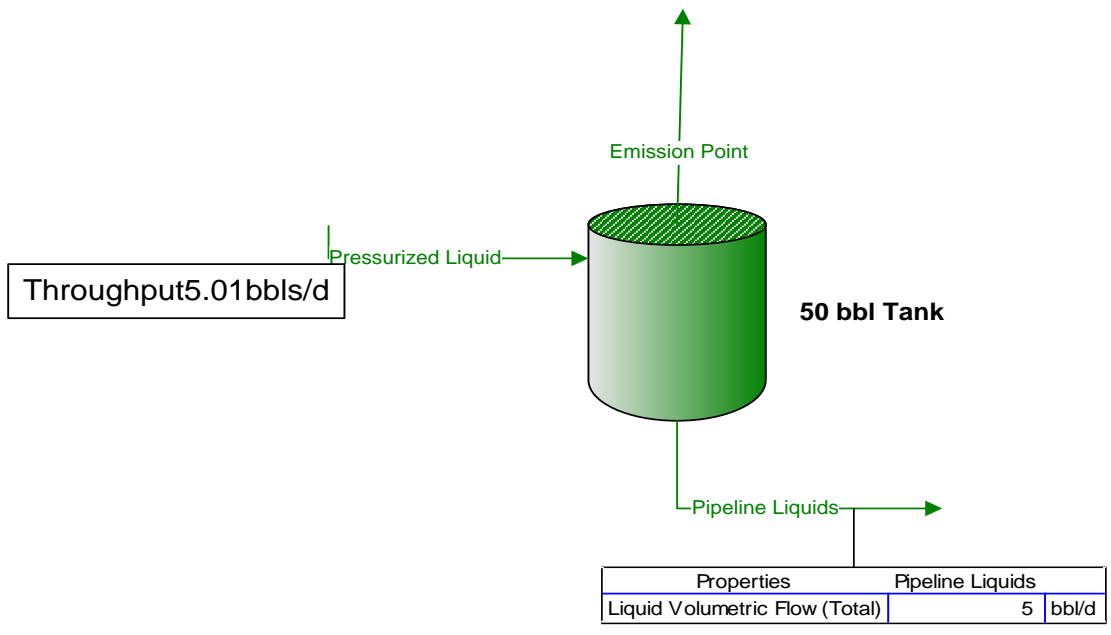
Report Navigator can be activated via the ProMax Navigator Toolbar.

An asterisk (*), throughout the report, denotes a user specified value.

A question mark (?) after a value, throughout the report, denotes an extrapolated or approximate value.

Annual tank loss calculations for "Pipeline Liquids".
 Total working and breathing losses from the Vertical Cylinder are 0.129 ton/yr.
 Flashing losses are 0.004991 ton/yr.
 Loading losses are 0.0458 ton/yr of loaded liquid.
 * Only Non-Exempt VOCs are reported.
 Vapor adjusted to ensure mass balance

Tank-1



Process Streams		Emission Point Pipeline Liquids Pressurized Liquid		
Composition		Status: Solved	Solved	Solved
Phase: Total	From Block:	50 bbl Tank	50 bbl Tank	--
	To Block:	--	--	50 bbl Tank
Mole Fraction		%	%	%
Carbon Dioxide		0	0	0*
Nitrogen		1.15424	0.00213663	0.0160002*
Methane		58.7391	0.297773	1.00101*
Ethane		24.6112	0.747858	1.03501*
Propane		9.51729	1.13616	1.23701*
Isobutane		1.40471	0.469754	0.481005*
n-Butane		2.34122	1.13550	1.15001*
Isopentane		0.703333	0.992489	0.989010*
n-Pentane		0.568989	1.08725	1.08101*
Benzene		0.0100047	0.0768046	0.0760008*
Toluene		0.0163253	0.489701	0.484005*
Ethylbenzene		0.00415519	0.426081	0.421004*
p-Xylene		0.0124147	1.36529	1.34901*
n-Hexane		0.203179	1.49860	1.48301*
2,2,4-Trimethylpentane		0	0	0*
Other C6's		0.311067	1.73313	1.71602*
Heptanes		0.261420	5.60030	5.53606*
Octanes		0.119034	8.14263	8.04608*
Nonanes		0.0223659	5.07384	5.01305*
Decanes +		3.96089E-07	69.7247	68.8857*
Molar Flow		lbmol/h	lbmol/h	lbmol/h
Carbon Dioxide		0	0	0*
Nitrogen		3.71046E-05	5.63923E-06	4.27438E-05*
Methane		0.00188824	0.000785916	0.00267416*
Ethane		0.000791158	0.00197383	0.00276499*
Propane		0.000305945	0.00299868	0.00330463*
Isobutane		4.51561E-05	0.00123983	0.00128499*
n-Butane		7.52616E-05	0.00299695	0.00307221*
Isopentane		2.26095E-05	0.00261949	0.00264210*
n-Pentane		1.82909E-05	0.00286959	0.00288788*
Benzene		3.21613E-07	0.000202711	0.000203033*
Toluene		5.24796E-07	0.00129247	0.00129300*
Ethylbenzene		1.33574E-07	0.00112456	0.00112470*
p-Xylene		3.99086E-07	0.00360344	0.00360384*
n-Hexane		6.53145E-06	0.00395528	0.00396182*
2,2,4-Trimethylpentane		0	0	0*
Other C6's		9.99963E-06	0.00457427	0.00458427*
Heptanes		8.40367E-06	0.0147809	0.0147894*
Octanes		3.82649E-06	0.0214910	0.0214948*
Nonanes		7.18981E-07	0.0133914	0.0133922*
Decanes +		1.27328E-11	0.184025	0.184025*
Mass Fraction		%	%	%
Carbon Dioxide		0	0	0*
Nitrogen		1.27576	0.000262596	0.00198772*
Methane		37.1797	0.0209580	0.0712154*
Ethane		29.1984	0.0986582	0.138016*
Propane		16.5583	0.219801	0.241899*
Isobutane		3.22133	0.119786	0.123981*
n-Butane		5.36899	0.289551	0.296421*
Isopentane		2.00215	0.314159	0.316442*
n-Pentane		1.61972	0.344153	0.345878*
Benzene		0.0308338	0.0263208	0.0263269*
Toluene		0.0593483	0.197955	0.197767*
Ethylbenzene		0.0174052	0.198458	0.198213*
p-Xylene		0.0520026	0.635919	0.635129*
n-Hexane		0.690828	0.566584	0.566752*
2,2,4-Trimethylpentane		0	0	0*
Other C6's		1.04323	0.646315	0.646852*
Heptanes		1.03361	2.46216	2.46023*
Octanes		0.535405	4.07253	4.06774*
Nonanes		0.112955	2.84932	2.84562*
Decanes +		4.44145E-06	86.9371	86.8195*

Mass Flow	lb/h	lb/h	lb/h
Carbon Dioxide	0	0	0*
Nitrogen	0.00103943	0.000157974	0.00119740*
Methane	0.0302920	0.0126080	0.0429001*
Ethane	0.0237894	0.0593512	0.0831406*
Propane	0.0134909	0.132229	0.145720*
Isobutane	0.00262457	0.0720616	0.0746862*
n-Butane	0.00437437	0.174189	0.178564*
Isopentane	0.00163125	0.188993	0.190624*
n-Pentane	0.00131966	0.207037	0.208357*
Benzene	2.51218E-05	0.0158342	0.0158593*
Toluene	4.83539E-05	0.119087	0.119135*
Ethylbenzene	1.41809E-05	0.119389	0.119403*
p-Xylene	4.23690E-05	0.382559	0.382601*
n-Hexane	0.000562850	0.340848	0.341411*
2,2,4-Trimethylpentane	0	0	0*
Other C6's	0.000849969	0.388813	0.389663*
Heptanes	0.000842132	1.48120	1.48204*
Octanes	0.000436220	2.44997	2.45041*
Nonanes	9.20296E-05	1.71410	1.71420*
Decanes +	3.61866E-09	52.3000	52.3000*

Process Streams		Emission Point Pipeline Liquids Pressurized Liquid		
Properties	Status:	Solved	Solved	Solved
Phase: Total	From Block:	50 bbl Tank	50 bbl Tank	--
	To Block:	--	--	50 bbl Tank
Property	Units			
Temperature	°F	57.7653	57.7653	58*
Pressure	psig	0	0	21*
Molecular Weight	lb/lbmol	25.3450	227.932	225.494
Mass Density	lb/ft^3	0.0674859	51.4304	49.7590
Molar Flow	lbmol/h	0.00321463	0.263931	0.267146
Mass Flow	lb/h	0.0814748	60.1584	60.2399
Vapor Volumetric Flow	ft^3/h	1.20729	1.16970	1.21063
Liquid Volumetric Flow	gpm	0.150519	0.145833	0.150936
API Gravity			40.2833	
Net Ideal Gas Heating Value	Btu/ft^3	1358.11	11167.2	11049.1
Net Liquid Heating Value	Btu/lb	20239.2	18439.8	18442.2

Environments Report

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station Tank Run.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	Ideal Gas Reference Volume	379.484 ft ³ /lbmol
Ideal Gas Reference Pressure	14.6959 psia	Liquid Reference Temperature	60 °F
Ideal Gas Reference Temperature	60 °F		

Environment1

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	1 %
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	FALSE
Freeze Out Temperature Threshold Difference	10 °F		

Components

Component	Henry's Law Comp.	Phase Initiator	Component	Henry's Law Comp.	Phase Initiator
Carbon Dioxide	FALSE	FALSE	Nitrogen	FALSE	FALSE
Methane	FALSE	FALSE	Ethane	FALSE	FALSE
Propane	FALSE	FALSE	Isobutane	FALSE	FALSE
n-Butane	FALSE	FALSE	Isopentane	FALSE	FALSE
n-Pentane	FALSE	FALSE	Benzene	FALSE	FALSE
Toluene	FALSE	FALSE	Ethylbenzene	FALSE	FALSE
p-Xylene	FALSE	FALSE	n-Hexane	FALSE	FALSE
2,2,4-Trimethylpentane	FALSE	FALSE	Other C6's	FALSE	FALSE
Heptanes	FALSE	FALSE	Octanes	FALSE	FALSE
Nonanes	FALSE	FALSE	Decanes +	FALSE	FALSE

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Vapor Package	Peng-Robinson
Overall Package	Peng-Robinson	Light Liquid Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Notes:

Single Oil Report Decanes +

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station Tank Run.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Properties

Volume Average Boiling Point	661.659 °F	Low Temperature Viscosity	6.79714 cP
Molecular Weight	284.2* lb/lbmol	Temperature of High T Viscosity	210 °F
Specific Gravity	0.8465*	High Temperature Viscosity	1.82072 cP
API Gravity	35.6589	Watson K	12.2730
Critical Temperature	951.235 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	170.611 psig	ASTM D93 Flash Point	338.345 °F
Critical Volume	17.6652 ft ³ /lbmol	Pour Point	61.4934 °F
Acentric Factor	0.880769	Paraffinic Fraction	71.7542 %
Carbon to Hydrogen Ratio	6.33114?	Naphthenic Fraction	22.5066 %
Refractive Index	1.46817	Aromatic Fraction	5.73929 %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	103.423 Btu/(lbmol*°F)

Notes:

Single Oil Report Heptanes

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station Tank Run.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Properties

Volume Average Boiling Point	204.170 °F	Low Temperature Viscosity	0.347616 cP
Molecular Weight	100.21* lb/lbmol	Temperature of High T Viscosity	210 °F
Specific Gravity	0.7016*	High Temperature Viscosity	0.211224 cP
API Gravity	70.1819	Watson K	12.4336
Critical Temperature	512.987 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	396.167 psig	ASTM D93 Flash Point	22.6774 °F
Critical Volume	6.61841 ft ³ /lbmol	Pour Point	-5.66945? °F
Acentric Factor	0.328178	Paraffinic Fraction	72.8431 %
Carbon to Hydrogen Ratio	5.34609	Naphthenic Fraction	21.4149 %
Refractive Index	1.39189	Aromatic Fraction	5.74200 %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	37.1664 Btu/(lbmol*°F)

Notes:

Single Oil Report Nonanes

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station Tank Run.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Properties

Volume Average Boiling Point	296.600 °F	Low Temperature Viscosity	0.569789 cP
Molecular Weight	128* lb/lbmol	Temperature of High T Viscosity	210 °F
Specific Gravity	0.7424*	High Temperature Viscosity	0.313911 cP
API Gravity	59.0981	Watson K	12.2722
Critical Temperature	612.483 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	339.966 psig	ASTM D93 Flash Point	86.4541 °F
Critical Volume	8.28440 ft ³ /lbmol	Pour Point	-11.0241? °F
Acentric Factor	0.420394	Paraffinic Fraction	62.4060 %
Carbon to Hydrogen Ratio	5.62062	Naphthenic Fraction	24.7656 %
Refractive Index	1.41424	Aromatic Fraction	12.8284 %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	46.6471 Btu/(lbmol*°F)

Notes:

**Single Oil Report
Octanes**

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station Tank Run.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Properties

Volume Average Boiling Point	251.542 °F	Low Temperature Viscosity	0.446533 cP
Molecular Weight	114* lb/lbmol	Temperature of High T Viscosity	210 °F
Specific Gravity	0.724*	High Temperature Viscosity	0.258447 cP
API Gravity	63.9420	Watson K	12.3290
Critical Temperature	565.037 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	367.393 psig	ASTM D93 Flash Point	55.3642 °F
Critical Volume	7.43719 ft ³ /lbmol	Pour Point	-9.582667 °F
Acentric Factor	0.374061	Paraffinic Fraction	66.6140 %
Carbon to Hydrogen Ratio	5.49569	Naphthenic Fraction	23.6971 %
Refractive Index	1.40406	Aromatic Fraction	9.68898 %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	41.8093 Btu/(lbmol*°F)

Notes:

**Single Oil Report
Other C6's**

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\CNX Gas\Projects\2017\Engine Determinations\Pond Fork\ProMax\Pond Fork Compressor Station Tank Run.pmx
Location:	0		
Flowsheet:	Flowsheet1		

Properties

Volume Average Boiling Point	147.291 °F	Low Temperature Viscosity	0.256680 cP
Molecular Weight	85* lb/lbmol	Temperature of High T Viscosity	210 °F
Specific Gravity	0.664*	High Temperature Viscosity	0.164743 cP
API Gravity	81.6024	Watson K	12.7512
Critical Temperature	445.480 °F	ASTM D86 10-90% Slope	0 °F/%
Critical Pressure	420.214 psig	ASTM D93 Flash Point	-16.56927 °F
Critical Volume	5.75172 ft ³ /lbmol	Pour Point	5.823217 °F
Acentric Factor	0.277116	Paraffinic Fraction	86.49397 %
Carbon to Hydrogen Ratio	5.07336	Naphthenic Fraction	13.50617 %
Refractive Index	1.37271	Aromatic Fraction	0? %
Temperature of Low T Viscosity	100 °F	Ideal Gas Heat Capacity	32.5709 Btu/(lbmol*°F)

Notes:

Calculators Report

Client Name:	Tank Emission Estimate	Job:	N:\W
Location:	0		
Flowsheet:	Flowsheet1		

Simple Solver 1

Source Code

Residual Error (for CV1) = PipelineLiquids-5

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Pressurized Liquid!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	0.146254
Units	sgpm

Measured Variable [PipelineLiquids]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Pipeline Liquids!Phases!Total!Properties!Liquid Volumetric Flow
Value	5.00000
Units	bbl/d

Solver Properties

Status: **Solved**

Error	3.97993E-12	Iterations	2
Calculated Value	0.146254 sgpm	Max Iterations	20
Lower Bound	sgpm	Weighting	1
Upper Bound	sgpm	Priority	0
Step Size	sgpm	Solver Active	Active
Is Minimizer	FALSE	Group	
Algorithm	Default	Skip Dependency Check	FALSE

Notes:

User Value Sets Report

Client Name:	Tank Emission Estimate	Job:	N:\West Virginia\
Location:	0		
Flowsheet:	Flowsheet1		

Tank-1

User Value [BlockReady]

Parameter	1*	Upper Boun	
Lower Bound		Enforce Bot	FALSE

User Value [ShellLength]

Parameter	5* ft	Upper Boun	ft
Lower Bound	0* ft	Enforce Bot	FALSE

User Value [ShellDiam]

Parameter	8.45* ft	Upper Boun	ft
Lower Bound	0* ft	Enforce Bot	FALSE

User Value [BreatherVP]

Parameter	0.0300000* psig	Upper Boun	psig
Lower Bound	psig	Enforce Bot	FALSE

User Value [BreatherVacP]

Parameter	-0.0300000* psig	Upper Boun	psig
Lower Bound	psig	Enforce Bot	FALSE

User Value [DomeRadius]

Parameter	4.23* ft	Upper Boun	ft
Lower Bound	ft	Enforce Bot	FALSE

User Value [OpPress]

Parameter	0* psig	Upper Boun	psig
Lower Bound	psig	Enforce Bot	FALSE

User Value [AvgPercentLiq]

Parameter	50* %	Upper Boun	%
Lower Bound	%	Enforce Bot	FALSE

User Value [MaxPercentLiq]

Parameter	90* %	Upper Boun	%
Lower Bound	%	Enforce Bot	FALSE

User Value [AnnNetTP]

Parameter	4.99692* bbl/day	Upper Boun	bbl/day
Lower Bound	0* bbl/day	Enforce Bot	FALSE

User Value [OREff]

Parameter	0* %	Upper Boun	%
Lower Bound	%	Enforce Bot	FALSE

User Value [MaxAvgT]

Parameter	65.75* °F	Upper Boun	°F
Lower Bound	°F	Enforce Bot	FALSE

User Value [MinAvgT]

Parameter	44.2167* °F	Upper Boun	°F
Lower Bound	°F	Enforce Bot	FALSE

User Value [BulkLiqT]			
Parameter	55.0033* °F	Upper Boun	°F
Lower Bound	°F	Enforce Bot	FALSE
User Value [AvgP]			
Parameter	14.2535* psia	Upper Boun	psia
Lower Bound	psia	Enforce Bot	FALSE
User Value [ThermI]			
Parameter	1250.57* Btu/ft^2/day	Upper Boun	Btu/ft^2/day
Lower Bound	Btu/ft^2/day	Enforce Bot	FALSE
User Value [AvgWindSpeed]			
Parameter	6.05* mi/h	Upper Boun	mi/h
Lower Bound	mi/h	Enforce Bot	FALSE
User Value [MaxHourlyLoadingRate]			
Parameter	0.208205* bbl/hr	Upper Boun	bbl/hr
Lower Bound	0* bbl/hr	Enforce Bot	FALSE
User Value [EntrainedOilFrac]			
Parameter	1* %	Upper Boun	%
Lower Bound	%	Enforce Bot	FALSE
User Value [TurnoverRate]			
Parameter	40.5744*	Upper Boun	
Lower Bound		Enforce Bot	FALSE
User Value [LLossSatFactor]			
Parameter	0.5*	Upper Boun	
Lower Bound		Enforce Bot	FALSE
User Value [AtmPressure]			
Parameter	14.2535* psia	Upper Boun	psia
Lower Bound	psia	Enforce Bot	FALSE
User Value [TVP]			
Parameter	7.19713* psia	Upper Boun	psia
Lower Bound	psia	Enforce Bot	FALSE
User Value [MaxVP]			
Parameter	7.61699* psia	Upper Boun	psia
Lower Bound	psia	Enforce Bot	FALSE
User Value [MinVP]			
Parameter	6.80177* psia	Upper Boun	psia
Lower Bound	psia	Enforce Bot	FALSE
User Value [AvgLiqSurfaceT]			
Parameter	56.6741* °F	Upper Boun	°F
Lower Bound	°F	Enforce Bot	FALSE
User Value [MaxLiqSurfaceT]			
Parameter	62.0382* °F	Upper Boun	°F
Lower Bound	°F	Enforce Bot	FALSE
User Value [TotalLosses]			
Parameter	0.129040* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [WorkingLosses]			
Parameter	0.0818841* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE

User Value [StandingLosses]			
Parameter	0.0471561* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [RimSealLosses]			
Parameter	0* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [WithdrawalLoss]			
Parameter	0* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [LoadingLosses]			
Parameter	0.0457980* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [MaxHourlyLoadingLoss]			
Parameter	0.0104562* lb/hr	Upper Boun	lb/hr
Lower Bound	lb/hr	Enforce Bot	FALSE
User Value [PStar]			
Parameter		Upper Boun	
Lower Bound		Enforce Bot	FALSE
User Value [AllCTotalLosses]			
Parameter	0.303578* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [AllCLoadingLosses]			
Parameter	0.107744* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [AllCMaxHLoadingLoss]			
Parameter	0.0245990* lb/hr	Upper Boun	lb/hr
Lower Bound	lb/hr	Enforce Bot	FALSE
User Value [AllCFlashingLosses]			
Parameter	0.0144033* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [DeckFittingLosses]			
Parameter	0* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [DeckSeamLosses]			
Parameter	0* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [FlashingLosses]			
Parameter	0.00499085* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [TotalResidual]			
Parameter	263.176* ton/yr	Upper Boun	ton/yr
Lower Bound	ton/yr	Enforce Bot	FALSE
User Value [GasMoleWeight]			
Parameter	0.0324673* kg/mol	Upper Boun	kg/mol
Lower Bound	kg/mol	Enforce Bot	FALSE
User Value [VapReportableFrac]			
Parameter	42.5064* %	Upper Boun	%

Lower Bound	%	Enforce Bot	FALSE
User Value [LiqReportableFrac]			
Parameter	99.8837* %	Upper Boun	%
Lower Bound	%	Enforce Bot	FALSE
User Value [FlashReportableFrac]			
Parameter	34.6507* %	Upper Boun	%
Lower Bound	%	Enforce Bot	FALSE
Notes:			
This User Value Set was programmatically generated. GUID={0658807B-16DE-46C9-972E-43AD43311EF6}			