global environmental solutions

CNX Gas Company, LLC

Oxford 13 Well Pad

New Milton, West Virginia

Rule 13 Permit Application

SLR Ref: 116.00894.00034

May 2015

Oxford 13 Well Pad Rule 13 Permit Application

Prepared for:

CNX Gas Company, LLC
PO Box 1248
Jane Lew, WV 26378

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

Ethan Saturday, E.I.
Staff Engineer

Jesse Hanshaw, P.E.
Principal Engineer

CONTENTS

ATTACHMENTS

Notes:

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

ATTACHMENT R - No delegation of authority

ATTACHMENT S - Not a Title V Permit Revision

APPLICATION FOR PERMIT

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT

AND

TITLE V PERMIT REVISION

(OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☒ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION**

☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**

☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**

☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
CNX Gas Company, LLC

2. Federal Employer ID No. ***(FEIN):***
550738862

3. Name of facility *(if different from above):*
Oxford 13 Well Pad

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

5A. Applicant's mailing address:
1000 Consol Energy Drive
Canonsburg, PA 15317

5B. Facility's present physical address:
Access road off Gain Road (See Coordinates)

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

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

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

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

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

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

10. North American Industry Classification System **(NAICS)** code for the facility:
212111

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

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

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

12A.

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

From the intersection of WV-Hwy. 18 and Co. Rte. 25 near New Milton, WV, travel south on WV-Hwy. 18 for 3 miles. Turn right on Porto Rico Rd. for 0.7 miles, then continue straight onto Toms Fork Road for another 0.7 miles. Take slight right onto Co. Rte. 54/1 for 2.5 miles, then turn left on Cain Run Road and go approx. 0.7 miles. Take access road to left and stay to the right as you go up the hill to arrive at site.

12B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
N/A	New Milton	Doddridge
12.E. UTM Northing (KM): 4,335.535	12F. UTM Easting (KM): 521.787	12G. UTM Zone: 17N

13. Briefly describe the proposed change(s) at the facility:
This permit application covers the construction of a well pad facility having the following equipment: 7 well heads (Marcellus), 2 thermoelectric generators, 1 flash gas compressor, 1 vapor recovery unit compressor, 1 vapor destruction unit, 1 process flare, 1 line heater, 7 GPU units, 12 – 400 BBL storage vessels, and 1 low pressure separator

14A. Provide the date of anticipated installation or change: **08/01/2015** – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen:	14B. Date of anticipated Start-Up if a permit is granted: **08/01/2015**

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

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

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

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

Section II. Additional attachments and supporting documents.

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

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

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

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

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

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

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

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

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

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

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

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

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

☒ General Emission Unit, specify: **Natural Gas Thermoelectric Generator and Compressor Engines**

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

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

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

☒ Other Collectors, specify: Vapor Destruction Unit - Enclosed Combustor, Catalytic Converter (NSCR)

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

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

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

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

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

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

☐ **YES** ☒ **NO**

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

Section III. Certification of Information

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

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

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

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

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

Certification of Truth, Accuracy, and Completeness

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

Compliance Certification

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

SIGNATURE Craig W Neal *(Please use blue ink)* DATE: 4/14/15 *(Please use blue ink)*

35B. Printed name of signee: Craig Neal		35C. Title: Vice President Gas Operations
35D. E-mail: craigneal@consolenergy.com	36E. Phone: 724-485-4000	36F. FAX
36A. Printed name of contact person (if different from above): Jesse Hanshaw		36B. Title: Principal Engineer, SLR International
36C. E-mail: jhanshaw@slrconsulting.com	36D. Phone: 304-545-8563	36E. FAX: 681-205-8969

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

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

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

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

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

ATTACHMENT A

BUSINESS CERTIFICATE

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

State of West Virginia

Certificate

I, Natalie E. Tennant, Secretary of State of the State of West Virginia, hereby certify that

CNX GAS COMPANY LLC

was duly authorized under the laws of this state to transact business in West Virginia as a foreign limited liability company on June 29, 2001.

The company is filed as a term company, for the term ending June 29, 2026.

I further certify that the company's most recent annual report, as required by West Virginia Code §31B-2-211, has been filed with our office and that a certificate of cancellation has not been filed.

Therefore, I hereby issue this

CERTIFICATE OF AUTHORIZATION

Given under my hand and the Great Seal of the State of West Virginia on this day of October 28, 2011

Natalie E. Tennant

Secretary of State

ATTACHMENT B

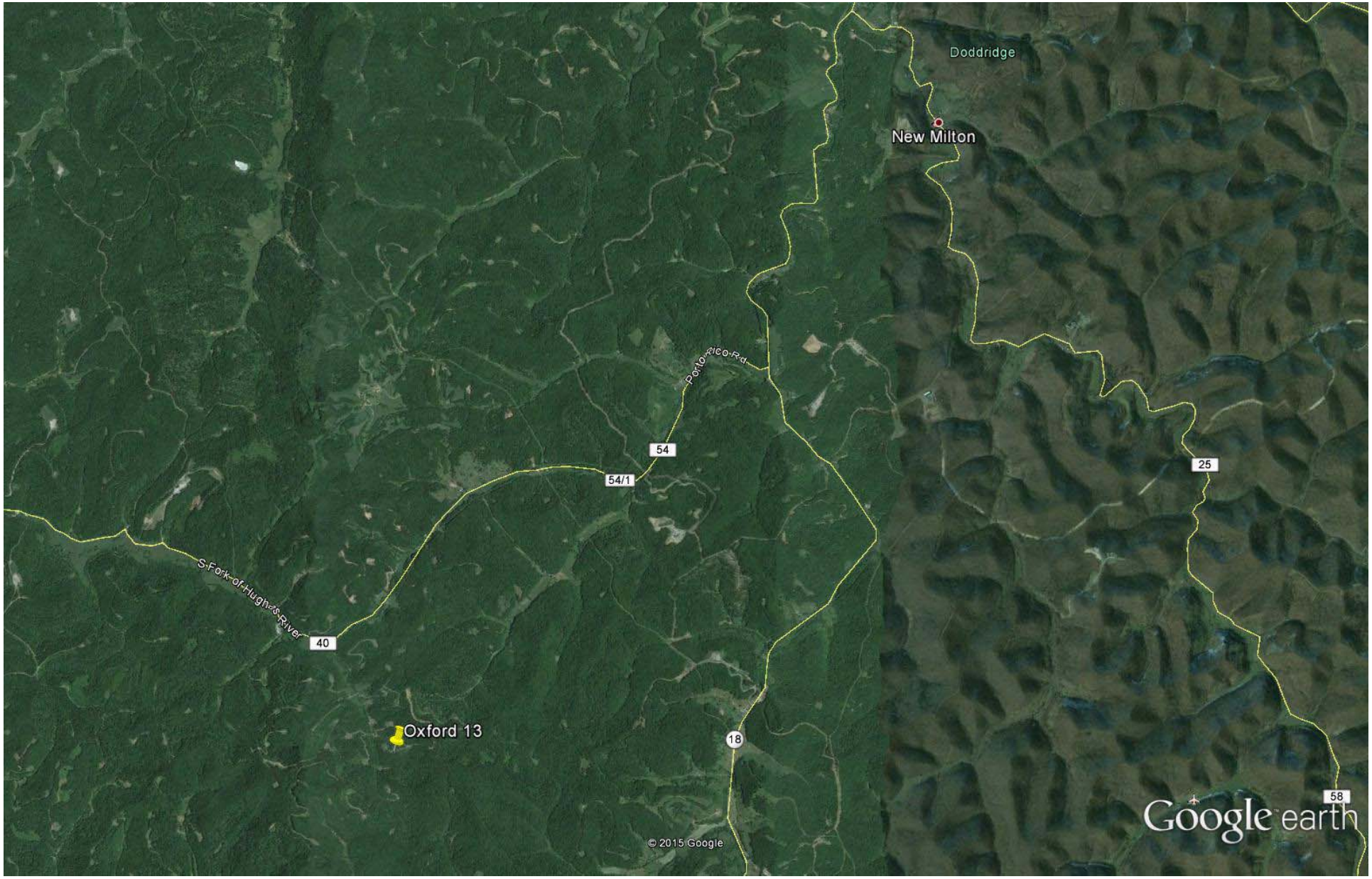
MAP

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015



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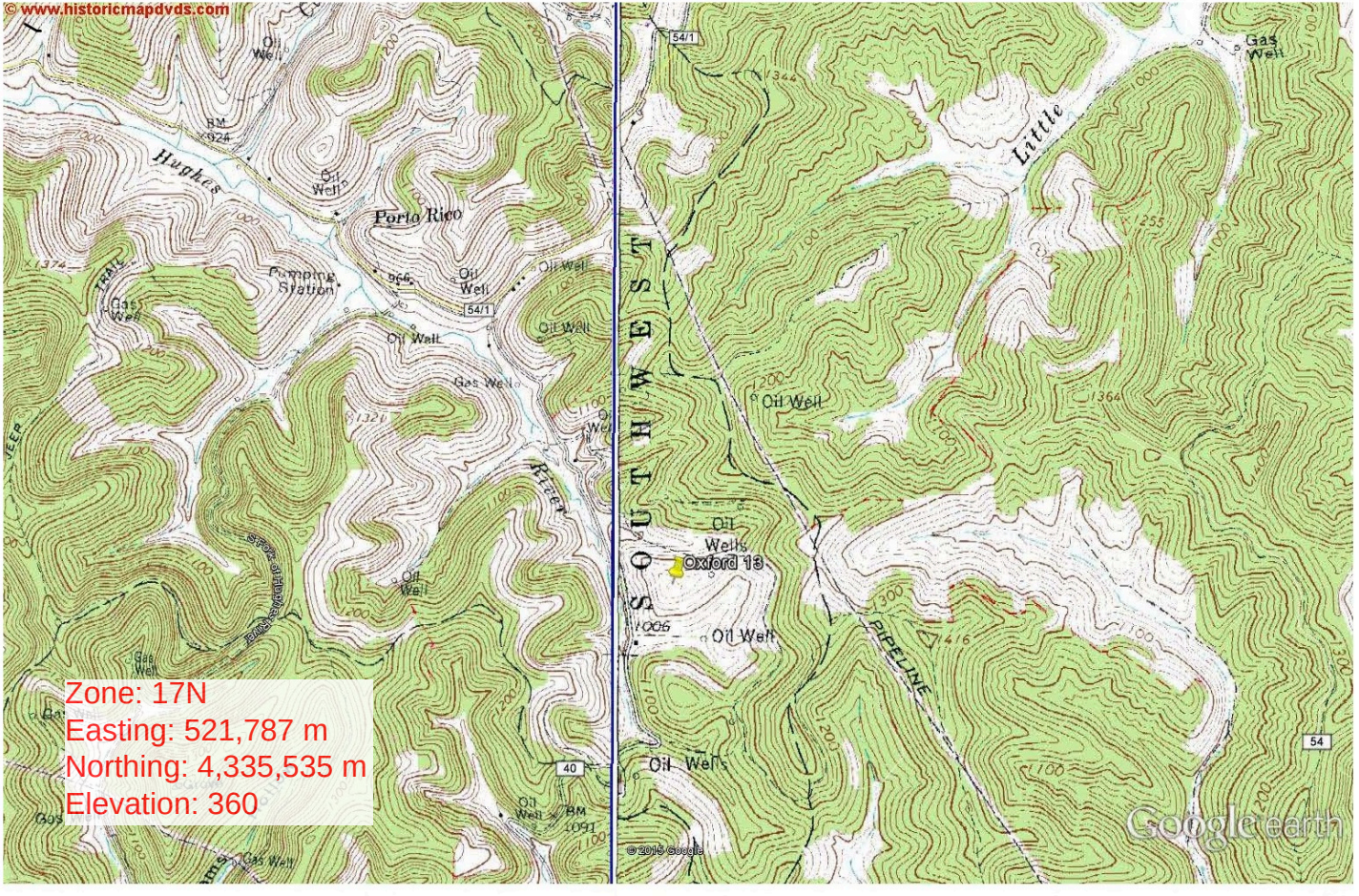
km 9



Google earth

miles 1

km 2

ATTACHMENT C

INSTALLATION AND START-UP

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

INSTALLATION AND STARTUP SCHEDULE

CNX Gas Company, LLC is preparing this facility for an anticipated initial startup date of August 1, 2015.

ATTACHMENT D

REGULATORY DISCUSSION

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

APPLICABLE REGULATIONS

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

Federal and State:

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

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

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

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

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

Therefore, the heat exchangers at this site are exempt from the weight emission standards of section 4 and the control of fugitive particulate matter standards of section 5. The additionally exempt sections of this rule, section 6, 8, and 9 pertain to registration, testing, monitoring, recordkeeping and reporting as well as startup, shutdown and malfunctions.

45 CSR 6 - Open Burning Prohibited

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

The weight rate of waste gas going to the VDU flare is estimated by ProMax simulation to be 224.28 lb/hr or 0.112 tph. Therefore, the corresponding Rule 6 PM limit would be 0.61 lb/hr. [E(lb/hr) = 5.43 * 0.112]

The weight rate of waste gas going to the larger process flare servicing the flash gas compressor is estimated by ProMax simulation to be 16,812.9 lb/hr or 8.41tph. This correlates to a Rule 6 PM limit of 22.88 lb/hr. [E(lb/hr)= 2.72 * 8.41].

When using emission factors for flare combustion devices presented in AP-42 Chapter 13 it specifies that gas combustion sources should not have PM emissions and therefore no factor is given.

45 CSR 10 - Emission of Sulfur Oxides

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

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

The natural gas fueled flash gas compressor (CE-2) is a 690 HP 4SLB G3508BLE Caterpillar unit and is considered a new unit as a result of it being manufactured on 2-12-2013. The emission standards of is subpart do apply due to being manufactured after the applicability date of 7-1-2008 as defined in Table 1.

40 CFR 60 Subpart OOOO – Gas Wells NSPS

The Gas wells located on the Oxford pad will have completed their flow back process by the time the surface equipment is permitted. Therefore they were required to follow the standards of flowback dictated within §60.5375 (a)(3) and (4) for wells that are hydraulically fractured and commence flowback after August 23, 2011.

40 CFR 61 - This facility is subject to the asbestos inspection and notification requirements related to construction activities containing asbestos.

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

The VRU Engine (CE-1) is a 4SRB 68 HP Arrow VRG330 unit which was manufactured on 06/01/1998; therefore, the requirements of this regulation, for existing SI engines are to comply with the work practice maintenance requirements of Table 2d.

45 CSR 4 - No Objectionable Odors

45 CSR 11 - Standby Plans for Emergency Episodes.

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

The company has applied for a Rule 13 construction and modification permit to receive federally enforceable requirements to limit the source to below Title V applicability thresholds.

WV Code § 22-5-4 (a) (14)

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

45 CSR 17 - Fugitive Particulate Emissions

NON-APPLICABILITY DETERMINATIONS

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

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

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

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

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

40 CFR 60 Subpart OOOO - Storage Vessel NSPS

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

40 CFR 60 Subpart OOOO – Pneumatic Control Valve NSPS

The site was evaluated and found to contain only intermittent venting pneumatic control valves rated at less than 6 scf/hr. Therefore the site is not proposing to install or operate any affected continuous bleed pneumatic devices defined by this NSPS for control valves.

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

There are no plans of installing a TEG 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 of HAPs.

40 CFR 60 Subpart KKK - Natural Gas Processing Plant NSPS

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

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

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

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

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

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

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

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

40 CFR 82 Subpart F - Ozone Depleting Substances

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

ATTACHMENT E

PLOT PLAN

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

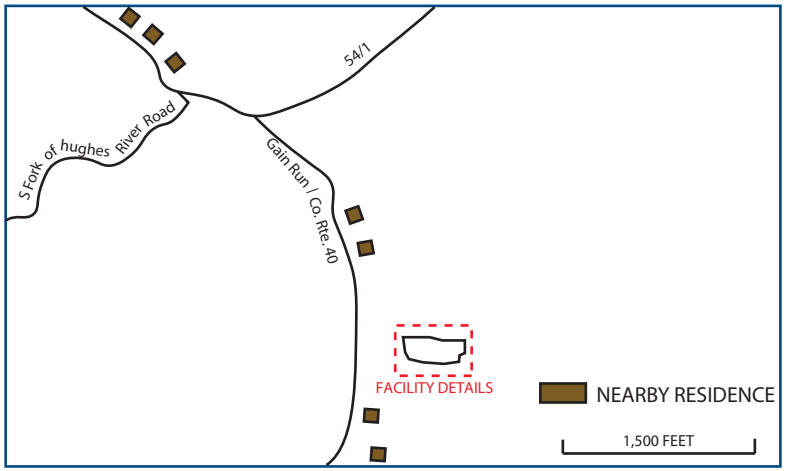
May 2015

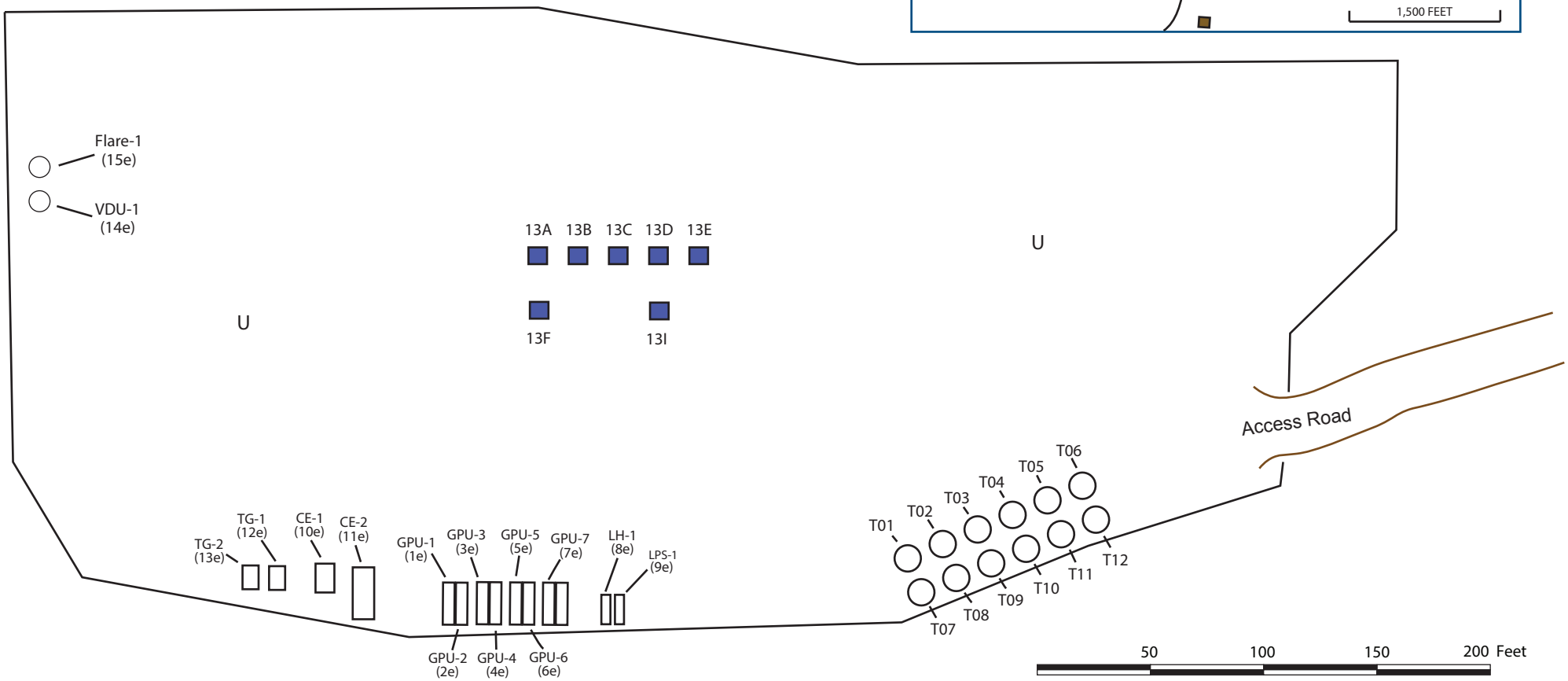
ELEVATION: 1180 FEET

REFERENCE CORDINATES (LAT/LONG):
39.168763/-80.747794°

LEGEND

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





Report
Regulation 13 Application

Drawing
PLOT PLAN

Date March 25, 2015 | FIGURE 1

CNX Gas Company, LLC
Oxford 13 Well Pad
New Milton, West Virginia

SLR

ATTACHMENT F

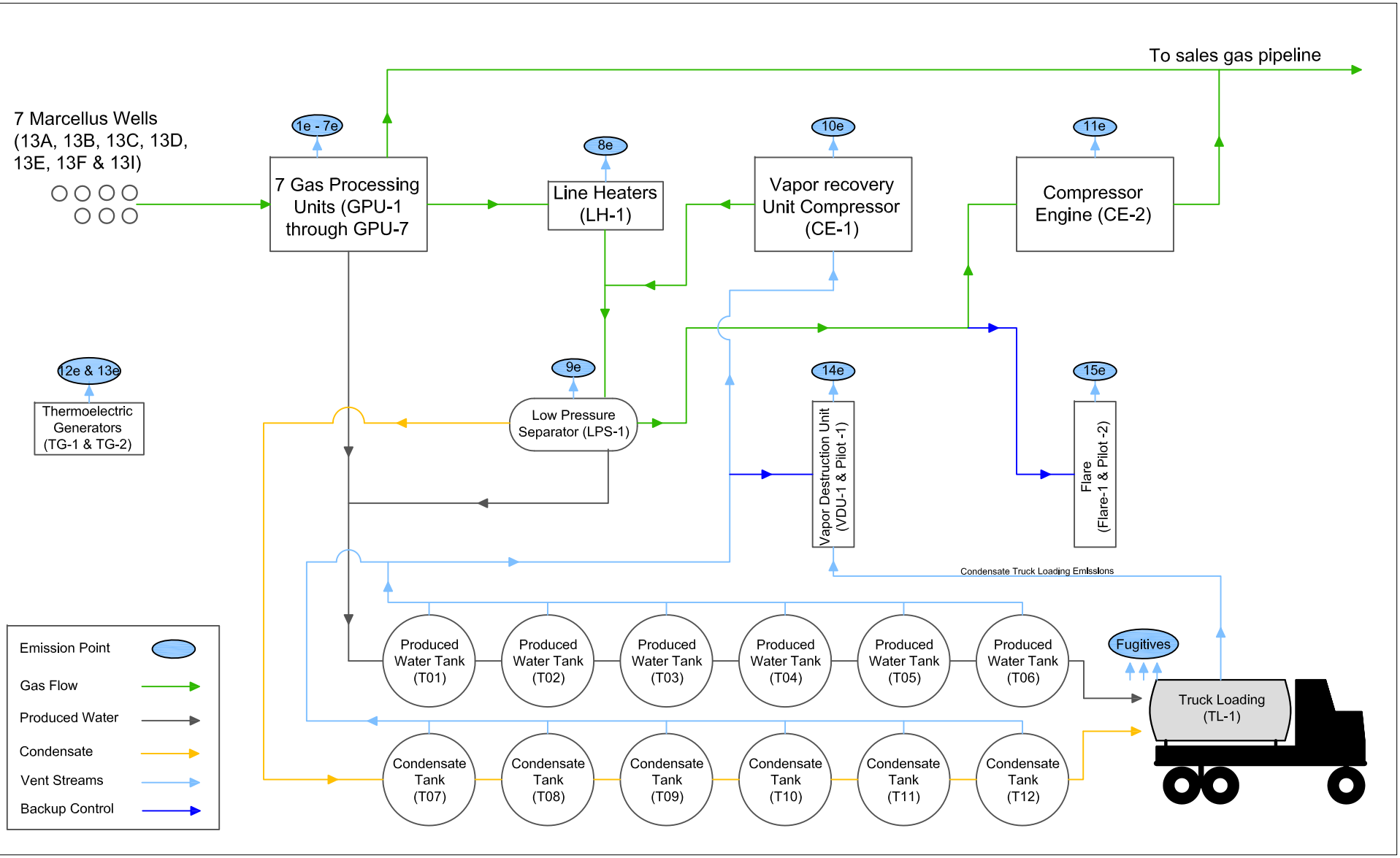
PROCESS FLOW DIAGRAM

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015



Process Flow Diagram
CNX Gas Company, LLC
Oxford 13 Well Pad
New Milton, West Virginia

ATTACHMENT G

PROCESS DESCRIPTION

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

PROCESS DESCRIPTION

CNX Gas Company, LLC is applying for coverage under 45CSR13, Regulation 13, for the construction and operation of the Oxford 13 natural gas well pad.

DESCRIPTION OF PROCESS

Natural gas, condensate and produced water will be collected from seven nonconventional horizontal wells located onsite producing from the Marcellus formation. The gas and liquids mixture will flow through one of seven 1.0 mmBtu/hr gas processing units (GPU-1 through GPU-7).

In the GPUs, the well stream is divided into sales gas, produced water and a condensate. The gas will leave the GPUs and go directly into the sales gas line. The produced water removed is routed to one of six 400 barrel (bbl) produced water storage tanks (T01-T06). The condensate mixture will go to a separate line heater (LH-1) where the pressure will be further reduced. This stream will then pass into a low pressure, 3-phase separator. From here, the water stream will flow to its respective storage vessels, the separated condensate will flow to one of six 400 bbl condensate storage tanks (T07-T12), and the gas separated by the low pressure separator will be sent to a flash gas compressor engine (CE-1). This flash gas stream is recycled to the sales gas line. In the event the flash gas compressor (CE-1) is down, the flash gas stream from the low pressure separator will be diverted to an elevated process flare (Flare-1). It is estimated that (Flare-1) can operate up to 1,000 hours per year at its maximum rated capacity of 250 MMBtu/hr or combust no more than 250,000 MMBtu/yr. Therefore, the flare emissions were estimated for 1,000 hr/yr + 8760 pilot light operations. CNX Gas would like to monitor waste gas flow rates and heat content values in order to determine compliance with this operating restriction.

The emissions from each of the storage vessels will be routed into a header system directed to the vapor recovery compressor (VRU-1). At this point, the tank vapors will be compressed and recycled back into the sales line via the suction side of the flash gas compressor. In the event the vapor recovery unit is down, the vapor stream will be controlled by a vapor destruction unit (VDU-1). Although the VRU compressor is operated as much as possible to recover valuable products, the facility's PTE is estimated using worst case VDU combustor emissions as if it was running 8760 hours per year. The VOC emissions are calculated as 2% of the uncontrolled rates predicted by Promax. The short term hourly emission rates reflect the maximum water and condensate flow, while the annual rates are based on 75% of this rate to account for annual declining rates. However, since the VDU and VRU cannot run at the same time due to design constraints, the sites potential emissions took into account the greatest VOC value from the 98% DRE VDU control scenario and eliminated the lesser amount in order to avoid double counting. Likewise, the facility wide total CO emissions eliminated those coming from the VRU compressor and counted the CO from the VDU to again assure the worst case scenario. However, for actual operations it is anticipated that increased operational flexibility can be realized by monitoring the total amount of waste gas combusted by each of the flares and keeping records of total monthly waste gas BTUs combusted. Running the VDU at its maximum rated capacity for 8760 as used in the worst case calculations, the total BTUs per year equate to 160,593 MMBtu/yr. Since both flares use the same emission factors for CO, and NOx the

source would like to have a combined BTU limit of no more than (250,000 MMBtu/yr + 160,593 MMBtu/yr) = 407,718 MMBtu/yr.

The contents of the produced water storage vessels are hauled away by 100 bbl trucks (TL-1) at an expected maximum turnover rate of 2760 bbl per day from the six tanks. The condensate tank contents are hauled away by 200 bbl trucks at an expected maximum turnover rate of 555 bbl per day between the six tanks. The emissions generated by water truck loading events were evaluated on an uncontrolled basis and found to be relatively small at less than 2 tpy VOCs. Condensate truck loading will be controlled by (VDU-1) at a 70% reduction efficiency. It should be noted in the calculations that annual emissions are based on 75% of the daily projected maximum rates.

The vapor recovery compressor (CE-1) will incorporate a 68 hp Arrow, 4SRB RICE manufactured in 1998. Therefore, this unit will not be controlled to meet NSPS JJJJ emission standards, but will follow applicable 40 CFR Part 63, Subpart ZZZZ maintenance work practice standards. The flash gas compressor (CE-2) is a Cat G3508BLE, 4SLB RICE manufactured on 2-13-2013. This classifies the flash gas compressor as a new construction under 40CFR63, Subpart ZZZZ. Also, due to this manufacturing (mfg) date being after 7-1-2008, it will be subject to Subpart JJJJ emission standards according to 40CFR§60.4236(e).

AGGREGATION DISCUSSION

CNX Gas has reviewed CONE midstream plans to potentially locate a salt desiccant dryer system on the Oxford 13 well site. Although all indications are that this unit will not create any additional emission sources at the site, the unit was conservatively evaluated for aggregation purposes. The only possible emission source associated with the unit would be a liquid knock out stream, which CNX Gas has agreed to route to their condensate storage. These liquids were accounted for within the condensate tank throughputs.

ATTACHMENT H

SAFETY DATA SHEETS (SDS)

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:

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

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

Health Hazards: Use with adequate ventilation.

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

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

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Not expected to be an eye irritant.

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

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

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

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

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

Cancer: No data available.

Target Organs: No data available.

Developmental: Limited data - See Other Comments, below.

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

Pre-Existing Medical Conditions: None known.

4. FIRST AID MEASURES

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

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

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

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

5. FIRE FIGHTING MEASURES

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

Personal Protective Equipment (PPE):

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

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

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

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

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

10. STABILITY AND REACTIVITY

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

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

Incompatible Materials: Avoid contact with strong oxidizing agents.

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

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

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

12. DISPOSAL CONSIDERATIONS

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

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

13. TRANSPORT INFORMATION

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

14. REGULATORY INFORMATION

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

--None--

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

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

--None Known--

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

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

15. DOCUMENTARY INFORMATION

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

16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

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

1□ PROD□CT AND COMPAN□ IDENTIFICATION

Product Name	Natural Gas Condensate, Sweet or Sour
Synonyms	Sweet Condensate, Sour Condensate, □ease Condensate (Sweet or Sour), Field Condensate (Sweet or Sour), Casing Head Gasoline (Sweet or Sour), Natural Gas □iquids (Sweet or Sour), Gas Drips (Sweet or Sour), Natural Gas Condensate C2-C8 (Sweet or Sour)
Chemical Family	Petroleum Hydrocarbon
Intended □se	Feedstoc□
MARPOL Annex I Category	Naphthas and Condensates
Supplier	□.P. Morgan Ventures Energy Corp. 383 Madison A□enue, 10th Floor New □or□, N□ 10017 □P Morgan Commodities Canada Corp. Suite 600, Vintage Towers II, 326 11th A□enue SW Calgary, Alberta T2R 0C5
2□ Hour Emergency Numbers	**Chemtrec:** 800-424-□300 **□P Morgan Technical Information:** 212-834-5788 (□SA), 403-532-2000 (Canada) **California Poison Control:** 800-356-321□

2□ HA□ARDS IDENTIFICATION

GHS Classification

H224	Flammable liquid – Category 1
H304	May be fatal if swallowed and enters airways – Category 1
H31□	Eye damage/irritation – Category 2
H335	May cause respiratory irritation – Category 3
H336	Specific target organ toxicity (single exposure) – Category 3
H350	Carcinogenicity – Category 1□
H411	Ha□ardous to the aquatic en□ironment, chronic toxicity – Category 2

Hazards Not Otherwise Classified

May contain or release poisonous hydrogen sulfide gas

Label Elements

Signal Words Danger

GHS Hazard Statements

H224	Extremely flammable liquid and □apor
H350	May cause cancer
H304	May be fatal if swallowed and enters airways
H31□	Causes serious eye irritation
H336	May cause drowsiness or di□□iness
H315	Causes s□in irritation
H331	Toxic if inhaled
H411	Toxic to aquatic life with long lasting effects

GHS Precautionary Statements

P201	Obtain special instructions before use
P202	Do not handle until all safety precautions ha□e been read and understood
P210	□eep away from heat/spar□s/open flames/hot surfaces – no smo□ing
P233	□eep container tightly closed
P240	Ground/bond container and recei□ing equipment

2□ HA□ARDS IDENTIFICATION

P241	□se explosion-proof electrical/□entilating/lighting equipment
P242	□se only non-spar□ing tools
P243	Ta□e precautionary measures against static discharge
P261	A□oid breathing dust/fume/gas/mist/□apours/spray
P264	Wash thoroughly after handling
P271	□se only outdoors or in a well-□entilated area
P273	A□oid release to the en□ironment
P280	Wear protecti□e glo□es / protecti□e clothing / eye protection / face protection
P361, P352, P362	IF ON S□IN OR HAIR: Remo□e/ta□e off immediately all contaminated clothing. Wash with plenty of soap and water. Ta□e off contaminated clothing and wash before reuse.
P305,P351,P338	IF IN E□ES: Rinse cautiously with water for se□eral minutes. Remo□e contact lenses, if present and easy to do. Continue rinsing
P313	If eye irritation persists, get medical ad□ice/attention
P301,P310	IF SWA□□OWED: Immediately call a POISON CENTER or doctor/physician
P331	Do NOT induce □omiting
P304,P340	IF INHA□ED: Remo□e □ictim to fresh air and □eep at rest in a position comfortable for breathing
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P370,P378	In case of fire: □se dry chemical, carbon dioxide, or foam for extinction
P3□1	Collect spillage
P405	Store loc□ed up
P403,P233, P235	Store in a well-□entilated place. □eep container tightly closed, □eep cool
P501	Dispose of contents/container to appro□ed facility

3□ COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS Registration No□	Concentration (%)
Natural Gas Condensate C2-C8	68□1□-3□-1	100
□en□ene	71-43-2	0.1 - 5
n-□utane	106-□7-8	5 - 15
Cyclohexane	110-82-7	□1 - 5
Ethyl □en□ene	100-41-4	□1 - 3
n-Heptane	142-82-5	10 - 20
n-Hexane	110-54-3	2 - 50
Hexane (all isomers)	mixture	2 - 50
Hydrogen Sulfide	7783-06-4	□0.1 - 20
Methylcyclohexane	108-87-2	5 - 10
n-Nonane	111-84-2	5 - 15
n-Octane	111-65-□	10 - 20
n-Pentane	10□-66-0	5 - 20
n-Propane	74-□8-6	□1 - 8
Toluene	108-88-3	□1 - 15
1,2,4 Trimethyl □en□ene	□5-63-6	□1 – 4
□ylene, all isomers	1330-20-7	□1 – 12

□□ FIRST AID MEAS□RES

Inhalation (□reathing) Mo□e the exposed person to fresh air. If not breathing, clear airways and gi□e artificial respiration. If breathing is difficult, humidified oxygen should be administered by qualified personnel. See□ medical attention if breathing difficulties continue.

□□ FIRST AID MEAS□RES

Eye Contact

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

S□in Contact

Remo□e contaminated shoes and clothing, and flush affected areas with large amounts of water. If s□in surface is damaged, apply a clean dressing and see□ medical attention. If s□in surface is not damaged, clean affected area thoroughly with mild soap and water. See□ medical attention if tissue appears damaged or if pain or irritation persists. □aunder or discard contaminated clothing.

Ingestion (Swallowing)

Aspiration ha□ard. Do not induce □omiting or gi□e anything by mouth because the material can enter the lungs and cause se□ere lung damage. If spontaneous □omiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Do not lea□e □ictim unattended and obser□e closely for adequacy of breathing. See□ medical attention
.

Most Important Symptoms and Effects

Acute: Headache, drowsiness, di□□iness, loss of coordination, disorientation and fatigue
Delayed: Dry s□in and possible irritation with repeated or prolonged exposure

Potential Acute Health Effects

Inhalation: □reathing high concentrations may be harmful. Mist or □apor can irritate the throat and lungs. □reathing this material may cause central ner□ous system depression with symptoms including nausea, headache, di□□iness, fatigue, drowsiness or unconsciousness. This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. Hydrogen sulfide and other ha□ardous □apors may e□ol□e and collect in the headspace of storage tan□s or other enclosed □essels. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of o□erexposure include irritation of the eyes, nose, throat and respiratory tract, blurred □ision, photophobia (light sensiti□ity) and pulmonary edema (fluid accumulation in lungs). Se□ere exposures can result in nausea, □omiting, muscle wea□ness or con□ulsions, respiratory failure and death.
Eye Contact: This product can cause eye irritation from short-term contact with liquid, mists or □apors. Symptoms include stinging, watering, redness and swelling. Effects may be more serious with repeated or prolonged contact. Hydrogen sulfide □apors may cause moderate to se□ere eye irritation and photophobia (light sensiti□ity).
S□in Contact: This product is a s□in irritant. Contact may cause redness, itching, burning and s□in damage.
Ingestion: Ingestion may result in nausea, □omiting, diarrhea and restlessness. Aspiration (inad□ertent suction) of liquid into the lungs must be a□oided as e□en small quantities in the lungs can produce chemical pneumonitis, pulmonary edema or hemorrhage and e□en death.

Potential Chronic Health Effects

Chronic effects of o□erexposure are similar to acute effects including central ner□ous system (CNS) effects and CNS depression. Effects may also include irritation of the digesti□e tract, irritation of the respiratory tract, nausea, □omiting and s□in dermatitis.

Notes to Physician

This material may contain or liberate hydrogen sulfide. In high doses, hydrogen sulfide may produce pulmonary edema and respiratory depression or paralysis. The first priority in treatment should be pro□iding adequate □entilation and administering 100% oxygen. If unresponsi□e to supporti□e care, nitrites (amyl nitrite by inhalation or sodium nitrite by I.V.) may be an effecti□e antidote, if deli□ered within the first few minutes of exposure. For adults, the dose is 10 ml of a 3$NaNO_2$ solution (0.5 gm $NaNO_2$ in 15 ml water) IV o□er 2 to 4 minutes. The dosage should be ad□usted in children or in the

□□ FIRST AID MEAS□RES

presence of anemia and methemoglobin le□els, arterial blood gases, and electrolyties should be monitored.

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

Ingestion of this product or subsequent □omiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis. Inhalation o□erexposure can produce toxic effects, monitor for respiratory distress. If cough or breathing difficulties de□elop, e□aluate for upper respiratory tract inflammation, bronchitis and pneumonitis.

S□in contact may aggra□ate an existing dermatitis. High pressure in□ection in□uries may cause necrosis of underlying tissue regardless of superficial appearance.

Federal regulations (2□ CFR 1□10.1028) specify medical sur□eillance programs for certain exposures to ben□ene abo□e the action le□el or PE□ (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), pro□ide a urine sample at the end of the shift for measurement of urine phenol.

□□ FIRE FIGHTING MEAS□RES

Flammability Classification
OSHA Classification (2□ CFR 1□10.1200): Flammable □iquid
NFPA Class-1□ Flammable □iquid
NFPA Ratings: Health: 3, Flammability: 4, Reacti□ity: 0

Flash Point
□ -46°C, □ -50°F (ASTM D-56)

Flammable Limits
□ower □imit: □ 1%
□pper □imit: 10%

Autoignition Temperature
232°C, 450°F

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

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

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

□□ FIRE FIGHTING MEAS□RES

ineffecti□e for extinguishment, unless used under fa□orable conditions by experienced fire fighters.

Fire Fighting □se water spray to cool fire-exposed containers and to protect personnel. Isolate immediate ha□ard area and □eep unauthori□ed personnel out. Water spray may be useful in minimi□ing or dispersing □apors and to protect personnel. Cool equipment exposed to fire with water. A□oid spreading burning liquid with water used for cooling. For fires beyond the incipient stage, emergency responders in the immediate ha□ard area should wear protecti□e clothing. When the potential chemical ha□ard is un□nown, in enclosed or confined spaces, or when explicitly required by regulations, a self-contained breathing apparatus should be worn. Wear other appropriate protecti□e equipment as conditions warrant.

□□ ACCIDENTAL RELEASE MEAS□RES

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

Environmental Precautions Stop the lea□ if it can be done without ris□. Pre□ent spilled material from entering waterways, sewers, basements or confined areas. Contain release to pre□ent further contamination of soils, surface water or groundwater. Clean up spill as soon as possible using appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A □apor suppressing foam may be used to reduce □apors. □se clean non-spar□ing tools to collect absorbed material. Where feasible and appropriate, remo□e contaminated soil.

Methods for Containment and Clean □p Immediate cleanup of any spill is recommended. □uild di□e far ahead of spill for containment and later reco□ery or disposal of spilled material. Absorb spill with inert material such as sand or □ermiculite and place in suitable container for disposal. If spilled on water, remo□e with appropriate equipment li□e s□immers, booms or absorbents. In case of soil contamination, remo□e contaminated soil for remediation or disposal in accordance with applicable regulations.

Reporting Report spills/releases as required, to appropriate local, state and federal authorities. □S Coast Guard and En□ironmental Protection Agency regulations require immediate reporting of spills/release that could reach any waterway including intermittent dry cree□s. Report spill/release to the National Response Center at (800) 424-8802. In case of accident or road spill, notify Chemtrec at (800) 424-□300.

□□ HANDLING AND STORAGE

Precautions for Safe Handling Extremely flammable. May □apori□e easily at ambient temperatures. The □apor is hea□ier than air and may create an explosi□e mixture of □apor and air. □eware of accumulation in confined spaces and low lying areas.

□□ HANDLING AND STORAGE

□se non-spar□ing tools and explosion-proof equipment. Open container slowly to relie□e any pressure. □ond and ground all equipment when transferring from one □essel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. Explosion-proof electrical equipment is recommended and may be required by fire codes.

Warning□ □se of this material in spaces without adequate □entilation may result in the generation of ha□ardous le□els of combustion products and/or inadequate oxygen le□els for breathing. Odor is an inadequate warning for ha□ardous conditions.

To pre□ent and minimi□e fire or explosion ris□ from static accumulation and discharge, effecti□ely bond and/or ground product transfer system. Do not use electronic de□ices (such as cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or storage area unless the de□ices are certified as intrinsically safe. Electrical equipment and fittings should comply with local fire codes.

Precautions for Safe Storage

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

In a tan□, barge or other closed container, the □apor space abo□e materials containing hydrogen sulfide may result in concentrations of H_2S immediately dangerous to life or health. Chec□ atmosphere for oxygen content, H_2S and flammability prior to entry.

Portable containers should ne□er be filled while they are in or on a motor □ehicle or marine craft. Static electricity may ignite □apors when filling non-grounded containers or □ehicles on trailers. To a□oid static buildup, do not use a no□□le loc□ open de□ice. □se only appro□ed containers. □eep containers tightly closed. Place the container on the ground before filling. □eep the no□□le in contact with the container during filling.

Empty containers retain liquid and □apor residues and can be dangerous. Do NOT pressuri□e, cut, weld, bra□e, solder, drill, grind or expose containers to heat, flame, spar□s, static electricity or other sources of ignition; they may explode and cause in□ury or death. Do not attempt to refill or clean containers since residue is difficult to remo□e. Empty drums should be completely drained, properly closed and returned to the supplier or a qualified drum reconditioner. All containers should be disposed of in an en□ironmentally safe manner in accordance with go□ernment regulations.

8□ E□POS□RE CONTROLS / PERSONAL PROTECTION

Component	ACGIH Exposure Limits	OSHA Exposure Limits	NIOSH Exposure Limits
Natural Gas Condensate	300 ppm TWA 500 ppm STE□ (as gasoline)	300 ppm TWA 500 ppm STE□ (as petroleum distillate (naphtha))	450 ppm TWA 1100 ppm ID□H (as petroleum distillate (naphtha))
□en□ene	0.5 ppm TWA 2.5 ppm STE□ S□in	1 ppm TWA 5 ppm STE□ S□in	0.5 ppm TWA 1 ppm STE□ S□in 500 ppm ID□H
n-□utane	800 ppm TWA		800 ppm TWA

8□ E□POS□RE CONTROLS / PERSONAL PROTECTION

Component	ACGIH Exposure Limits	OSHA Exposure Limits	NIOSH Exposure Limits
Cyclohexane	100 ppm TWA	300 ppm TWA	300 ppm TWA 1300 ppm ID□H
Ethyl □en□ene	100 ppm TWA 125 ppm STE□	100 ppm TWA 125 ppm STE□	100 ppm TWA 125 ppm STE□ 800 ppm ID□H
n-Heptane	400 ppm TWA 500 ppm STE□	500 ppm TWA	85 ppm TWA 440 ppm Ceiling 750 ppm ID□H
n-Hexane	50 ppm TWA S□in	500 ppm TWA	50 ppm TWA 1100 ppm ID□H
Hexane (all isomers)	500 ppm TWA 1000 ppm STE□		100 ppm TWA 510 ppm ID□H Ceiling
Hydrogen Sulfide	10 ppm TWA 15 ppm STE□	20 ppm Ceiling 50 ppm Pea□	10 ppm Ceiling 100 ppm ID□H
Methylcyclohexane	400 ppm TWA	500 ppm TWA	400 ppm TWA 1200 ppm ID□H
n-Nonane	200 ppm TWA		200 ppm TWA
n-Octane	300 ppm TWA	500 ppm TWA	75 ppm TWA 385 ppm Ceiling 1000 ppm ID□H
n-Pentane	600 ppm TWA	1000 ppm TWA	120 ppm TWA 610 ppm Ceiling 1500 ppm ID□H
n-Propane	2500 ppm TWA	1000 ppm TWA	1000 ppm TWA 2100 ppm ID□H
Toluene	50 ppm TWA S□in	200 ppm TWA 300 ppm Ceiling 500 ppm Pea□-10 min	100 ppm TWA 150 ppm STE□ 500 ppm ID□H
1,2,4 Trimethyl □en□ene	25 ppm TWA	25 ppm TWA	25 ppm TWA
□ylene, all isomers	100 ppm TWA 150 ppm STE□	100 ppm TWA 150 ppm STE□	□00 ppm ID□H

Note: State, local or other agencies or ad□isory groups may ha□e established more stringent limits. Consult an industrial hygienist or similar professional for further information.

ACGIH - American Conference of Go□ernment Industrial Hygienists, OSHA - Occupational Safety and Health Administration, NIOSH - National Institute for Industrial Safety and Health, TWA - Time Weighted A□erage (8 hour a□erage for ACGIH and OSHA, 10 hour a□erage for NIOSH), STE□ - 15 Minute Short Term Exposure □e□el, S□in - indicates potential for cutaneous absorption of liquid or □apor through the eyes or mucous membranes, Ceiling - Ceiling □e□el, Pea□ - Acceptable pea□o□er the ceiling concentration for a specified number of minutes, ID□H - Immediately Dangerous to □ife and Health

Personal Protective Equipment

General Considerations Consider the potential ha□ards of this material, applicable exposure limits, □ob acti□ities and other substances in the wor□place when designing engineering controls and selecting personal protecti□e equipment.

Engineering Controls □se process enclosures, local exhaust □entilation or other engineering controls to maintain airborne le□els below the recommended exposure limits. An emergency eye wash station and safety shower should be located near the wor□station.

Personal Protective Equipment

Personal Protective Equipment If engineering controls or wor□ practices are not adequate to pre□ent exposure to harmful le□els of this material, personal protecti□e equipment (PPE) is recommended. A ha□ard assessment of the wor□ should be conducted by a qualified professional to determine what PPE is required.

Respiratory Protection A respiratory protection program that meets or exceeds OSHA 2□ CFR 1□10.134 and ANSI □.88.2 should be followed whene□er wor□place conditions warrant the use of a respirator. When airborne concentrations are expected to exceed the established exposure limits gi□en in Section 8, use a NIOSH appro□ed air purifying respirator equipped with organic □apor cartridges/canisters. □se a full-face positi□e-pressure supplied air respirator in circumstances where air-purifying respirators may not pro□ide adequate protection or where there may be the potential for airborne exposure abo□e the exposure limits. If exposure concentration is un□nown, ID□H conditions exist or there is a potential for exposure to hydrogen sulfide abo□e exposure limits, use a NIOSH appro□ed self contained breathing apparatus (SC□A) or equi□alent operated in a pressure demand or other positi□e pressure mode.

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

S□in and □ody Protection A□oid s□in contact. Wear long-slee□ed fire-retardant garments while wor□ing with flammable and combustible liquids. Additional chemical-resistant protecti□e gear may be required if splashing or spraying conditions exist. This may include an apron, arm co□ers, imper□ious glo□es, boots and additional facial protection.

Hand Protection A□oid s□in contact. □se imper□ious glo□es (e.g., PVC, neoprene, nitrile rubber). Chec□ with glo□e suppliers to confirm the brea□through performance of glo□es. PVC and neoprene may be suitable for incidental contact. Nitrile rubber should be used for longer term protection when prolonged or frequent contact may occur. Glo□es should be worn on clean hands and hands should be washed after remo□ing glo□es. Also wash hands with plenty of mild soap and water before eating, drin□ing, smo□ing, using toilet facilities or lea□ing wor□.

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

□□ PH□SICAL AND CHEMICAL PROPERTIES

Appearance	Clear to dar□ brown liquid	**Physical Form**	□iquid
Odor	Strong hydrocarbon, sulfurous odor possible	**Odor Threshold**	Not established
pH	Neutral	**□apor Pressure**	5 - 15 psi (Reid)
□apor Density	□1 (air □ 1)	**□oiling Point/Range**	-20-1000°F/-17-538°C

□□ PH□SICAL AND CHEMICAL PROPERTIES

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

10□ STA□ILIT□ AND REACTI□IT□

Stability Stable under normal anticipated storage and handling temperatures and pressures. Extremely flammable liquid and □apor. Vapor can cause flash fire.
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Conditions to Avoid A□oid high temperatures and all possible sources of ignition. Pre□ent □apor accumulation.

Incompatibility (Materials to Avoid) A□oid contact with strong oxidi□ing agents such as strong acids, al□alies, chlorine and other halogens, dichromates or permanganates, which can cause fire or explosion.

Hazardous Decomposition Products Ha□ardous decomposition products are not expected to form curing normal storage. The use of hydrocarbon fuel in an area without adequate □entilation may result in ha□ardous le□els of combustion products (e.g., oxides of carbon, sulfur and nitrogen, ben□ene and other hydrocarbons) and/or dangerously low oxygen le□els.

Hazardous Polymerization Not □nown to occur

11□ TO□ICOLOGICAL INFORMATION

Overview This product is a clear to dar□ brown liquid with a strong hydrocarbon odor. It may also ha□e a sulfurous or rotten egg odor. Hydrogen sulfide, an extremely flammable and □ery toxic gas is expected to be present. This product is a □olatile and extremely flammable liquid that may cause flash fires. □eep away from heat, spar□s and flames and other sources of ignition. This product contains ben□ene, which may cause cancer or be toxic to blood forming organs. It contains material that has caused cancer based on animal data. Ne□er siphon this product by mouth. If swallowed, this product may be aspirated into the lungs and cause lung damage or death.

This material may contain ben□ene and ethyl ben□ene at concentrations abo□e 0.1%. □en□ene is considered to be a □nown human carcinogen by OSHA, IARC and NTP. IARC has ethyl ben□ene, gasoline and gasoline engine exhaust as possibly carcinogenic to humans (Group 2□) based on laboratory animal studiesal studies.

Toxicological Information of the Material.

Acute Toxicity **Dermal:** □ow Toxicity: □D50 □2000 mg/□g (rabbit)
Causes mild s□in irritation. Repeated exposure may cause s□in dryness or crac□ing that can lead to dermatitis.

Inhalation: Hydrogen Sulfide is Extremely Toxic: □C100 □600 ppm(□), 30 min (man)

11□ TO□ICOLOGICAL INFORMATION

Product expected to ha□e low degree of toxicity by inhalation: □C 50 □ 5.2 mg/l (□apor)
Effect of o□erexposure may include irritation of the digesti□e tract, irritation of the respiratory tract, nausea, □omiting, diarrhea and signs of central ner□ous system depression (e.g., headache, drowsiness, di□□iness, loss of coordination, disorientation and fatigue). Continued inhalation may result in unconsciousness and/or death.

Ingestion: Product expected to ha□e low degree of toxicity by ingestion: Oral □D50 □ 5 g/□g (rat), □ 10 g/□g (mice)
Aspiration into the lungs when swallowed or □omited may cause chemical pneumonitis which can be fatal.

Eye Damage / Irritation Sensitization

Causes serious eye irritation.

S□in: Not expected to be a s□in sensiti□er
Respiratory: Not expected to be a respiratory sensiti□er

Specific Target Organ Toxicity

Single Exposure: High concentrations may cause irritation of the s□in, eyes, digesti□e tract, irritation of the respiratory tract, nausea, □omiting, diarrhea and signs of central ner□ous system depression (e.g., headache, drowsiness, di□□iness, loss of coordination, disorientation and fatigue). Continued inhalation may result in unconsciousness and/or death.

Repeated Exposure: Two year inhalation studies of wholly □apori□ed unleaded gasoline and □0 day studies of □arious petroleum naphthas did not produce significant target organ toxicity in laboratory animals. Nephropathy in male rates, characteri□ed by the accumulation of alpha-2-uglobulin in epithelial cells of the proximal tubules was obser□ed, howe□er follow up studies suggest that these changes are unique to the male rat.

Conditions Aggravated by Overexposure

Disorders of the organs or organ systems that may be aggra□ated by significant exposure to this material or its components include the s□in, respiratory system, li□er, □idneys, CNS, cardio□ascular system and blood-forming system.

Carcinogenicity

May cause cancer based on component information.

Two year inhalation studies of □apori□ed unleaded gasoline produced an increased incidence of □idney tumors in male rats and li□er tumors in female mice. Repeated s□in application of □arious petroleum naphthas in mice for two years resulted in an increased incidence of s□in tumors but only in the presence of se□ere s□in irritation. Follow up mechanistic studies suggest that the occurrence of these tumors may be the consequence of promotional process and not rele□ant to human ris□ assessment. Epidemiology data collected from a study of more than 18,000 petroleum mar□eting and distribution wor□ers showed no increased ris□ of leu□emia, multiple myeloma or □idney cancer from gasoline exposure.

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

Germ Cell Mutagenicity

Inadequate information a□ailable, not expected to be mutagenic.

11□ TO□ICOLOGICAL INFORMATION

Reproductive and Developmental Toxicity

Not expected to cause reproducti□e or de□elopmental toxicity. No e□idence of de□elopmental toxicity was found in pregnant laboratory animals (rats and mice) exposed to high □apor concentrations of unleaded gasoline and petroleum naphthas □ia inhalation. A two generation reproducti□e toxicity study of □apor reco□ery gasoline did not ad□ersely affect reproducti□e function or offspring sur□i□al and de□elopment.

Additional Information

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

Toxicological Information of Components

□enzene □1-□3-2

Acute Data:
Dermal □D50 □ □400 mg/□g (Rabbit), (Guinea Pig)
□C50 □ □□80 ppm (Mouse); 10000 ppm/7hr (Rat)
Oral □D50 □ 4700 mg/□g (Mouse); □30 mg/□g (Rat); 5700 mg/□g (Mammal)
Carcinogenicity: □en□ene is an animal carcinogen and is □nown to produce acute myelogenous leu□emia (a form of cancer) in humans. □en□ene has been identified as a human carcinogen by NTP, IARC and OSHA.
Target Organs: Prolonged or repeated exposures to ben□ene □apors has been lin□ed to bone marrow toxicity which can result in blood disorders such as leu□openia, thrombocytopenia, and aplastic anemia. All of these diseases can be fatal.
Developmental: Exposure to ben□ene during pregnancy demonstrated limited e□idence of de□elopmental toxicity in laboratory animals. The effects seen include decreased body eight and increased s□eletal □ariations in rodents. Alterations in hematopoeisis ha□e been obser□ed in the fetuses and offspring of pregnant mice.
Mutagenicity: □en□ene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells, and DNA damage in mammalian cells in □itro

Cyclohexane 110-82-□

Acute Toxicity:
Dermal □D50 □□ 2 g/□g (Rabbit)
□C50 □ 4,044 ppm (4-hr, Rat)
Oral □D50 □ 2 g/□g (Rat)
Target Organs: Cyclohexane can cause eye, s□in and mucous membrane irritation, CNS depressant and narcosis at ele□ated concentrations. In experimental animals exposed to lethal concentrations by inhalation or oral route, generali□ed □ascular damage and degenerati□e changes in the heart, lungs, li□er, □idneys and brain were identified.
Developmental: Cyclohexane has been the focus of substantial testing in laboratory animals. Cyclohexane was not found to be genotoxic in se□eral tests including unscheduled DNA synthesis, bacterial and mammalian cell mutation assays, and in □i□o chromosomal aberration. An increase in chromosomal aberrations in bone marrow cells of rats exposed to cyclohexane was reported in the 1980's. However, a careful reevaluation of slides from this study by the laboratory which conducted the study indicates these findings were in error, and that no significant chromosomal effects were

11□ TO□ICOLOGICAL INFORMATION

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

Ethyl □enzene 100-□1-□

Acute Toxicity:
Dermal □D50 □ 17800 mg/□g (Rabbit)
□C50 □ 4000 ppm/4 hr; 13367 ppm (Rat)
Oral □D50 □ 3500 mg/□g (Rat)
Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl ben□ene in a two year inhalation study demonstrated limited e□idence of □idney, li□er, and lung cancer. Ethyl ben□ene has been listed as a possible human carcinogen by IARC. Ethyl ben□ene has not been listed as a carcinogen by NTP or OSHA.
Target Organs: In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl ben□ene in a two year inhalation study there was mild damage to the □idney (tubular hyperplasia), li□er (eosinophilio foci,hypertrophy, necrosis), thyroid (hyperplasia) and pituitary (hyperplasia).

n-Hexane 110-□□-3

Acute Toxicity:
Dermal □D50 □ □2,000 mg/□g (Rabbit)
□C50 □ 3,367 ppm (4 hr, Rat)
Oral □D50 □ 5,000 mg/□g (Rat)
Target Organs: Excessi□e exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor wea□ness is typically obser□ed in muscles of the toes and fingers but may also in□ol□e muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for se□eral months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl □etone and methyl isobutyl □etone. Prolonged exposure to high concentrations of n-hexane (□1,000 ppm) has resulted in decreased sperm count and degenerati□e changes in the testes of rats but not those of mice.

Hydrogen Sulfide □□83-0□-□

Acute Toxicity:
Dermal - No data
□C□o□ 600 ppm, 30 min (Human)
Hydrogen sulfide concentrations will □ary significantly depending on the source and sulfur content of the product. Sweet natural gas condensate (□0.5% sulfur) may contain toxicologically significant le□els of hydrogen sulfide in the □apor spaces of bul□ storage tan□s and transport compartments. Concentrations of H_2S as low as 10 ppm o□er an 8 hour wor□shift may cause eye or throat irritation. Prolonged breathing of 50-100 ppm H_2S □apors can produce significant eye and respiratory irritation. Sour condensates commonly contain extremely high concentrations of H_2S (500-70,000 ppm) in the □apor spaces of bul□ storage □essels. Exposure to 250-600 ppm for 15-30 minutes can produce headache, di□□iness, ner□ousness, staggering gait, nausea and pulmonary edema or bronchial pneumonia. Concentrations □1,000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/wee□ for 10 wee□s, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and de□elopment (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respecti□ely. O□er the years a number of acute cases of H_2S poisonings ha□e been reported. Complete and rapid reco□ery is the general rule. Howe□er, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lac□ of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

Toluene 108-88-3

Acute Toxicity:
Dermal □D50 □ 14 g/□g (Rabbit)

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□C50 □ 8,000 ppm (4-hr, Rat)
Oral □D50 □ 2.5 - 7.□ g/□g (Rat)
Target Organs: Epidemiology studies suggest that chronic occupational o□erexposure to toluene may damage color □ision. Subchronic and chronic inhalation studies with toluene produced □idney and li□er damage, hearing loss and central ner□ous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause li□er, □idney, and central ner□ous system damage, including hearing loss and □isual disturbances.
Developmental: Exposure to toluene during pregnancy has demonstrated limited e□idence of de□elopmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased s□eletal □ariations in both inhalation and oral studies.

1□2□ Trimethyl □enzene □□-□3-□
Acute Toxicity:
Dermal □D50 □ No data a□ailable
□C50 □ 18 gm/m^3/4hr (Rat)
Oral □D50 □ 3-6 g/□g (Rat)

□ylenes 1330-20-□
Acute Toxicity:
Dermal □D50 □3.16 ml/□g (Rabbit)
□C50□ 5000 ppm/4 hr. (Rat)
Oral □D50 □ 4300 mg/□g (Rat)
Target Organs: A six wee□ inhalation study with xylene produced hearing loss in rats.
Developmental: □oth mixed xylenes and the indi□idual isomers produced limited e□idence of de□elopmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, s□eletal □ariations and resorptions.

12□ ECOLOGICAL INFORMATION

Toxicity

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

Classification H411, Chronic Category 2

□6 hours □C50: 8.3 mg/l (Cyprinodon □ariegatus)
□6 hours □C50: 1.8 mg/l (Mysidopsis bahia)
48 hours □C50: 3.0 mg/l (Daphnia magna)
□6 hours □C50: 2.7 mg/l (Oncorhynchus my□iss)

Coating action of oil can □ill birds, plan□ton, aquatic life, algae and fish.

Persistence and Degradability

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

12□ ECOLOGICAL INFORMATION

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

Persistence per IOPC Fund Definition	Non-Persistent
□ioaccumulative Potential	Contains components with the potential to bioaccumulate. The octanol water coefficient □alues measured for the hydrocarbon components of this material range from 3 to greater than 6, and therefore would be considered as ha□ing the potential to bioaccumulate.
Mobility	**Air:** Contains □olatile components. □ighter components will □olatili□e in the air. In air, the □olatile hydrocarbons undergo photodegradation by reaction with hydroxyl radicals with half li□es □arying from 0.5 days for n-dodecane to 6.5 days for ben□ene. **Water:** Spreads on a film on the surface of water. Significant proportion of spill will remain after one day. □ower molecular weight aromatic hydrocarbons and some polar compounds ha□e low but significant water solubility. Some higher molecular weight compounds are remo□ed by emulsification and these also slowly biodegrade while others adsorb to sediment and sin□. Hea□ier fractions agglomerate to form tars, some of which sin□. **Soil:** Some constituents may be mobile and contaminate groundwater.
Other Adverse Effects	Films form on water and may affect oxygen transfer and damage organisms.

13□ DISPOSAL CONSIDERATIONS

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

This material, if discarded as produced, is not a RCRA "listed" ha□ardous waste. Howe□er, it should be fully characteri□ed for ignitability (D001), reacti□ity (D003) and ben□ene (D018) prior to disposal (40 CFR 261). □se which results in chemical or physical change or contamination may sub□ect it to regulation as a ha□ardous waste. Along with properly characteri□ing all waste materials, consult state and local regulations regarding the proper disposal of this material.

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

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

1□□ TRANSPORTATION INFORMATION

□nited States Department of Transportation (□S DOT)	**Shipping Description:** Petroleum Distillates, n.o.s., 3, □N1268, I or II **Shipping Name:** Petroleum Distillates, n.o.s (contains natural gas condensate) **Hazard Class and Division:** 3 **ID Number:** □N1268 **Pac□ing Group:** I or II **Label:** Flammable □iquid **Placard:** Flammable **Reportable □uantity:** None established for this material **Emergency Response Guide:** 128
Transportation of Dangerous Goods (TDG) Canada	
International Maritime Dangerous Goods Code (IMDG)	**Shipping Description:** Petroleum Distillates, n.o.s., 3, □N1268, I or II **Shipping Name:** Petroleum Distillates, n.o.s (contains natural gas condensate) **Hazard Class and Division:** 3 **□N Number:** 1268 **Label:** Flammable □iquid **EMS Guide:** F-E, S-E Not a DOT Marine Pollutant per 4□ CFR 71.8
European Agreements Concerning the International Carriage by Rail (RID) and by Road (ADR)	**Shipping Name**: Petroleum Distillates, n.o.s (contains natural gas condensate) **Hazard Class:** 3 **Pac□ing Group:** I or II **Label:** Flammable □iquid **Danger Number:** 33 **□N Number:** 1268
International Civil Aviation Organization / International Air Transport Association (ICAO/IATA)	**Shipping Name:** Petroleum Distillates, n.o.s (contains natural gas condensate) or Natural Gasoline **□N/ID Number:** □N1268 **Hazard Class/Division:** 3 **Pac□ing Group:** I or II **Labels:** Flammable **Emergency Response Guide:** 3H

1□□ REG□LATOR□ INFORMATION

□nited States Federal Regulatory Information

EPA TSCA Inventory	This product and/or its components are listed on the Toxic Substances Control Act (TSCA) In□entory
EPA SARA 302/30□ Emergency Planning and Notification	This material contains the following chemicals sub□ect to reporting under the Superfund Amendments and Reauthori□ation Act of 1□86 (SARA): Material contains hydrogen sulfide, considered an extremely ha□ardous substance. TPQ– 500 lb, EPCRA RQ – 100 lb
EPA SARA 311/312 (Title III Hazard Categories)	Acute Health: □es Chronic Health: □es Fire Ha□ard: □es Pressure Ha□ard: No Reacti□e Ha□ard: No

1□□ REG□LATOR□ INFORMATION

EPA SARA Toxic Chemical Notification and Release Reporting (□0 CFR 3□2) and CERCLA Reportable □uantities (□0 CFR 302□□)

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

CERC□A Section 101(14) excludes crude oil and crude oil fractions, including ha□ardous constituents of petroleum, from the definition of ha□ardous substances. The petroleum exclusion applies to this product.

EPA CWA and OPA This product is classified as an oil under Section 311 of the Clean Water Act (CWA) and Oil Pollution Act of 1□□0 (OPA), sub□ect to spill reporting requirements.

Canadian Regulatory Information

DSL/NDSL Inventory This product has been classified in accordance with the ha□ard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations..

Wor□place Hazardous Materials Information System (WHMIS) Hazard Class
□2 - Flammable □iquid
D1A – Material Causing Immediate and Serious Toxic Effects - Very Toxic Material
D2A: Material Causing Other Toxic Effects Very Toxic
D2□ - Material Causing Other Toxic Effects - Toxic Material

European □nion Regulatory Information

Labeling Product is dangerous as defined by the European □nion Dangerous Substances / Preparations Directi□es
Contains: □ow □oiling Point Naphtha

Symbol
F□ Extremely Flammable
T Toxic
N Dangerous for the En□ironment

Ris□ Phrases R12-45-38-65-67-51/53
Extremely flammable. May cause cancer. Irritating to s□in. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and di□□iness. Toxic to aquatic organisms, may cause long-term ad□erse effects in the aquatic en□ironment.

Safety Phrases S16-53-45-2-23-24-2□-43-62
□eep away from sources of ignition – No smo□ing. A□oid exposure – obtain special instructions before use. In case of accident or if you feel unwell, see□ medical ad□ice immediately (show the label where possible). □eep out of reach of children. Do not breathe □apor. A□oid contact with s□in. Do not empty into drains. In case of fire use foam/dry powder/CO_2. If swallowed, do not induce □omiting: see□ medical ad□ice immediately and show this container or label.

1□□ REG□LATOR□ INFORMATION

California Proposition □□
This product may contain detectable quantities of the following chemicals, □nown to the State of California to cause cancer, birth defects, or other reproducti□e harm and which may be sub□ect to the warning requirements of California Proposition 65. Chemicals □nown to the State of California to cause cancer, birth defects or other reproducti□e harm are created by the combustion of this product.
Carcinogens: □en□ene, Ethyl □en□ene
Developmental Toxicity: □en□ene, Toluene
Male Reproductive Toxicity: □en□ene

Carcinogen Identification by International Agency for Research on Cancer

	Group 1	Carcinogenic to Humans	□en□ene
	Group 2A	Probably Carcinogenic to Humans	
	Group 2□	Possibly Carcinogenic to Humans	Ethyl □en□ene, Gasoline, Gasoline Engine Exhaust
	Group 3	Not Classifiable	Toluene, □ylenes

1□□ OTHER INFORMATION

Prepared □y

□.P. Morgan Ventures Energy Corp.
383 Madison A□enue, 10th Floor
New □or□, N□ 10017

□P Morgan Commodities Canada Corp.
Suite 600, Vintage Towers II, 326 11th
A□enue SW
Calgary, Alberta
T2R 0C5

The information presented in this Material Safety Data Sheet is based on data belie□ed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANT□ OF MERCHANTA□I□IT□, FITNESS FOR AN□ PARTIC□□AR P□RPOSE, OR AN□ OTHER WARRANT□ IS E□PRESSED OR IS TO □E IMP□IED REGARDING THE ACC□RAC□ OR COMP□ETENESS OF THE INFORMATION PROVIDED A□OVE, THE RES□□TS TO □E O□TAINED FROM THE □SE OF THIS INFORMATION OR THE PROD□CT, THE SAFET□ OF THIS PROD□CT, OR THE HA□ARDS RE□ATED TO ITS □SE. No responsibility is assumed for any damage or in□ury resulting from abnormal use or from any failure to adhere to recommended practices. The information pro□ided abo□e, and the product, are furnished on the condition that the person recei□ing them shall ma□e their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the ris□ of their use. In addition, no authori□ation is gi□en nor implied to practice any patented in□ention without a license.

ATTACHMENT I

EMISSION UNITS TABLE

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
GPU-1	1e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
GPU-2	2e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
GPU-3	3e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
GPU-4	4e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
GPU-5	5e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
GPU-6	6e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
GPU-7	7e	Gas Processing unit	2015	1.0 MMBtu/hr	New	None
LH-1	8e	Line Heater	2015	2.5 MMBtu/hr	New	None
LPS-1	9e	Low Pressure Separator	2015	0.5 MMBtu/hr	New	None
CE-1	10e	Vapor Recovery Unit Compressor Engine	2015	68 HP	New	1C
CE-2	11e	Flash Gas Compressor Engine	2015	690 HP	New	2C
TG-1	12e	Thermoelectric Generator	2015	0.013MMBtu/hr	New	None
TG-2	13e	Thermoelectric Generator	2015	0.013MMBtu/hr	New	None
VDU-1	14e	Vapor Destruction Unit	2015	18.34 MMBtu/hr	New	None
Flare-1	15e	Flare	2015	250 MMBtu/hr	New	None
TL-1	14e	Truck Loading	2015	1.53 MMBBL/yr	New	VDU-1
T01-T06	None	Produced Water Tanks	2015	400 BBL each	New	VDU-1
T07-T12	None	Condensate Tanks	2015	400 BBL each	New	VDU-1

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

EMISSION POINTS DATA SUMMARY SHEET

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
1e	Vertical Stack	GPU-1	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request
2e	Vertical Stack	GPU-2	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request
3e	Vertical Stack	GPU-3	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request
4e	Vertical Stack	GPU-4	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request
5e	Vertical Stack	GPU-5	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request
6e	Vertical Stack	GPU-6	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request

7e	Vertical Stack	GPU-7	Gas Processing Unit	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	0.01 <0.01 0.10 0.09 0.01 117.01	0.04 0.01 0.43 0.37 0.03 512.51	Gas/ Vapor	EE	Can Supply Upon Request
8e	Vertical Stack	LH-1	Line Heater	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.02 0.01 0.25 0.21 0.02 292.53	0.09 0.01 1.08 0.91 0.06 1281.26	0.02 0.01 0.25 0.21 0.02 292.53	0.09 0.01 1.08 0.91 0.06 1281.26	Gas/ Vapor	EE	Can Supply Upon Request
9e	Vertical Stack	LPS-1	Low Pressure Separator	NA	NA	NA	NA	PM SO2 NO_x CO VOC CO_2e	0.01 <0.01 0.05 0.05 0.01 58.5	0.02 0.01 0.22 0.18 0.02 256.25	0.01 <0.01 0.05 0.05 0.01 58.5	0.02 0.01 0.22 0.18 0.02 256.25	Gas/ Vapor	EE	Can Supply Upon Request
10e	Vertical Stack	CE-1	4-Stroke Rich Burn RICE	1C	Catalytic Converter	NA	NA	PM SO2 NOx CO VOC Formaldehyde CO_2e	0.03 <0.01 10.00 9.31 0.02 0.02 71.59	0.13 0.01 43.82 40.74 0.08 0.06 313.9	0.03 <0.01 1.39 2.28 0.02 0.02 71.59	0.13 0.01 6.09 9.98 0.08 0.06 313.9	Gas/ Vapor	EE	Can Supply Upon Request
11e	Vertical Stack	CE-2	4-Stroke Lean Burn RICE	2C	Catalytic Converter	NA	NA	PM SO2 NOx CO VOC Formaldehyde CO_2e	<0.01 0.01 0.77 4.61 1.66 0.43 766.2	0.01 0.02 3.34 20.19 7.27 1.87 3,786.1	<0.01 0.01 0.77 3.05 1.07 0.43 766.2	0.01 0.02 3.34 13.33 4.67 1.87 3,786.1	Gas/ Vapor	EE	Can Supply Upon Request
12e	Vertical Stack	TG-1	Thermo-electric Generator	NA	NA	NA	NA	CO NOx	<0.01 <0.01	<0.01 <0.01	<0.01 <0.01	<0.01 <0.01	Gas/ Vapor	EE	Can Supply Upon Request
13e	Vertical Stack	TG-2	Thermo-electric Generator	NA	NA	NA	NA	CO NOx	<0.01 <0.01	<0.01 <0.01	<0.01 <0.01	<0.01 <0.01	Gas/ Vapor	EE	Can Supply Upon Request
14e	Vertical Stack	VDU-1 with pilot-1	Vapor Destruction Unit	NA	NA	NA	NA	CO NOx VOC SO2 CO_2e	6.81 1.25 180.0 0.35 2142.90	29.80 5.48 591.3 1.51 9385.90	6.81 1.25 3.61 0.35 2142.90	29.80 5.48 11.86 1.51 9385.90	Gas/ Vapor	EE	Can Supply Upon Request
15e	Open	Flare-1 with pilot-2	Flare	NA	NA	NA	NA	CO NOx VOC SO2 CO_2e	92.51 17.00 9,084.8 5.11 29,223	46.28 8.51 4,542.4 2.56 14,612	92.51 17.00 181.7 5.11 29,223	46.28 8.51 68.15 2.56 14,612	Gas/ Vapor	EE	Can Supply Upon Request
-	None	T01-T06	Produced Water Tanks	VDU-1	Vapor Destruction Unit	NA	NA	VOC	4.32	14.19	0.09	0.29	Gas/ Vapor	EE	Can Supply Upon Request
-	None	T07-T12	Condensate Tanks	VDU-1	Vapor Destruction Unit	NA	NA	VOC	163.30	536.41	3.27	10.73	Gas/ Vapor	EE	Can Supply Upon Request

14e	Vertical Stack	TL-1	Truck Loading	VDU-1	Vapor Destruction Unit	NA	NA	VOC	12.79	42.01	4.15	13.61	Gas/ Vapor	EE	Can Supply Upon Request
Fugitives	Equipment Fugitives	NA	NA	NA	NA	NA	NA	VOC CO2e	7.40 80.6	32.4 353	7.40 80.6	32.4 353	Gas/ Vapor	EE	Can Supply Upon Request

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^{o}F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
1e	1.0	500	303	6.4	1180	12	4,335.535	521.787
2e	1.0	500	303	6.4	1180	12	4,335.535	521.787
3e	1.0	500	303	6.4	1180	12	4,335.535	521.787
4e	1.0	500	303	6.4	1180	12	4,335.535	521.787
5e	1.0	500	303	6.4	1180	12	4,335.535	521.787
6e	1.0	500	303	6.4	1180	12	4,335.535	521.787
7e	1.0	500	303	6.4	1180	12	4,335.535	521.787
8e	1.0	500	758	16.1	1180	12	4,335.535	521.787
9e	1.0	500	152	3.2	1180	12	4,335.535	521.787
10e	0.2	1238	406	215.4	1180	12	4,335.535	521.787
11e	0.67	981	4,460	216.7	1180	12	4,335.535	521.787
12e	0.25	500	4.0	1.36	1180	4	4,335.535	521.787
13e	0.25	500	4.0	1.36	1180	4	4,335.535	521.787
14e	4	1650	138.9	0.18	1180	20	4,335.535	521.787
15e	0.5	1650	3,125	265.3	1180	26.33	4,335.535	521.787

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

ATTACHMENT K

FUGITIVE EMISSIONS DATA SHEET

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

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

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

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

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads		-	-	-	-	EE
Unpaved Haul Roads		-	-	-	-	EE
Storage Pile Emissions		-	-	-	-	EE
Loading/Unloading Operations	VOC	12.79	42.01	4.15	13.61	EE
Wastewater Treatment Evaporation & Operations		-	-	-	-	EE
Equipment Leaks	VOC CO_2e	7.40 80.45	32.39 352.34	7.40 80.45	32.39 352.34	EE
General Clean-up VOC Emissions		-	-	-	-	EE
Other		-	-	-	-	EE

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L

EMISSION UNIT DATA SHEET

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

NATURAL GAS WELL AFFECTED FACILITY DATA SHEET

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

Please provide the API number(s) for each NG well at this facility:	
OXFD-13AHS	047-017-06456
OXFD-13BHS	047-017-06457
OXFD-13CHS	047-017-06576
OXFD-13DHS	047-017-06577
OXFD-13EHS	047-017-06578
OXFD-13FHS	047-017-06632
OXFD-13IHS	047-017-06631

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

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

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

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

STORAGE VESSEL EMISSION UNIT DATA SHEET

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

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Oxford 13Well Pad	2. Tank Name Produced Water Tank
3. Emission Unit ID number T01 - T06	4. Emission Point ID number 10e
5. Date Installed or Modified *(for existing tanks)* 2015	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable) NA*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 400 BBl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 20	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 20	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. 400 BBL	
13A. Maximum annual throughput (gal/yr) 7,051,800 per tank	13B. Maximum daily throughput (gal/day) 19,320 per tank
14. Number of tank turnovers per year 420 per tank	15. Maximum tank fill rate (gal/min) 50 per tank
16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): ☒ Fixed Roof _x_ vertical ___ horizontal _x_ flat roof ___ cone roof ___ dome roof ___ other (describe) ☐ External Floating Roof ___ pontoon roof ___ double deck roof ☐ Domed External (or Covered) Floating Roof ☐ Internal Floating Roof ___ vertical column support ___ self-supporting ☐ Variable Vapor Space ___ lifter roof ___ diaphragm ☐ Pressurized ___ spherical ___ cylindrical ☐ Underground ☐ Other (describe)	

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

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

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	Flashing Loss		Breathing Loss		Working Loss		Total Emissions Loss		Estimation Method[1]
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	
See Calculations for details									Promax Simulation

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)
Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

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

TANK CONSTRUCTION AND OPERATION INFORMATION

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

20A. Shell Color: white	20B. Roof Color: white	20C. Year Last Painted:

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

22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

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

25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒

25A. Year Internal Floaters Installed:

25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐No

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

25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No

25F. Describe deck fittings:

26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply

26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:

26C. Deck seam. Continuous sheet construction:
☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)

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

SITE INFORMATION:

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

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

LIQUID INFORMATION:

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

35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):	35B. Maximum (psig):

36A. Minimum liquid surface temperature (°F):	36B. Corresponding vapor pressure (psia):
37A. Avg. liquid surface temperature (°F):	37B. Corresponding vapor pressure (psia):
38A. Maximum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):

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

39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From: To:			

STORAGE VESSEL EMISSION UNIT DATA SHEET

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Oxford 13 Well Pad	2. Tank Name Condensate
3. Emission Unit ID number T07 – T12	4. Emission Point ID number 10e
5. Date Installed or Modified *(for existing tanks)* 2015	6. Type of change: ☒ New construction ☐ New stored material ☐ Other
7A. Description of Tank Modification *(if applicable) NA*	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Provide any limitations on source operation affecting emissions. (Production variation, etc.) None	

II. TANK INFORMATION (required)

8. Design Capacity *(specify barrels or gallons).* Use the internal cross-sectional area multiplied by internal height. 400 BBL	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 20	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 20	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity *(specify barrels or gallons).* This is also known as "working volume. 400 BBL	
13A. Maximum annual throughput (gal/yr) 2,938,250 per tank	13B. Maximum daily throughput (gal/day) 8,050 per tank
14. Number of tank turnovers per year 175	15. Maximum tank fill rate (gal/min) 50
16. Tank fill method ☒ Submerged ☐ Splash ☐ Bottom Loading	
17. Is the tank system a variable vapor space system? ☐ Yes ☒ No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	

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

☒ Fixed Roof _x_ vertical ___ horizontal _x_ flat roof ___ cone roof ___ dome roof ___ other (describe)

☐ External Floating Roof ___ pontoon roof ___ double deck roof
☐ Domed External (or Covered) Floating Roof
☐ Internal Floating Roof ___ vertical column support ___ self-supporting
☐ Variable Vapor Space ___ lifter roof ___ diaphragm
☐ Pressurized ___ spherical ___ cylindrical
☐ Underground
☐ Other (describe)

III. TANK CONSTRUCTION AND OPERATION INFORMATION *(check which one applies)*

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

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

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

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

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

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

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

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

[1] Complete appropriate Air Pollution Control Device Sheet

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

Material Name and CAS No.	**Flashing Loss**		**Breathing Loss**		**Working Loss**		**Total Emissions Loss**		**Estimation Method[1]**
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	
Condensate: See Calculations for details									EE Promax Simulation

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

Remember to attach emissions calculations, including TANKS Summary Sheets and other modeling summary sheets if applicable.

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

TANK CONSTRUCTION AND OPERATION INFORMATION

19. Tank Shell Construction:

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

20A. Shell Color: white	20B. Roof Color: white	20C. Year Last Painted:

21. Shell Condition (if metal and unlined):

☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ Yes ☒ No	22B. If yes, operating temperature:	22C. If yes, how is heat provided to tank?

23. Operating Pressure Range (psig):

24. Is the tank a **Vertical Fixed Roof Tank**?	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slop (ft/ft):

☐ Yes ☐ No		
25. Complete item 25 for **Floating Roof Tanks** ☐ Does not apply ☒		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type *(check one):* ☐ Metallic (mechanical) shoe seal ☐ Liquid mounted resilient seal ☐ Vapor mounted resilient seal ☐ Other (describe):		
25C. Is the Floating Roof equipped with a secondary seal? ☐ Yes ☐ No		
25D. If yes, how is the secondary seal mounted? *(check one)* ☐ Shoe ☐ Rim ☐ Other (describe):		
25E. Is the floating roof equipped with a weather shield? ☐ Yes ☐ No		
25F. Describe deck fittings:		
26. Complete the following section for **Internal Floating Roof Tanks** ☒ Does not apply		
26A. Deck Type: ☐ Bolted ☐ Welded	26B. For bolted decks, provide deck construction:	
26C. Deck seam. Continuous sheet construction: ☐ 5 ft. wide ☐ 6 ft. wide ☐ 7 ft. wide ☐ 5 x 7.5 ft. wide ☐ 5 x 12 ft. wide ☐ other (describe)		

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

SITE INFORMATION:		
27. Provide the city and state on which the data in this section are based:		
28. Daily Avg. Ambient Temperature (°F):	29. Annual Avg. Maximum Temperature (°F):	
30. Annual Avg. Minimum Temperature (°F):	31. Avg. Wind Speed (mph):	
32. Annual Avg. Solar Insulation Factor (BTU/ft^2-day):	33. Atmospheric Pressure (psia):	
LIQUID INFORMATION:		
34. Avg. daily temperature range of bulk liquid (°F):	34A. Minimum (°F):	34B. Maximum (°F):
35. Avg. operating pressure range of tank (psig):	35A. Minimum (psig):	35B. Maximum (psig):
36A. Minimum liquid surface temperature (°F):	36B. Corresponding vapor pressure (psia):	
37A. Avg. liquid surface temperature (°F):	37B. Corresponding vapor pressure (psia):	
38A. Maximum liquid surface temperature (°F):	38B. Corresponding vapor pressure (psia):	
39. Provide the following for each liquid or gas to be stored in the tank. Add additional pages if necessary.		

39A. Material name and composition:			
39B. CAS number:			
39C. Liquid density (lb/gal):			
39D. Liquid molecular weight (lb/lb-mole):			
39E. Vapor molecular weight (lb/lb-mole):			
39F. Maximum true vapor pressure (psia):			
39G. Maxim Reid vapor pressure (psia):			
39H. Months Storage per year. From: To:			

NATURAL GAS FIRED FUEL BURNING UNITS
EMISSION DATA SHEET

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

Emission Unit ID #[1]	Emission Point ID#[2]	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type[3] and Date of Change	Control Device[4]	Design Heat Input (mmBtu/hr)[5]	Fuel Heating Value (Btu/scf)[6]
GPU-1	1e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
GPU-2	2e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
GPU-3	3e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
GPU-4	4e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
GPU-5	5e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
GPU-6	6e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
GPU-7	7e	Gas Processing Unit	2015	New	NA	1.0 MMBtu/hr	1020
LH-1	8e	Line Heater	2015	New	NA	2.5 MMBtu/hr	1020
LPS-1	9e	Low Pressure Separator	2015	New	NA	0.5 MMBtu/hr	1020
TG-1	12e	Thermoelectric Generator	2015	New	NA	0.013 MMBtu/hr	1000
TG-1	13e	Thermoelectric Generator	2015	New	NA	0.013 MMBtu/hr	1000

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

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

[3] New, modification, removal

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

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

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

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

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

Emission Unit (Source) ID No.[1]		CE-1		CE-2			
Emission Point ID No. [2]		10e		11e			
Engine Manufacturer and Model		Arrow VRG 330		Caterpillar G3508 BLE			
Manufacturer's Rated bhp/rpm		68/1800		690/1400			
Source Status[3]		NS		NS			
Date Installed/Modified/Removed[4]		2015		2015			
Engine Manufactured/Reconstruction Date[5]		06/01/1998		2/12/2013			
Is this engine subject to 40CFR60, Subpart JJJJ?		No		Yes			
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60, Subpart JJJJ? (Yes or No)[6]		No		No			
Is this engine subject to 40CFR63, Subpart ZZZZ? (yes or no)		Yes		No			
Engine, Fuel and Combustion Data	Engine Type[7]	4SRB		4SLB			
	APCD Type[8]	NSCR		OC			
	Fuel Type[9]	PQ		PQ			
	H_2S (gr/100 scf)	0.25		0.25			
	Operating bhp/rpm	68/1800		690/1400			
	BSFC (Btu/bhp-hr)	8,038		8,332			
	Fuel throughput (ft^3/hr)	536		4,910			
	Fuel throughput ($MMft^3$/yr)	4.70		43.02			
	Operation (hrs/yr)	8760		8760			
Reference[10]	Potential Emissions[11]	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO_X	1.39	6.09	0.77	3.34		
	CO	2.28	9.98	3.05	13.33		
	VOC	0.02	0.08	1.07	4.67		
	SO_2	<0.01	<0.01	0.01	0.02		
	PM_{10}	0.03	0.13	<0.01	0.01		
	Formaldehyde	0.02	0.06	0.43	1.87		
MRR[12]	Proposed Monitoring:	Hours of operation		Hours of operation			
	Proposed Recordkeeping:	Will keep records for 5 years and 2 years on site.		Will keep records for 5 years and 2 years on site.			
	Proposed Reporting:	Will report any emissions limits or opacity deviations		Will report any emissions limits or opacity deviations			

Instructions for completing the Engine Emission Unit Data Sheet:

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

TANK TRUCK LOADING
EMISSION UNIT DATA SHEET

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

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

8. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7

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

Liquid Name	Produced Water	Condensate	
Max. daily throughput (1000 gal/day)	115.92	48.30	
Max. annual throughput (1000 gal/yr)	42,310.8	17,629.5	
Loading Method [1]	Sub	Sub	
Max. Fill Rate (gal/min)	-	-	
Average Fill Time (min/loading)	-	-	
Max. Bulk Liquid Temperature (^{o}F)	75.94	75.94	
True Vapor Pressure [2]	0.33	9.88	
Cargo Vessel Condition[3]	U	C	
Control Equipment or Method [4]	NA	ECD	
Minimum collection efficiency (%)	0	71	
Minimum control efficiency (%)	0	98	

** Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	0.44	3.71	
	Annual (ton/yr)	1.44	12.18	
Estimation Method [5]		EPA	EPA	

Notes: AP-42 Section 5.2

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets as Attachment "H"*):
CA = Carbon Adsorption
VB = Dedicated Vapor Balance (closed system)
ECD = Enclosed Combustion Device
F = Flare
TO = Thermal Oxidation or Incineration

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

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

MONITORING *Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation/air pollution control device.* The loadout operation will be visual monitored during the procedure.	RECORDKEEPING *Please describe the proposed recordkeeping that will accompany the monitoring.* Records will be kept of the amount of liquids transferred, as well as the frequency of the operation.
REPORTING *Please describe the proposed frequency of reporting of the recordkeeping.* Reporting of records will be performed as required by permit standards.	TESTING *Please describe any proposed emissions testing for this process equipment/air pollution control device.* Testing will be performed as required by permit standards

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

LEAK SOURCE DATA SHEET

Source Category	Pollutant	Number of Source Components[1]	Number of Components Monitored by Frequency[2]	Average Time to Repair (days)[3]	Estimated Annual Emission Rate (lb/yr)[4]
Pumps[5]	light liquid VOC[6,7]				
	heavy liquid VOC[8]				
	Non-VOC[9]				
Valves[10]	Gas VOC	1,000	Quarterly	As soon as possible	28,772
	Light Liquid VOC				
	Heavy Liquid VOC				
	Non-VOC-CO2e	1,000	Quarterly	As soon as possible	272,429
Safety Relief Valves[11]	Gas VOC	200	Quarterly	As soon as possible	3,824
	Non VOC-CO2e	200	Quarterly	As soon as possible	54,486
Open-ended Lines[12]	VOC				
	Non-VOC-CO2e				
Sampling Connections[13]	VOC	4,000	Quarterly	As soon as possible	4,192
	Non-VOC-CO2e	4,000	Quarterly	As soon as possible	48,445
Compressor Seals	VOC				
	Non-VOC				
Flanges	VOC	4,000	Quarterly	As soon as possible	7,422
	Non-VOC	4,000	Quarterly	As soon as possible	94,472
Other	VOC	4,000	Quarterly	As soon as possible	19,844
	Non-VOC-CO2e	4,000	Quarterly	As soon as possible	234,847

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

Notes for Leak Source Data Sheet

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

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

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

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

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

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

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

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

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

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

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

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

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

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

13. Do not include closed-purge sampling connections.

ATTACHMENT M

AIR POLLUTION CONTROL DEVICE

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

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

Control Device ID No. (C1):

Equipment Information

1. Manufacturer:Miratech Model No. IQ-10-04-C1	2. Control Device Name: C1 Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. See attached converter drawing	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device. This is an EPA Certified unit that has been proven effective by EPA testing.	
5. Provide a scale diagram of the control device showing internal construction. See Converter Drawing Attached	
6. Submit a schematic and diagram with dimensions and flow rates. No diagram was provided by manufacturer, but engine is listed as having a maximum flow of 142 cfm at 1180F	
7. Guaranteed minimum collection efficiency for each pollutant collected: The catalyst manufacturer list 75.5% reduction efficiency for CO, and 86.1% reduction efficiency for NOx.	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 142 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. No liquid flow associated with this catalytic converter and although pressure drop may be measured periodically, the inlet and outlet temperature will be measured continuously by this unit in order to assess performance with manufacturer's operating requirements.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Particulate (type):	☐ Odor ☒ Other NOx, CO
17. Inlet gas velocity: 6.9 ft/sec	18. Pollutant specific gravity:
19. Gas flow into the collector: 142cfm ACF @ 1180°F	20. Gas stream temperature: Inlet: 750-1250 °F Outlet: 1350 °F
21. Gas flow rate: Design Maximum: 142 ACFM Average Expected: 8.9 ACFM	22. Particulate Grain Loading in grains/scf: Inlet: NA Outlet:

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

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A CO	2.44		100	0.6		75.5
B NOx	2.16		100	0.3		86.1
C						
D						
E						

24. Dimensions of stack: Height 12 ft. Diameter 0.2 ft.

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

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

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

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

MONITORING: Hours of operation and malfunctions will be monitored	RECORDKEEPING: All maintenance records will be maintained and made available upon request.
REPORTING: Upon Request	TESTING: NA

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

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. 75.5% for CO, and 86.1% for NOx

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

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

Manufacturer's emission related instructions limits the inlet temperature to be between 750-1250 degrees F.

Attachment M
Air Pollution Control Device Sheet
(Oxidation Catalyst)

Control Device ID No. (C2):

Equipment Information

1. Manufacturer: DCL America Inc. Model No. DC64L2	2. Control Device Name: C2 Type: OC
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. Provided Upon Request	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device. This is an EPA Certified unit that has been proven effective by EPA testing.	
5. Provide a scale diagram of the control device showing internal construction. See Converter Drawing Attached	
6. Submit a schematic and diagram with dimensions and flow rates. No diagram was provided by manufacturer, but engine is listed as having a maximum flow of 4460 cfm at 981 ˚F	
7. Guaranteed minimum collection efficiency for each pollutant collected: The catalyst manufacturer list 34% reduction efficiency for CO, and 36% reduction efficiency for VOC.	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 1634 SCFM	10. Capacity: NA
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. No liquid flow associated with this catalytic converter and although pressure drop may be measured periodically, the inlet and outlet temperature will be measured continuously by this unit in order to assess performance with manufacturer's operating requirements.	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. NA	
13. Description of method of handling the collected material(s) for reuse of disposal. NA	

Gas Stream Characteristics

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

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

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Particulate (type):	☐ Odor ☒ Other CO & VOC
17. Inlet gas velocity: 34.7 ft/sec	18. Pollutant specific gravity:
19. Gas flow into the collector: 4460 cfm ACF @ 981°F	20. Gas stream temperature: Inlet: 750-1250 °F Outlet: 981 °F
21. Gas flow rate: Design Maximum: 1634 ACFM Average Expected: ACFM	22. Particulate Grain Loading in grains/scf: Inlet: NA Outlet:

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

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr	grains/acf		lb/hr	grains/acf	
A CO	4.61		100	3.04		34
B VOC	1.66		100	1.07		36
C						
D						
E						

24. Dimensions of stack: Height 12 ft. Diameter 0.2 ft.

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

Particulate Distribution

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

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

28. Describe the collection material disposal system: NA

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

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

MONITORING: Hours of operation and malfunctions will be monitored	RECORDKEEPING: All maintenance records will be maintained and made available upon request.
REPORTING: Upon Request	TESTING: NA

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

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. 34% for CO, and 36% for VOC

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

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

NA

AIR POLLUTION CONTROL DEVICE
Vapor Combustion Control Device Sheet

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

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1. Control Device ID#: Flare-1	2. Installation Date: 2015 ☒ New	
3. Maximum Rated Total Flow Capacity: 125,000 scfh 3,000,000 scfd	4. Maximum Design Heat Input: 250 MMBtu/hr	5. Design Heat Content: 2,000 BTU/scf

Control Device Information

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

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

7. Manufacturer: National Oilwell Varco (NOV) Model No.: PGF 3000	8. Hours of operation per year: 1000 per PTE calcs, but as allowed by enhanced monitoring of waste gas BTU combustion rate.

9. List the emission units whose emissions are controlled by this vapor combustion control device: (Emission Point ID#: 13e)

10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
LPS-1	Low Pressure Separator		

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

11. Assist Type	12. Flare Height	13. Tip Diameter	14. Was the design per §60.18?
☐ Steam - ☐ Air - ☒ Pressure - ☐ Non -	26.33 ft	To Be Determined	☒Yes ☐No

Waste Gas Information

15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft3)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (ft/s)
2083.33	2,000	1400-1650	<400

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

Pilot Information

20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Fuel Gas	1	13.5	17,500	☒ Yes ☐ No

25. If automatic re-ignition will be used, describe the method: Electronic re-ignition will be installed and monitored for proof of pilot flame through flame ionization, auto relight.

26. Describe the method of controlling flame: NA

27. Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	28. If yes, what type? ☐ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☒ Other, describe: Ionization rod which sends a signal to controller as long as it is in contact with the flame.

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
VOC	100	98

32. Has the control device been tested by the manufacturer and certified? No

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

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

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

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

INSTRUCTIONS:
Vapor Combustion Control Device

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

General Information

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

Control Device Information

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

Waste Gas Information

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

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

Pilot Information

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

**continued next page*

Control Information

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

AIR POLLUTION CONTROL DEVICE
Vapor Combustion Control Device Sheet

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

IMPORTANT: READ THE INSTRUCTIONS ACCOMPANYING THIS FORM BEFORE COMPLETING.

General Information

1. Control Device ID#: VDU-1	2. Installation Date: 2015 ☒ New	
3. Maximum Rated Total Flow Capacity: 8,333 scfh 200,000 scfd	4. Maximum Design Heat Input: 18.33 MMBtu/hr	5. Design Heat Content: 2,200 BTU/scf

Control Device Information

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

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

7. Manufacturer: National Oilwell Varco (NOV) Model No.: MEVC 200DT	8. Hours of operation per year: 8760

9. List the emission units whose emissions are controlled by this vapor combustion control device: (Emission Point ID#: 12e)

10. Emission Unit ID#	Emission Source Description:	Emission Unit ID#	Emission Source Description:
T01	Produced Water Tank	T07	Condensate Tank
T02	Produced Water Tank	T08	Condensate Tank
T03	Produced Water Tank	T09	Condensate Tank
T04	Produced Water Tank	T10	Condensate Tank
T05	Produced Water Tank	T11	Condensate Tank
T06	Produced Water Tank	T12	Condensate Tank.
TL-1	Truck Loading		

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

11. Assist Type	12. Flare Height	13. Tip Diameter	14. Was the design per §60.18?
☐ Steam - ☐ Air - ☐ Pressure - ☒ Non -	20 ft	Multi tip Burner	☒Yes ☐No

Waste Gas Information

15. Maximum waste gas flow rate (scfm):	16. Heat value of waste gas stream (BTU/ft3)	17. Temperature of the emissions stream (°F)	18. Exit Velocity of the emissions stream (ft/s)
139	2,200	1400-1650	<60

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

Pilot Information

20. Type/Grade of pilot fuel:	21. Number of pilot lights:	22. Fuel flow rate to pilot flame per pilot (scf/hr):	23. Heat input per pilot (BTU/hr):	24. Will automatic re-ignition be used?
Fuel Gas	1	49	50,000	☒ Yes ☐ No

25. If automatic re-ignition will be used, describe the method: Electronic re-ignition will be installed (additional details provided upon request)

26. Describe the method of controlling flame: Thermocouple

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

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
VOC	100	98

32. Has the control device been tested by the manufacturer and certified? No

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

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

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

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

INSTRUCTIONS:
Vapor Combustion Control Device

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

General Information

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

Control Device Information

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

Waste Gas Information

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

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

Pilot Information

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

**continued next page*

Control Information

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

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

Table 1. Annual Potential To Emit (PTE)
CNX Gas LLC - Oxford 13

Criteria PTE

Source	PM	PM10	PM2.5	SO2	NOx	CO [2]	VOC [1]	CO_{2e}
Tanks with VDU 98% DRE (ton/yr)	-	-	-	-	-	-	11.012	-
Gas Processing Units (ton/yr)	0.228	0.228	0.228	0.018	3.006	2.525	0.165	3587.524
Line heaters (ton/yr)	0.082	0.082	0.082	0.006	1.074	0.902	0.059	1281.258
Low Pressure Separator (ton/yr)	0.016	0.016	0.016	0.001	0.215	0.180	0.012	256.252
Engines (ton/yr)	0.131	0.131	0.131	0.016	9.416	23.297	4.744	4099.963
Vapor Destruction Unit (VDU) (tons/yr)	-	-	-	1.501	5.475	29.791	11.854	9385.892
Process Flare (ton/yr)	-	-	-	2.557	8.505	46.278	68.146	14611.250
Thermoelectic Burner (ton/yr)	-	-	-	-	0.011	0.005	-	-
Truck Loading (ton/yr)	-	-	-	-	-	-	13.602	-
Fugitive Equipment Leaks (ton/yr)	-	-	-	-	-	-	32.384	352.339
Total Point Source Emissions (ton/yr)	0.46	0.46	0.46	4.10	27.70	93.01	98.58	33574.48
Total Emissions (lb/hr)	0.10	0.10	0.10	0.94	6.32	21.23	22.51	7665.41

Notes:

(1) The VOC total does not include emissions from the tanks since it has already been included within the VDU. The VDU 98 % DRE includes the total for tanks and truck loading. Additionally the process flare is estimated to run 1000 hr/yr to cover flash gas compressor maintenance and establish a maximum facility wide PTE
The maximum uncontrolled annual rate for VOC from the Low Pressure Separator is reduced by 25% to account for production decline over the first year
With respect to the VDU, the PTE is estimated as if the combustor is running all year so, when the VRU compressor is operating the facility's emissions will be decreased
Lastly the fugitive piping and valve losses are subtracted from the point source facility wide total since the well pad is no a listed source category under Title V or PSD Regulations
(2) The CO PTE for the facility does not include emissions from VRU, assumes worst case VDU emissions 8760 hrs/yr

HAP PTE

Source	Benzene	Toluene	Ethylbenzene	Xylene	n-Hexane	Formaldehyde	Total HAPs Listed
Gas Processing Units (ton/yr)	0.000	0.000	-	-	0.054	0.002	0.057
Line heaters (ton/yr)	0.000	0.000	-	-	0.019	0.001	0.020
Separator (ton/yr)	0.000	0.000	-	-	0.004	0.000	0.004
Engines (ton/yr)	0.015	0.012	0.001	0.005	0.028	1.921	1.982
Total Emissions (ton/yr)	0.015	0.012	0.001	0.005	0.028	1.921	2.063
Total Emissions (lb/hr)	0.003	0.003	0.000	0.001	0.006	0.438	0.471

Table 3. Gas Processing Unit (GPU) Rates and Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor			Emissions (lbs/hr)	Emissions (tons/yr)	Emissions x 7 (lbs/hr)	Emissions x 7 (tons/yr)
Criteria Pollutants							
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.0075	0.0326	0.05	0.23
SO_2	0.6	lb/MMcf	(1)	0.0006	0.0026	0.00	0.02
NOx	100	lb/MMcf	(2)	0.0980	0.4294	0.69	3.01
CO	84	lb/MMcf	(2)	0.0824	0.3607	0.58	2.52
VOC	5.5	lb/MMcf	(1)	0.0054	0.0236	0.04	0.17
Hazardous Air Pollutants							
Arsenic	2.0E-04	lb/MMcf	(3)	1.96E-7	8.59E-7	1.37E-6	6.01E-6
Benzene	2.1E-03	lb/MMcf	(4)	2.06E-6	9.02E-6	1.44E-5	6.31E-5
Beryllium	1.2E-05	lb/MMcf	(3)	1.18E-8	5.15E-8	8.24E-8	3.61E-7
Cadmium	1.1E-03	lb/MMcf	(3)	1.08E-6	4.72E-6	7.55E-6	3.31E-5
Chromium	1.4E-03	lb/MMcf	(3)	1.37E-6	6.01E-6	9.61E-6	4.21E-5
Cobalt	8.4E-05	lb/MMcf	(3)	8.24E-8	3.61E-7	5.76E-7	2.52E-6
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	1.18E-6	5.15E-6	8.24E-6	3.61E-5
Formaldehyde	7.5E-02	lb/MMcf	(4)	7.35E-5	3.22E-4	5.15E-4	2.25E-3
Hexane	1.8E+00	lb/MMcf	(4)	1.76E-3	7.73E-3	1.24E-2	5.41E-2
Lead	5.0E-04	lb/MMcf	(3)	4.90E-7	2.15E-6	3.43E-6	1.50E-5
Manganese	3.8E-04	lb/MMcf	(3)	3.73E-7	1.63E-6	2.61E-6	1.14E-5
Mercury	2.6E-04	lb/MMcf	(3)	2.55E-7	1.12E-6	1.78E-6	7.82E-6
Naphthalene	6.1E-04	lb/MMcf	(4)	5.98E-7	2.62E-6	4.19E-6	1.83E-5
Nickel	2.1E-03	lb/MMcf	(3)	2.06E-6	9.02E-6	1.44E-5	6.31E-5
PAH/POM	1.3E-03	lb/MMcf	(4)	1.26E-6	5.53E-6	8.84E-6	3.87E-5
Selenium	2.4E-05	lb/MMcf	(3)	2.35E-8	1.03E-7	1.65E-7	7.21E-7
Toluene	3.4E-03	lb/MMcf	(4)	3.33E-6	1.46E-5	2.33E-5	1.02E-4
Total HAP	**1.9E+00**	**lb/MMCF**		1.85E-3	8.11E-3	1.30E-2	5.68E-2
Greenhouse Gas Emissions							
CO_2	116.89	lb/MMBtu	(5)	1.17E+2	5.12E+2	8.18E+2	3.58E+3
CH_4	2.2E-03	lb/MMBtu	(5)	2.20E-3	9.66E-3	1.54E-2	6.76E-2
N_2O	0.0	lb/MMBtu	(5)	2.20E-4	9.66E-4	1.54E-3	6.76E-3
CO_2e[(b)]	-	-		117.010	512.503	819.069	3,587.524

Calculations:

(a) Annual emissions (tons/yr) = [Annual Usage (MMBtu/yr or MMCF/yr)]x [Number of Identical Heaters]x [Emission Factor (lb/MMBtu or lb/MMCF)] / [2,000 lb/ton]

Number of GPUs 7
Fuel Use (MMBtu/hr) = 1
Hours of Operation (hr/yr)= 8760
PTE Fuel Use (MMcf/yr) = 8.6 (7)

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

Global Warming Potential (GWP)

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

Notes:

(1) AP-42, Chapter 1.4, Table 1.4-2. Emission Factors For Criteria Pollutants and Greenhouse Gases From Natural Gas Combustion, July 1998.

(2) AP-42, Chapter 1.4, Table 1.4-1. Emission Factors For Nitrogen Oxides (Nox) and Carbon Monoxide(CO) From Natural Gas Combustion, July 1998.

(3) AP-42, Chapter 1.4, Table 1.4-4. Emission Factors For Metals From Natural Gas Combustion, July 1998.

(4) AP-42, Chapter 1.4, Table 1.4-3. Emission Factors for Speciated Organic Compounds from Natural Gas Combustion, July 1998.

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

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

(7) MMBtu to MMcf conversion factor is 1020. AP-42, Chapter 1.4

Table 2. Tank Emissions
CNX Gas LLC - Oxford 13

Emission Unit	Tank Contents	Control Devices	Tank Throughput (bbls/day)	Flashing and W&B Emissions (lb/hr) *(a)*	Uncontrolled VOC Emissions (ton/yr)	98 %VOC Control (lb/hr)	98 %VOC Control (ton/yr) *(b)*
T01-T06	Produced Water	None	2760.00	4.317	14.182	0.086	0.284
T07-T12	Condensate	None	1150.00	163.291	536.409	3.266	10.728
Total				**167.608**	**550.591**	**3.352**	**11.012**

Note: 98% DRE was used to estimate emissions due to the VDU being the backup control to the VRU compressor

(a) Emissions are taken from ProMax 3.2. and are the combination of the flashing and working/ breathing losses determinted from representative site sampling at Oxford 1

(b) Annual VOC emisisons only take into account 75% of maximum hourly flow to account for production decreases over the year

Notes:

Promax Results Summary (Complete results located in the back of atachment I)

Condensate Tanks Vented Emissions

Pollutant	lb/hr
Propane	50.4442
i-Butane	14.8585
n-Butane	34.068
i-Pentane	14.1212
n-Pentane	14.659
Hexane	24.1432
Isohexane	3.26202
Neohexane	0
2,2,4-Trimethylpentane	0.0112941
Benzene	0.189246
Heptane	4.31445
Toluene	0.292146
Octane	2.32121
Ethylbenzene	0.0192899
o-Xylene	0.0230076
Nonane	0.530828
C10+	0.0329332
VOCs	**163.29**

Water Tanks Vented Emissions

Pollutant	lb/hr
Propane	3.62452
i-Butane	0.116855
n-Butane	0.404631
i-Pentane	0.0512626
n-Pentane	0.0439155
Hexane	0.013887
Isohexane	0.00260521
Neohexane	0
2,2,4-Trimethylpentane	5.60E-07
Benzene	0.0258005
Heptane	0.00329812
Toluene	0.0263884
Octane	0.000662846
Ethylbenzene	0.00135796
o-Xylene	0.00172942
Nonane	0.000203098
C10+	5.20E-06
VOCs	**4.32**

Table 4. Line Heater (LH) Rates and Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor			Emissions (lbs/hr)	Emissions (tons/yr)
Criteria Pollutants					
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.02	0.08
SO_2	0.6	lb/MMcf	(1)	0.00	0.01
NOx	100	lb/MMcf	(2)	0.25	1.07
CO	84	lb/MMcf	(2)	0.21	0.90
VOC	5.5	lb/MMcf	(1)	0.01	0.06
Hazardous Air Pollutants					
Arsenic	2.0E-04	lb/MMcf	(3)	4.90E-7	2.15E-6
Benzene	2.1E-03	lb/MMcf	(4)	5.15E-6	2.25E-5
Beryllium	1.2E-05	lb/MMcf	(3)	2.94E-8	1.29E-7
Cadmium	1.1E-03	lb/MMcf	(3)	2.70E-6	1.18E-5
Chromium	1.4E-03	lb/MMcf	(3)	3.43E-6	1.50E-5
Cobalt	8.4E-05	lb/MMcf	(3)	2.06E-7	9.02E-7
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	2.94E-6	1.29E-5
Formaldehyde	7.5E-02	lb/MMcf	(4)	1.84E-4	8.05E-4
Hexane	1.8E+00	lb/MMcf	(4)	4.41E-3	1.93E-2
Lead	5.0E-04	lb/MMcf	(3)	1.23E-6	5.37E-6
Manganese	3.8E-04	lb/MMcf	(3)	9.31E-7	4.08E-6
Mercury	2.6E-04	lb/MMcf	(3)	6.37E-7	2.79E-6
Naphthalene	6.1E-04	lb/MMcf	(4)	1.50E-6	6.55E-6
Nickel	2.1E-03	lb/MMcf	(3)	5.15E-6	2.25E-5
PAH/POM	1.3E-03	lb/MMcf	(4)	3.16E-6	1.38E-5
Selenium	2.4E-05	lb/MMcf	(3)	5.88E-8	2.58E-7
Toluene	3.4E-03	lb/MMcf	(4)	8.33E-6	3.65E-5
Total HAP	**1.9E+00**	**lb/MMCF**		4.63E-3	2.03E-2
Greenhouse Gas Emissions					
CO_2	116.89	lb/MMBtu	(5)	2.92E+2	1.28E+3
CH_4	2.2E-03	lb/MMBtu	(5)	5.51E-3	2.41E-2
N_2O	0.0	lb/MMBtu	(5)	5.51E-4	2.41E-3
CO_2e[(b)]	-	-		292.5248	1281.2585

Calculations:

(a) Annual emissions (tons/yr) = [Annual Usage (MMBtu/yr or MMCF/yr)]x [Number of Identical Heaters] x [Emission Factor (lb/MMBtu or lb/MMCF)] / [2,000 lb/ton]

Number of Line Heaters= 1
Fuel Use (MMBtu/hr) = 2.5
Hours of Operation (hr/yr)= 8760
PTE Fuel Use (MMcf/yr) = 21.5 (7)

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

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

Notes:

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

Table 5. Low Pressure Separator (LPS-1) Rates and Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor			Emissions (lbs/hr)	Emissions (tons/yr)
Criteria Pollutants					
PM/PM10/PM2.5	7.6	lb/MMcf	(1)	0.00	0.02
SO_2	0.6	lb/MMcf	(1)	0.00	0.00
NOx	100	lb/MMcf	(2)	0.05	0.21
CO	84	lb/MMcf	(2)	0.04	0.18
VOC	5.5	lb/MMcf	(1)	0.00	0.01
Hazardous Air Pollutants					
Arsenic	2.0E-04	lb/MMcf	(3)	9.80E-8	4.29E-7
Benzene	2.1E-03	lb/MMcf	(4)	1.03E-6	4.51E-6
Beryllium	1.2E-05	lb/MMcf	(3)	5.88E-9	2.58E-8
Cadmium	1.1E-03	lb/MMcf	(3)	5.39E-7	2.36E-6
Chromium	1.4E-03	lb/MMcf	(3)	6.86E-7	3.01E-6
Cobalt	8.4E-05	lb/MMcf	(3)	4.12E-8	1.80E-7
Dichlorobenzene	1.2E-03	lb/MMcf	(4)	5.88E-7	2.58E-6
Formaldehyde	7.5E-02	lb/MMcf	(4)	3.68E-5	1.61E-4
Hexane	1.8E+00	lb/MMcf	(4)	8.82E-4	3.86E-3
Lead	5.0E-04	lb/MMcf	(3)	2.45E-7	1.07E-6
Manganese	3.8E-04	lb/MMcf	(3)	1.86E-7	8.16E-7
Mercury	2.6E-04	lb/MMcf	(3)	1.27E-7	5.58E-7
Naphthalene	6.1E-04	lb/MMcf	(4)	2.99E-7	1.31E-6
Nickel	2.1E-03	lb/MMcf	(3)	1.03E-6	4.51E-6
PAH/POM	1.3E-03	lb/MMcf	(4)	6.31E-7	2.77E-6
Selenium	2.4E-05	lb/MMcf	(3)	1.18E-8	5.15E-8
Toluene	3.4E-03	lb/MMcf	(4)	1.67E-6	7.30E-6
Total HAP	**1.9E+00**	**lb/MMCF**		9.26E-4	4.06E-3
Greenhouse Gas Emissions					
CO_2	116.89	lb/MMBtu	(5)	58.44	255.99
CH_4	2.2E-03	lb/MMBtu	(5)	1.10E-3	4.83E-3
N_2O	0.0	lb/MMBtu	(5)	1.10E-4	4.83E-4
CO_2e[(b)]	-	-		58.50	256.25

Calculations:

(a) Annual emissions (tons/yr) = [Annual Usage (MMBtu/yr or MMCF/yr)]x [Number of Identical Heaters] x [Emission Factor (lb/MMBtu or lb/MMCF)] / [2,000 lb/ton]

Number of Line Heaters= 1
Fuel Use (MMBtu/hr) = 0.5
Hours of Operation (hr/yr)= 8760
PTE Fuel Use (MMcf/yr) = 4.3 (7)

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

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

Notes:

(1) AP-42, Chapter 1.4, Table 1.4-2. Emission Factors For Criteria Pollutants and Greenhouse Gases From Natural Gas Combustion, July 1998.

(2) AP-42, Chapter 1.4, Table 1.4-1. Emission Factors For Nitrogen Oxides (Nox) and Carbon Monoxide(CO) From Natural Gas Combustion, July 1998.

(3) AP-42, Chapter 1.4, Table 1.4-4. Emission Factors For Metals From Natural Gas Combustion, July 1998.

(4) AP-42, Chapter 1.4, Table 1.4-3. Emission Factors for Speciated Organic Compounds from Natural Gas Combustion, July 1998.

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

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

(7) MMBtu to MMcf conversion factor is 1020. AP-42, Chapter 1.4

Table 6. Vapor Recovery Unit (VRU) Compressor Engine (CE-1) Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor			PTE (lb/hr)	PTE[(a)] (tons/yr)
Criteria Pollutants					
PM/PM10/PM2.5	4.83E-02	lb/MMBtu	(2)	0.030	0.129
SO_2	5.88E-04	lb/MMBtu	(1)	0.000	0.002
NOx	2.27	lb/MMBtu	(2)	1.389	6.085
CO	3.72	lb/MMBtu	(2)	2.277	9.972
VOC	0.03	lb/MMBtu	(2)	0.018	0.080
Hazardous Air Pollutants					
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	(1)	1.55E-05	6.78E-05
1,1,2-Trichloroethane	1.53E-05	lb/MMBtu	(1)	9.36E-06	4.10E-05
1,3-Butadiene	6.63E-04	lb/MMBtu	(1)	4.06E-04	1.78E-03
1,3-Dichloropropene	1.27E-05	lb/MMBtu	(1)	7.77E-06	3.40E-05
2-Methylnaphthalene	1.30E-05	lb/MMBtu	(1)	7.96E-06	3.48E-05
2,2,4-Trimethylpentane	6.63E-04	lb/MMBtu	(1)	4.06E-04	1.78E-03
Acetaldehyde	2.79E-03	lb/MMBtu	(1)	1.71E-03	7.48E-03
Acrolein	2.63E-03	lb/MMBtu	(1)	1.61E-03	7.05E-03
Benzene	1.58E-03	lb/MMBtu	(1)	9.67E-04	4.24E-03
Carbon Tetrachloride	1.77E-05	lb/MMBtu	(1)	1.08E-05	4.74E-05
Chlorobenzene	1.29E-05	lb/MMBtu	(1)	7.89E-06	3.46E-05
Chloroform	1.37E-05	lb/MMBtu	(1)	8.38E-06	3.67E-05
Ethylbenzene	2.48E-05	lb/MMBtu	(1)	1.52E-05	6.65E-05
Ethylene Dibromide	2.13E-05	lb/MMBtu	(1)	1.30E-05	5.71E-05
Formaldehyde	2.05E-02	lb/MMBtu	(1)	1.25E-02	5.50E-02
Methanol	3.06E-03	lb/MMBtu	(1)	1.87E-03	8.20E-03
Methylene Chloride	4.12E-05	lb/MMBtu	(1)	2.52E-05	1.10E-04
Naphthalene	9.71E-05	lb/MMBtu	(1)	5.94E-05	2.60E-04
PAH (POM)	1.41E-04	lb/MMBtu	(1)	8.63E-05	3.78E-04
Styrene	1.19E-05	lb/MMBtu	(1)	7.28E-06	3.19E-05
Toluene	5.58E-04	lb/MMBtu	(1)	3.41E-04	1.50E-03
Vinyl Chloride	7.18E-06	lb/MMBtu	(1)	4.39E-06	1.92E-05
Xylenes	1.95E-04	lb/MMBtu	(1)	1.19E-04	5.23E-04
Total HAP	**3.3E-02**	**lb/MMBtu**		**0.020**	**0.09**
Greenhouse Gas Emissions					
CO_2	116.98	lb/MMBtu	(3)	71.59	3.14E+02
CH_4	2.2E-03	lb/MMBtu	(3)	1.35E-03	5.91E-03
N_2O	2.2E-04	lb/MMBtu	(3)	1.35E-04	5.91E-04
CO_2e[(b)]	-	-		71.59	313.90

Calculations:

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

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

Engine Power Output (kW) =	50.7	
Engine Power Output (hp) =	68.0	
Number of engines Operating at a Time =	1	
Fuel Throughput (cf/hr) =	600.0	
BSFC (Btu/hp-hr) =	9,000	(2)
Heat Content Natural Gas(Btu/scf) =	1,020.0	(4)
PTE Hours of Operation =	8,760	

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

CO_2	1	(5)
CH_4	25	(5)
N_2O	298	(5)

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) Emission factors from Estimated Exhaust Emissions Arrow VRG330 spec sheet
(3) Emission factors are from 40 CFR 98, Subpart C, C-2.
(4) Default natural gas heat value
(5) Global Warming Potentials obtained from 40 CFR 98, Subpart A, Table A-1

Table 7. Caterpillar G3508BLE Flash Gas Compressor Engine (CE-2) Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor		PTE (lb/hr)	PTE[(a)] (tons/yr)
Criteria Pollutants				
PM/PM10/PM2.5	7.71E-05 lb/MMBtu	(2)	0.000	0.002
SO_2	5.88E-04 lb/MMBtu	(2)	0.003	0.015
NOx	0.50 g/hp-hr	(1)	0.761	3.331
CO	2.00 g/hp-hr	(1)	3.042	13.325
VOC	0.70 g/hp-hr	(1)	1.065	4.664
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	4.00E-05 lb/MMBtu	(2)	2.30E-04	1.01E-03
1,1,2-Trichloroethane	3.18E-05 lb/MMBtu	(2)	1.83E-04	8.01E-04
1,3-Butadiene	2.67E-04 lb/MMBtu	(2)	1.54E-03	6.72E-03
1,3-Dichloropropene	1.27E-05 lb/MMBtu	(2)	7.30E-05	3.20E-04
2-Methylnaphthalene	3.32E-05 lb/MMBtu	(2)	1.91E-04	8.36E-04
2,2,4-Trimethylpentane	2.50E-04 lb/MMBtu	(2)	1.44E-03	6.30E-03
Acetaldehyde	8.36E-03 lb/MMBtu	(2)	4.81E-02	2.11E-01
Acrolein	5.14E-03 lb/MMBtu	(2)	2.96E-02	1.29E-01
Benzene	4.40E-04 lb/MMBtu	(2)	2.53E-03	1.11E-02
Carbon Tetrachloride	3.67E-04 lb/MMBtu	(2)	2.11E-03	9.24E-03
Chlorobenzene	3.04E-05 lb/MMBtu	(2)	1.75E-04	7.66E-04
Chloroform	2.85E-05 lb/MMBtu	(2)	1.64E-04	7.18E-04
Ethylbenzene	3.97E-05 lb/MMBtu	(2)	2.28E-04	1.00E-03
Ethylene Dibromide	4.43E-05 lb/MMBtu	(2)	2.55E-04	1.12E-03
Formaldehyde	2.80E-01 g/hp-hr	(1)	0.426	1.866
Methanol	2.50E-03 lb/MMBtu	(2)	1.44E-02	6.30E-02
Methylene Chloride	2.00E-05 lb/MMBtu	(2)	1.15E-04	5.04E-04
n-Hexane	1.11E-03 lb/MMBtu	(2)	6.38E-03	2.80E-02
Naphthalene	7.44E-05 lb/MMBtu	(2)	4.28E-04	1.87E-03
PAH (POM)	2.69E-05 lb/MMBtu	(2)	1.55E-04	6.77E-04
Styrene	2.36E-05 lb/MMBtu	(2)	1.36E-04	5.94E-04
Toluene	4.08E-04 lb/MMBtu	(2)	2.35E-03	1.03E-02
Vinyl Chloride	1.49E-05 lb/MMBtu	(2)	8.57E-05	3.75E-04
Xylenes	1.84E-04 lb/MMBtu	(2)	1.06E-03	4.63E-03
Total HAP	**3.0E-01 lb/MMBtu**		**0.538**	**2.36**
Greenhouse Gas Emissions				
CO_2	501.00 g/hp-hr	(1)	762.1	3338.0
CH_4	2.68 g/hp-hr	(1)	4.1	17.9
N_2O	2.2E-04 lb/MMBtu	(3)	1.27E-03	5.55E-03
CO_2e[(b)]	- -		766.2	3786.1

Calculations:

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

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

Engine Power Output (kW) =	514	
Engine Power Output (hp) =	690	
Number of engines Operating at a Time =	1	
Fuel throughput=	4,910	
BSFC (Btu/hp-hr) =	8,332	(1)
Heat Content Natural Gas(Btu/scf) =	1,171.0	(4)
PTE Hours of Operation =	8,760	

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

CO_2	1	(5)
CH_4	25	(5)
N_2O	298	(5)

Notes:

(1) USA Compression G3508TALE Specification Sheet

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

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

(4) CNX Oxford 1-12-15 gas analysis

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

Table 8. Thermoelectric Generator Emissions (TG-1 & TG-2) Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor (lb/MMscf)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMscf/ 1000000scf)	Emissions (lbs/hr)	Emissions (ton/yr)	Emissions x2 (lbs/hr)	Emissions x2 (ton/yr)
CO	40	13	1,000	(1/1,000,000)	0.0005	0.0023	0.0010	0.0046
NOx	94	13	1,000	(1/1,000,000)	0.0012	0.0054	0.0024	0.0107

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\,factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\,heat\,value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\,Btu} \times \frac{8760\,hrs}{1\,yr} \times \frac{1\,ton}{2{,}000\,lbs}$$

Emission Factor = AP-42 Table 1.5-1 emission factor for specific pollutant
Volume = 13 scf/hr (from Model 1120 Thermoelectric Generators spec sheeet
Gas Heat Value = 1000 Btu/scf

Table 9. Vapor Destruction Unit (VDU-1) Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.37	8,333	2,200	(1/1,000,000)	6.78	29.71
NOx	0.07	8,333	2,200	(1/1,000,000)	1.25	5.46
VOC	0.14	8,333	2,200	(1/1,000,000)	2.57	11.24
CO2e	116.89	8,333	2,200	(1/1,000,000)	2142.90	9385.89

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\ factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\ heat\ value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\ Btu} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

Emission Factor = AP-42 Table 13.1 emission factor for specific pollutant
Volume = 8333 scf/hr 199,992 scf/d
Hours of operation calculated at 8760
Gas Heat Value = 2200 Btu/scf

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	8,333	15.26	0.0002423	64.00	1/379.4	0.3406	1.4920

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = Volume\left(\frac{scf}{hr}\right) \times mol\ fraction\left(\frac{H2S}{100\ scf} \times 0.00001588\right) \times molecular\ weight \times \frac{lb \cdot mol}{scf} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

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

H2S conversion taken from supporting Sulfur Measurement Handbook
grain H2S/100 scf = 15.26
Volume = 8333 scf/hr
Hours of operation calculated at 8760
1 lb mol = 379.4 cubic feet

For Pilot Light

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.37	49	1,020	(1/1,000,000)	0.0185	0.0810
NOx	0.07	49	1,020	(1/1,000,000)	0.0034	0.0149
VOC	0.14	49	1,020	(1/1,000,000)	0.0070	0.0306

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\ factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\ heat\ value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\ Btu} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

Emission Factor = AP-42 Table 13.1 emission factor for specific pollutant
Gas Heat Value = 1300 Btu/scf

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	49.00	15.26	0.0002423	64.00	1/379.4	0.0020	0.0088

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = Volume\left(\frac{scf}{hr}\right) \times mol\ fraction\left(\frac{H2S}{100\ scf} \times 0.00001588\right) \times molecular\ weight \times \frac{lb \cdot mol}{scf} \times \frac{8760\ hrs}{1\ yr} \times \frac{1\ ton}{2{,}000\ lbs}$$

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

H2S conversion taken from supporting Sulfur Measurement Handbook
grain H2S/100 scf = 15.26

1 lb mol = 379.4 cubic feet

The VOC totals in the following table take into account emissions from all tanks, tank truck loading, and the pilot light

VDU and Pilot Combined		
Pollutant	lb/hr	ton/yr
CO	**6.802**	**29.791**
NOx	**1.250**	**5.475**
VOC	**3.606**	**11.854**
SO_2	**0.343**	**1.501**

Note: VOC totals were calculated using Promax uncontrolled
lb/hr VOCs reduced by 98 % DRE as if the VRU compressor is not used
The annual tons/yr is calculated using 75% of the maximum
hourly rate to account for production decline during first year
This estimate replaces that of AP-42 at 11.24 tpy VOCs

Table 10. Flare (Flare-1) Emissions
CNX Gas LLC - Oxford 13

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.37	125,000	2,000	(1/1,000,000)	92.50	46.25
NOx	0.07	125,000	2,000	(1/1,000,000)	17.00	8.50
VOC	0.14	125,000	2,000	(1/1,000,000)	181.69	68.14
CO2	116.89	125,000	2,000	(1/1,000,000)	29222.50	14611.25

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\,factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\,heat\,value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\,Btu} \times \frac{1000\,hrs}{1\,yr} \times \frac{1\,ton}{2{,}000\,lbs}$$

Emission Factor = AP-42 Table 13.1 emission factor for specific pollutant
98% DRE for VOCs from Promax predicted untonrolled emissions
Hours of operation calculated at 11.4% of 8760 = 1000 hrs/yr
Gas Heat Value = 2200 Btu/scf

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	125,000	15.26	0.0002423	64.00	1/379.4	5.1097	2.5549

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = Volume\left(\frac{scf}{hr}\right) \times mol\,fraction\left(\frac{H2S}{100\,scf} \times 0.00001588\right) \times molecular weight \times \frac{lb \cdot mol}{scf} \times \frac{1000\,hrs}{1\,yr} \times \frac{1\,ton}{2{,}000\,lbs}$$

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

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

For Pilot Light

Pollutant	Emission Factor (lb/MMBtu)	Volume (scf/hr)	Gas Heat Value (Btu/scf)	(MMBtu/ 1000000Btu)	Emissions (lbs/hr)	Emissions (ton/yr)
CO	0.37	13.5	1,300	(1/1,000,000)	0.0065	0.0284
NOx	0.07	13.5	1,300	(1/1,000,000)	0.0012	0.0052
VOC	0.14	13.5	1,300	(1/1,000,000)	0.0025	0.0108

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = emission\,factor\left(\frac{lb}{MMBtu}\right) \times Volume\left(\frac{scf}{hr}\right) \times gas\,heat\,value\left(\frac{Btu}{scf}\right) \times \frac{MMBtu}{1{,}000{,}000\,Btu} \times \frac{1000\,hrs}{1\,yr} \times \frac{1\,ton}{2{,}000\,lbs}$$

Emission Factor = AP-42 Table 13.1 emission factor for specific pollutant
Gas Heat Value = 1300 Btu/scf

Pollutant	Volume (scf/hr)	grain H2S/ 100 scf	Mol Fraction	Mol weight (g/mol)	(lb-mol /scf)	Emissions (lbs/hr)	Emissions (ton/yr)
SO2	13.5	15.26	0.0002423	64.00	1/379.4	0.0006	0.0024

Example Formula:

$$emissions\left(\frac{ton}{yr}\right) = Volume\left(\frac{scf}{hr}\right) \times mol\,fraction\left(\frac{H2S}{100\,scf} \times 0.00001588\right) \times molecular weight \times \frac{lb \cdot mol}{scf} \times \frac{1000\,hrs}{1\,yr} \times \frac{1\,ton}{2{,}000\,lbs}$$

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

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

Flare and Pilot Combined		
Pollutant	lb/hr	ton/yr
CO	92.51	46.28
NOx	17.00	8.51
VOC	181.70	68.15
SO_2	5.11	2.56

Promax LPS Stream to Compressor		
Components	lb/hr	lb/hr VOC
Methane	3844.61	
Ethane	3812.48	
Propane	3244.32	3244.32
i-Butane	803.307	803.307
n-Butane	1778.63	1778.63
i-Pentane	707.202	707.202
n-Pentane	731.52	731.52
Nitrogen	19.6923	
Carbon Dioxide	49.0213	
Oxygen	0.41567	
Hexane	1253.97	1253.97
Isohexane	162.547	162.547
Neohexane	0	0
2,2,4-Trimethylpentane	0.576851	0.576851
Benzene	9.80566	9.80566
Heptane	221.584	221.584
Toluene	15.4034	15.4034
Octane	122.553	122.553
Ethylbenzene	1.03681	1.03681
o-Xylene	1.24255	1.24255
Nonane	28.7497	28.7497
Decane	2.25927	2.25927
Water	1.98138	
Uncontrolled	lb/hr	9084.707
Controlled	lb/hr	181.6941
	ton/yr	68.1353

Table 11. Truck Loading (TL) VOC Emissions
CNX Gas LLC - Oxford 13

Contents	Volume Transferred	Loading Loss [(a)] (lb VOC/1000gal)	PTE VOC Emissions (lb/hr)	PTE VOC Emissions (ton/yr) [(b)]	VOC Emissions 70% Controlled, cond only (lb/hr)	VOC Emissions 70% Controlled, cond only (ton/yr)
Water	42,310,800 gal/yr	0.090	0.436	1.431	0.436	1.431
Condensate	17,629,500 gal/yr	6.137	12.350	40.571	3.705	12.171
Total			**12.786**	**42.002**	**4.141**	**13.602**

Calculations:

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

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

	Water	Condensate	
Saturation factor	0.60	0.60	Note [(1)]
Condensate Pvap (psia)	0.33	9.88	Note [(2)]
Molecular Weight (lb/lb-mol)	19.00	43.63	Note [(2)]
Bulk Liquid Tempurature (F)	65.08	65.08	Note [(2)]

Notes:

(1) AP-42 Section 5.2

(2) ProMax Oxford 13 - 1150 BBLs of condensate per day

(3) Annual rates based on 75% of daily max

Table 12. Fugitive Leak Emissions
CNX Gas LLC - Oxford 13

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

Pollutant	Emission Factor			PTE[(a) Gas Service] (tons/yr)
Valves	9.9E-03	lb/hr/source	(1)	43.45
Low Bleed Pneumatic Valves	9.9E-03	lb/hr/source	(1)	8.69
Flanges	8.6E-04	lb/hr/source	(1)	15.07
Connectors	4.4E-04	lb/hr/source	(1)	7.73
Other Points in Gas Service	1.9E-02	lb/hr/source	(1)	37.46
Total Gas Released	-	-		112.39
Total VOC Released (gas service)			(b)	**24.73**
Calculations:		**Total CO2e**	(c)	352.34

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

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

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

Number of Components in Gas Service

Valves=	1,000	(2)
Low Bleed Pneumatic Valves=	200	(2)
Connectors=	4,000	(2)
Other Points in Gas Service =	200	(2)
Maximum Hour of Operation =	8,760	

Pollutant	Emission Factor			PTE[(a) Light Liquid Service] (tons/yr)
Valves	5.5E-03	lb/hr/source	(1)	4.83
Pump Seals in Light Liq Service	2.8E-02	lb/hr/source	(1)	0.49
Flanges	2.4E-04	lb/hr/source	(1)	0.40
Connector	4.6E-04	lb/hr/source	(1)	0.75
Other Points in Light Liq Service	1.7E-02	lb/hr/source	(1)	1.19
Total VOC Release Light Liq Service			(b)	**7.66**

Calculations:

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

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

Number of Components in Light Liquid Service

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

Notes:

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

(2) Site specific estimate from equipment count

USA COMPRESSION

USA Compression Unit 1600 Caterpillar G3508BLE Engine Emissions

Date of Manufacture	**February 12, 2013**	Engine Serial Number	**RBK01337**	Date Modified/Reconstructed	Not Any
Driver Rated HP	690	Rated Speed in RPM	1400	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	8	Compression Ratio	8:1	Combustion Setting	Ultra Lean Burn
Displacement, in^3	2115	Fuel Delivery Method	Carburetor	Combustion Air Treatment	T.C./Aftercooled

Raw Engine Emissions (Customer Suppplied Fuel Gas with little to no H2S)

Fuel Consumption *7561 LHV BTU/bhp-hr or 8332 HHV BTU/bhp-hr*
Altitude *1200 ft*
Maximum Air Inlet Temp *90 F*

	g/bhp-hr [1]	lb/MMBTU [2]	lb/hr	TPY
Nitrogen Oxides (NOx)	0.5		0.76	3.33
Carbon Monoxide (CO)	3.03		4.61	20.19
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	1.09		1.66	7.26
Formaldehyde (CH2O)	0.28		0.43	1.87
Particulate Matter (PM) Filterable+Condensable		9.99E-03	5.74E-02	2.51E-01
Sulfur Dioxide (SO2)		5.88E-04	3.38E-03	1.48E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	501	762	3028
Methane (CH4)	2.68	4.08	16.20

[1] g/bhp-hr are based on Caterpillar Specifications (GERP) with customer supplied fuel gas, 1200 ft elevation, and 90 F Max Air Inlet Temperature.
Note that g/bhp-hr values are based on 100% Load Operation.
It is recommended to add a safety margin to CO, VOC and other organic compounds to allow for operational flexibility and variability to fuel gas composition.
[2] Emission Factor obtained from EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines, Table 3.2-2).

Catalytic Converter Emissions

Catalytic Converter Make amd Model: *DCL, DC64L2*
Element Type: *Oxidation*
Number of Elements in Housing: *2*
Air/Fuel Ratio Control *Caterpillar ADEM3, NOx Feedback*

	% Reduction	**lb/hr**	**TPY**
Nitrogen Oxides (NOx)	0	**0.76**	**3.33**
Carbon Monoxide (CO)	34	**3.04**	**13.32**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	36	**1.06**	**4.65**
Formaldehyde (CH2O)	0	**0.43**	**1.87**
Particulate Matter (PM)	0	**5.74E-02**	**2.51E-01**
Sulfur Dioxide (SO2)	0	**3.38E-03**	**1.48E-02**

	% Reduction	**lb/hr**	**Metric Tonne/yr**
Carbon Dioxide (CO2)	0	**762**	**3028**
Methane (CH4)	0	**4.08**	**16.20**

DCL America Inc.

1610 Woodstead Ct, Suite 245, The Woodlands, Texas 77380 USA
Tel: 877-965-8989 *Fax:* 281-605-5858 info@dcl-inc.com www.dcl-inc.com

GLOBAL LEADER IN EMISSION CONTROL SOLUTIONS

To:	Chris Magee	**Phone:**	814-746-6942
Company:	USA Compression	**Email**	CMagee@usacompression.com
Date:	April 27th, 2015	**No. Pages:**	1

Dear Chris,

We hereby guarantee that our Model DC64L2 specified below with one (2) elements installed as described below, and sized for the following engine:

Engine Data	
Engine Model	Caterpillar G3508B
Power	690HP
Fuel	PQNG
Exhaust Flow Rate	4460 acfm
Exhaust Temperature	981°F

Catalyst Data	
Catalyst Model	DC64L2
Type	Oxidation- A
# of Elements	1
Cell Density	300 cpsi
Approx Dimensions	See attached drawing
Approx Pressure Drop	2.4" w.c

will perform as follows:

Exhaust Component	Engine Output g/bhp-hr	Converter Output g/bhp-hr
CO	3.03	2
VOC	1.09	0.7

for a period of 1 year or 8000 hours, whichever comes first, subject to all terms and conditions contained in the attached warranty document being respected and met.

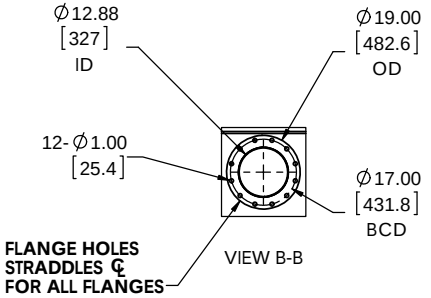
Best Regards,

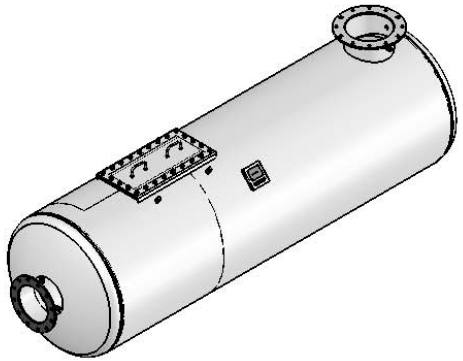
On behalf of DCL America Inc.

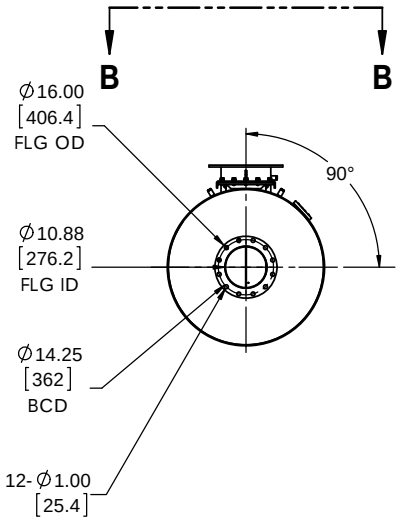
Lisa Barber

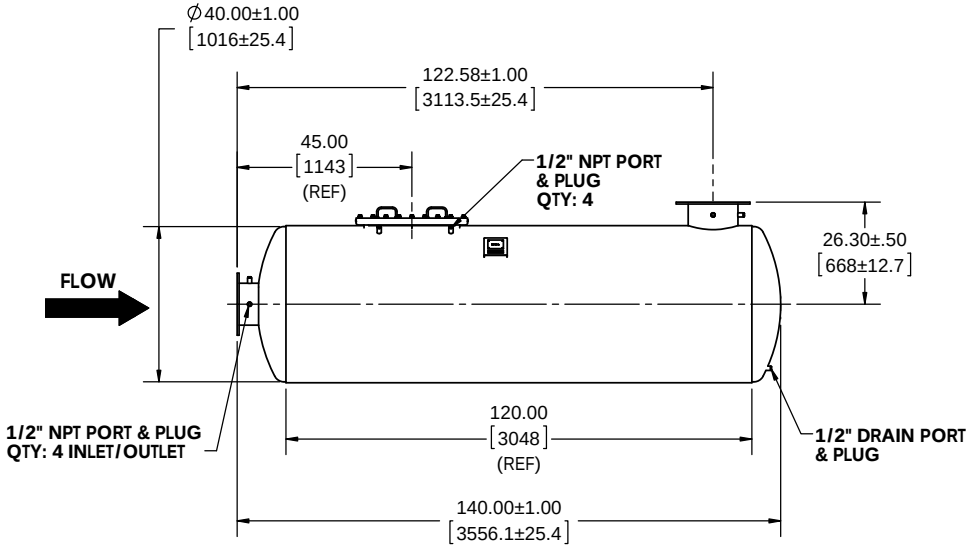
416-788-8021
lbarber@dcl-inc.com

DCL INTERNATIONAL RESERVES THE RIGHT TO REVISE THE INTERNAL DESIGN WITHOUT NOTICE









ENGINE HP	690 HP
FUEL	NATURAL GAS
EXHAUST FLOW RATE	3479 kg/hr @ 450 °C
BACK PRESSURE	7.3" W.C APPROX
SOUND GRADE	HOSPITAL + GR (42-50 dBA)
MATERIAL	CARBON STEEL
SURFACE FINISH	HEAT RESISTANT BLACK PAINT
OTHER STRUCTURAL REQUIREMENTS	TBD
APPROX. TOTAL WEIGHT	2240 LBS

EO-8038
EO-7936

NO	REVISION	DRAWN BY	YY/MM/DD	CHK'D BY
A	REMOVED SADDLE, OUTLET 12", 7.3" W.C WAS 8.7" W.C	JS	13/04/15	
0	INITIAL RELEASE	JS	13/03/13	

DCL International Inc.

UNLESS OTHERWISE NOTED
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS ARE IN INCHES
3. [ ] DIMENSIONS ARE IN MILLIMETERS
TOLERANCES
.X ±.2 [-] ±5
.XX ±.10 [.X] ±2.5
.XXX ±.060 [.XX] ±1.50
ANGULAR TOLERANCE ±2°
THIRD ANGLE PROJECTION

TITLE: DC64-10/12 SUPER HOSPITAL GR CATALYTIC SILENCER, Q6			ORIG. P/N:
APPLICATION:			ENGINE:
DATE: 13/03/13	DRAWN BY: JS	CHECKED BY:	PART NO. N/A
PAPER SIZE:	SCALE:		FILE NAME: C2H3-01S-4X64-X1

G3508B

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
CNX Oxford 13_4-27-15

CATERPILLAR®

ENGINE SPEED (rpm):	1400	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	8:1	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	CAT WIDE RANGE WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 2 INLET (°F):	130		
AFTERCOOLER - STAGE 1 INLET (°F):	201	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	203	FUEL:	CNX Oxford 13 4-21-15
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig):	7.0-40.0
COOLING SYSTEM:	JW+OC+1AC, 2AC	FUEL METHANE NUMBER:	52.0
CONTROL SYSTEM:	ADEM3	FUEL LHV (Btu/scf):	1171
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	1200
COMBUSTION:	LOW EMISSION	MAXIMUM INLET AIR TEMPERATURE(°F):	90
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5	STANDARD RATED POWER:	690 bhp@1400rpm
SET POINT TIMING:	27		

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(1)	bhp	690	690	517	345
INLET AIR TEMPERATURE			°F	90	90	90	90
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(2)	Btu/bhp-hr	7561	7561	8025	8726
FUEL CONSUMPTION (HHV)		(2)	Btu/bhp-hr	8332	8332	8844	9617
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(3)(4)	ft3/min	1584	1585	1230	855
AIR FLOW	(WET)	(3)(4)	lb/hr	6862	6862	5327	3703
FUEL FLOW (60ºF, 14.7 psia)			scfm	74	74	59	43
INLET MANIFOLD PRESSURE		(5)	in Hg(abs)	92.0	92.0	74.4	52.2
EXHAUST TEMPERATURE - ENGINE OUTLET		(6)	°F	981	981	979	1051
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(7)(4)	ft3/min	4460	4460	3462	2533
EXHAUST GAS MASS FLOW	(WET)	(7)(4)	lb/hr	7112	7112	5526	3847
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(8)(9)	g/bhp-hr	0.50	0.50	0.50	0.50
CO		(8)(9)	g/bhp-hr	3.03	3.03	3.23	3.19
THC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	4.81	4.81	5.08	4.90
NMHC (mol. wt. of 15.84)		(8)(9)	g/bhp-hr	2.13	2.13	2.26	2.17
NMNEHC (VOCs) (mol. wt. of 15.84)		(8)(9)(10)	g/bhp-hr	1.09	1.09	1.15	1.11
HCHO (Formaldehyde)		(8)(9)	g/bhp-hr	0.28	0.28	0.31	0.32
CO2		(8)(9)	g/bhp-hr	501	501	530	574
EXHAUST OXYGEN		(8)(11)	% DRY	9.4	9.4	9.1	8.6
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(12)	Btu/min	13070	13070	11073	9625
HEAT REJ. TO ATMOSPHERE		(12)	Btu/min	3498	3498	2915	2332
HEAT REJ. TO LUBE OIL (OC)		(12)	Btu/min	2650	2650	2405	2103
HEAT REJ. TO A/C - STAGE 1 (1AC)		(12)(13)	Btu/min	4896	4896	4184	1416
HEAT REJ. TO A/C - STAGE 2 (2AC)		(12)(13)	Btu/min	3005	3005	2846	1764

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(13)(14)	Btu/min	22698
TOTAL AFTERCOOLER CIRCUIT (2AC)	(13)(14)	Btu/min	3156
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

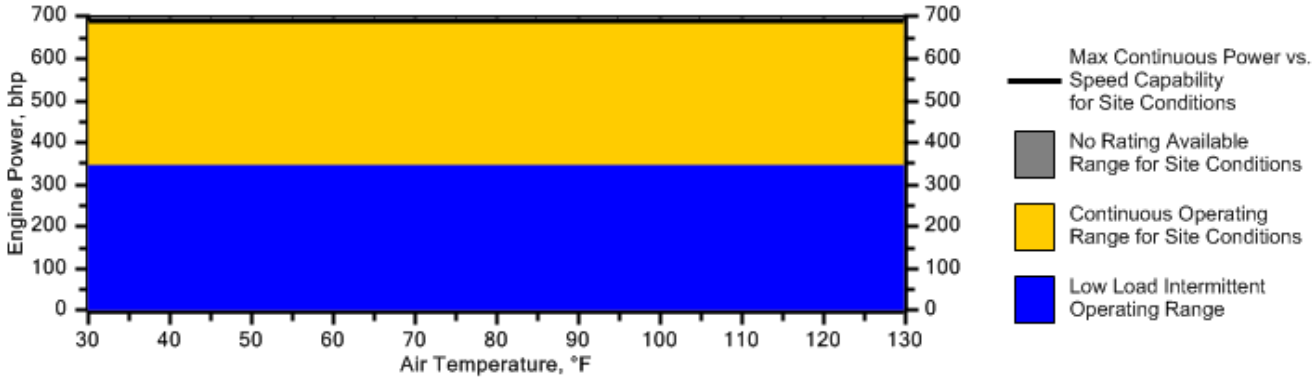
CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

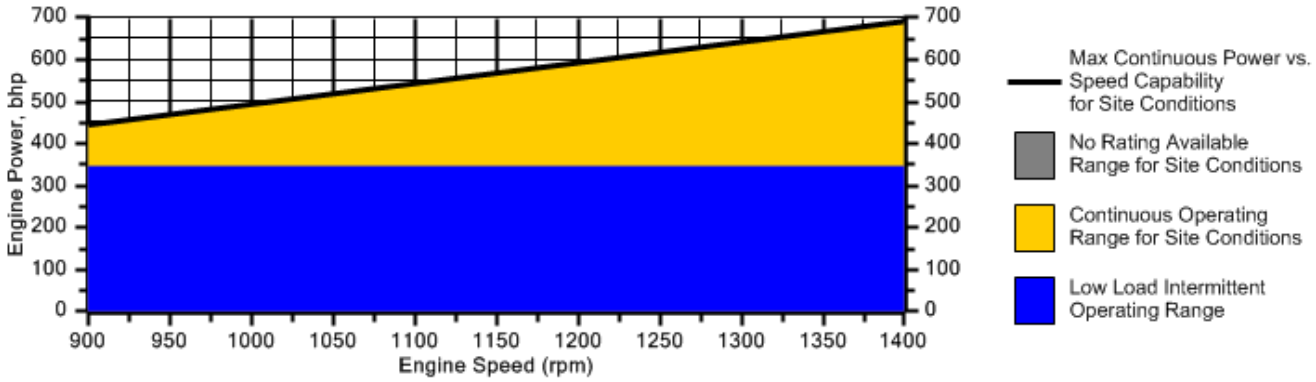
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1200 ft and 1400 rpm



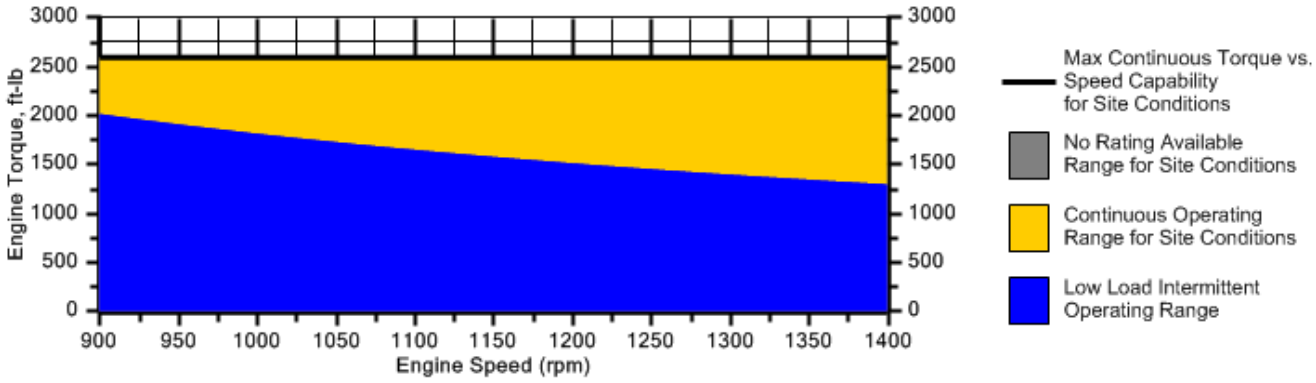
Engine Power vs. Engine Speed

Data represents speed sweep at 1200 ft and 90 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 1200 ft and 90 °F



Note: At site conditions of 1200 ft and 90°F inlet air temp., constant torque can be maintained down to 900 rpm. The minimum speed for loading at these conditions is 900 rpm.

NOTES

1. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

2. Fuel consumption tolerance is ± 3.0% of full load data.

3. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

4. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

5. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

6. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

7. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

8. Emissions data is at engine exhaust flange prior to any after treatment.

9. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

10. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

11. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

12. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

13. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

14. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	76.0977	76.0978
Ethane	C2H6	14.9153	14.9153
Propane	C3H8	4.8556	4.8556
Isobutane	iso-C4H1O	0.6609	0.6609
Norbutane	nor-C4H1O	1.3067	1.3067
Isopentane	iso-C5H12	0.3557	0.3557
Norpentane	nor-C5H12	0.3555	0.3555
Hexane	C6H14	0.8148	0.8148
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.4433	0.4433
Carbon Dioxide	CO2	0.1889	0.1889
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0055	0.0055
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		99.9999	100.0000

Fuel Makeup:	CNX Oxford 13 4-21-15
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	52.0
Lower Heating Value (Btu/scf):	1171
Higher Heating Value (Btu/scf):	1291
WOBBE Index (Btu/scf):	1363
THC: Free Inert Ratio:	162.49
Total % Inerts (% N2, CO2, He):	0.63%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.996
Stoich A/F Ratio (Vol/Vol):	12.14
Stoich A/F Ratio (Mass/Mass):	16.43
Specific Gravity (Relative to Air):	0.739
Specific Heat Constant (K):	1.278

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

MSES consultants, inc.

CMSES consultants, inc. CORROSION PRODUCTS DIVISION

Gas Corrosion Analysis

Consol Energy

PO Drawer 190 - Clarksburg, WV 26302-0190
Telephone: 304.624.9700 - Fax: 304.622.0981
Website: www.msesinc.com/analysis

Analysis No:	1
Analysis Date:	7/10/2014
MSES Project No.:	14-043

SAMPLE COLLECTION INFORMATION

Client:	Consol Energy	Sample Date:	7/9/2014
Sample Location:	Oxford	Sample Time:	9:50 PM
Sample Collection Source:	Inlet	Collected By:	MFM
MSES Sample Number:	N/A	Sample Pressure:	250.0
Date Received at Lab:	7/9/2014	Sample Temp. (°F):	N/A
Collection Remark:	None	Sample Container Type:	Cylinder
		MSES/CPD ID#	115
		Client ID #:	N/A

ANALYSIS REPORT

COMPONENTS	UNITS	ANALYTICAL METHODS	RESULTS
H_2S HYDROGEN SULFIDE	PPMV	ASDTM D5504-08	<0.1
O_2 OXYGEN	Mole %	GPA 2261-00	0.0055
CO_2 CARBON DIOXIDE	Mole %	GPA 2261-00	0.1889

ANALYTICAL METHODS AND VALUES

(1) Fractional analysis and reporting performed following procedures outlined in GPA 2261-00: Analysis for Natural Gas and Similar Gaseous Mixtures By Gas Chromatography

(2) Physical properties and values used in calculations were acquired from GPA 2145-09: Table of Physical properties for Hydrocarbons and Other Compounds of Interest to the Natural Gas Industry

(3) Sulfur Compounds Analysis and Reporting Performed by Gas Chromatography using a Sulfur Chemiluminescence Detector Following Procedures Outlined by ASTM Method D5504-08

MSES consultants, inc.

MSES consultants, inc. CORROSION PRODUCTS DIVISION

Fractional Analysis

Consol Energy

PO Drawer 190 - Clarksburg, WV 26302-0190
Telephone: 304.624.9700 - Fax: 304.622.0981
Website: www.msesinc.com/analysis

Analysis No:	1
Analysis Date:	7/10/2014
MSES Project No.:	14-043

SAMPLE COLLECTION INFORMATION

Client:	Consol Energy	Sample Date:	7/9/2014
Sample Location:	Oxford	Sample Time:	9:50 AM
Sample Collection Source:	Inlet	Collected By:	MFM
MSES Sample Number:	CE-1-7-9-14	Sample Pressure:	250.0
Date Received at Lab:	7/9/2014	Sample Temp. (°F):	N/A
Collection Remark:	N/A	Sample Container Type:	Cylinder
		MSES/CPD ID#	115
		Client ID #:	N/A

ANALYSIS REPORT

FRACTIONAL ANALYSIS			ANALYTICAL RESULTS AT BASE CONDITIONS (CALCULATED VALUES)	
COMPONENTS	MOLE PERCENT	GPM		
METHANE	76.0977		BTU/SCF (DRY):	1294.07
ETHANE	14.9153	3.98	BTU/SCF (SATURATED):	1272.03
PROPANE	4.8556	1.33	PRESSURE (PSIA):	14.696
I-BUTANE	0.6609	0.22	TEMPERATURE (°F)	60.00
N-BUTANE	1.3067	0.41	Z FACTOR (DRY):	0.9962
I-PENTANE	0.3557	0.13	Z FACTOR (SATURATED):	0.9958
N-PENTANE	0.3555	0.13	ETHANE + GPM	6.5778
NITROGEN	0.4433		SPECIFIC GRAVITIES (CALCULATED VALUES)	
CARBON DIOXIDE	0.1889			
OXYGEN	0.0055		IDEAL GRAVITY	0.7409
HEXANES (PLUS)	0.8148	0.35	REAL GRAVITY	0.7435
TOTAL	100.0000			

COMMENTS

ANALYTICAL METHODS AND VALUES

(1) Fractional analysis and reporting performed following procedures outlined in GPA 2261-00: Analysis for Natural Gas and Similar Gaseous Mixtures By Gas Chromatography

(2) Physical properties and values used in calculations were acquired from GPA 2145-09: Table of Physical properties for Hydrocarbons and Other Compounds of Interest to the Natural Gas Industry

MSES consultants, inc.
CORROSION PRODUCTS DIVISION

PO Drawer 190 - Clarksburg, WV 26302-0190
Telephone: 304.624.9700 - Fax: 304.622.0981
Website: www.msesinc.com/analysis

Extended Gas Analysis
Consol Energy

Analysis No:	1
Analysis Date:	7/10/2014
MSES Project No.:	14-043

SAMPLE COLLECTION INFORMATION

Client:	Consol Energy	Sample Date:	7/9/2014
Sample Location:	Oxford	Sample Time:	9:50 AM
Sample Collection Source:	Inlet	Collected By:	MFM
MSES Sample Number:	CE-1-7-9-14	Sample Pressure:	250.0
Date Received at Lab:	7/9/2014	Sample Temp. (°F):	N/A
Collection Remark:	N/A	Sample Container Type:	Cylinder
		MSES/CPD ID#	MSES 115
		Client ID #:	N/A

ANALYSIS REPORT

COMPONENTS	UNITS	ANALYTICAL METHODS	RESULTS
C_5H_{10} CYCLOPENTANE	Mole %	GPA 2186	0.0021
C_6H_{12} CYCLOHEXANE	Mole %	GPA 2186	<0.0001
C_6H_{14} n-HEXANE	Mole %	GPA 2186	0.1478
C_6H_{14} 2 METHYLPENTANE (isohexane)	Mole %	GPA 2186	0.1034
C_6H_{14} 3 METHYLPENTANE	Mole %	GPA 2186	0.0657
C_6H_{14} 2,2 DIMETHYLBUTANE (neohexane)	Mole %	GPA 2186	0.0107
C_6H_{14} 2,3 DIMETHYLBUTANE	Mole %	GPA 2186	0.0200
C_7H_{14} METHYLCYCLOHEXANE	Mole %	GPA 2186	0.0187
C_7H_{16} n-HEPTANE	Mole %	GPA 2186	0.0999
C_8H_{18} n-OCTANE	Mole %	GPA 2186	0.0951
C_8H_{18} 2,2,4 TRIMETHYLPENTANE (isooctane)	Mole %	GPA 2186	0.0011
C_9H_{20} n-NONANE	Mole %	GPA 2186	0.0060
$C_{10}H_{22}$ n-DECANE	Mole %	GPA 2186	0.0029
$C_{11}H_{24}$ UNDECANE	Mole %	GPA 2186	0.0012
$C_{12}H_{26}$ DODECANE	Mole %	GPA 2186	<0.0001
$C_{13}H_{28}$ TRIDECANE	Mole %	GPA 2186	<0.0001
$C_{14}H_{30}$ TETRADECANE	Mole %	GPA 2186	<0.0001

ANALYTICAL METHODS AND VALUES

Gas Chromatography Analysis was performed following procedures outlined in GPA 2186-02

MSES consultants, inc.
CMSES consultants, inc. CORROSION PRODUCTS DIVISION

PO Drawer 190 - Clarksburg, WV 26302-0190
Telephone: 304.624.9700 - Fax: 304.622.0981
Website: www.msesinc.com/analysis

Aromatic Hydrocarbon Analysis

Consol Energy

Analysis No:	1
Analysis Date:	7/9/2014
MSES Project No.:	14-043

SAMPLE COLLECTION INFORMATION

Client:	Consol Energy	Sample Date:	7/9/2014
Sample Location:	Oxford	Sample Time:	9:50 AM
Sample Collection Source:	Inlet	Collected By:	MFM
MSES Sample Number:	N/A	Sample Pressure:	250.0
Date Received at Lab:	7/9/2014	Sample Temp. (°F):	N/A
Collection Remark:	None	Sample Container Type:	Cylinder
		MSES/CPD ID#	115
		Client ID #:	N/A

ANALYSIS REPORT

COMPONENTS	UNITS	ANALYTICAL METHODS	RESULTS
C_6H_6 BENZENE	ppmV	GPA 2286-95	<0.1
C_7H_8 TOLUENE	ppmV	GPA 2286-95	6.0
C_8H_{10} ETHYLBENZENE	ppmV	GPA 2286-95	<0.1
C_8H_{10} XYLENE	ppmV	GPA 2286-95	1.9

ANALYTICAL METHODS AND VALUES

(1) Gas chromatography analysis was performed and results calculated following procedures outlined in GPA 2286-95: Tentative Method of Extended Analysis for Natural Gas and Similar Gaseous Mixtures by Temperature Programmed Gas Chromatography

(2) Gas sampling was performed following procedures outlined in GPA 2166-05: Obtaining Natural Gas Samples for Analysis by Gas Chromatography

(3) Limit of Detection = 0.1 ppmV

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CMSES consultants, inc. CORROSION PRODUCTS DIVISION

PO Drawer 190 - Clarksburg, WV 26302-0190
Telephone: 304.624.9700 - Fax: 304.622.0981
Website: www.msesinc.com/analysis

Sulfur Compounds Analysis

Consol Energy

Analysis No:	1
Analysis Date:	7/10/2014
MSES Project No.:	14-043

SAMPLE COLLECTION INFORMATION

Client:	Consol Energy	Sample Date:	7/9/2014
Sample Location:	Oxford	Sample Time:	9:50 AM
Sample Collection Source:	Inlet	Collected By:	MFM
MSES Sample Number:	CE-1-7-9-14	Sample Pressure:	250.0
Date Received at Lab:	7/9/2014	Sample Temp. (°F):	N/A
Collection Remark:	None	Sample Container Type:	Cylinder
		MSES/CPD ID#	115
		Client ID #:	N/A

ANALYSIS REPORT

COMPONENTS	UNITS	ANALYTICAL METHODS	RESULTS
H_2S HYDROGEN SULFIDE	PPMV	ASTM D-5504	<0.1
COS CARBONYL SULFIDE	PPMV	ASTM D-5504	<0.1
CS_2 CARBON DISULFIDE	PPMV	ASTM D-5504	<0.1
SO_2 SULFUR DIOXIDE	PPMV	ASTM D-5504	<0.1
CH_4S METHYL MERCAPITAN	PPMV	ASTM D-5504	<0.1
C_2H_6S ETHYL MERCAPITAN	PPMV	ASTM D-5504	<0.1
$(CH_3)_2S$ DIMETHYL SULFIDE	PPMV	ASTM D-5504	<0.1
$(CH_3)_3CSH$ *tert*-BUTYL MERCAPTAN	PPMV	ASTM D-5504	<0.1
$C_2H_5SCH_3$ ETHYL METHYL SULFIDE	PPMV	ASTM D-5504	<0.1
TOTAL SULFUR COMPOUNDS	PPMV	ASTM D-5504	<0.1

ANALYTICAL METHODS AND VALUES

(1) Sulfur Compounds Analysis and Reporting Performed by Gas Chromatography using a Sulfur Chemiluminescence Detector Following Procedures Outlined by ASTM Method D5504-08

(2) Gas sampling was performed following procedures outlined in GPA 2166-05: Obtaining Natural Gas Samples for Analysis by Gas Chromatography

(3) Limit of Detection = 0.1 ppmV

Emissions Report

01/27/2015

USA Compression Unit 1006 VRG330/6A219-214 G18

Engine Serial Number :	C665	Engine Manufactured Date :	04/30/1998
Max HP :	68	Max RPM :	1800
Number of Engine Cylinders :		Total Displacement (in3) :	
Combustion Type & Setting :	4 Stroke Rich Burn	Fuel Delivery Method:	
Compression Ratio :		Combustion Air Treatment :	
Engine Modified/Reconstructed? :			
Compressor Frame Serial # :	5252X299	Unit Packaged Date :	05/01/1998
Compressor Frame Max RPM :	1800	# of Compressor Throws :	0

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Doddridge WV

NSPS JJJJ	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr		
Ozone Non-Attainment / General Permit	NOx	g/hp-hr	CO	g/hp-hr	VOC	g/hp-hr	CH2O	g/hp-hr

RAW ENGINE EMISSIONS

(based on assumption of burning 900-970 LHV BTU/SCF or 80-85 Fuel Methane # Fuel Gas with little to no H2S)

Fuel Consumption : HHV BTU/bhp-hr

	g/bhp-hr	lb/MMBTU	lb/hr	TPY
Nitrogen Oxides (NOx) :				
Carbon Monoxide (CO) :				
Volatile Organic Compounds (NMNEHC excluding CH2O) :				
Formaldehyde (CH2O) :				
Particulate Matter (PM) Filterable+Condensable :		0.0194		
Sulfur Dioxide (SO2) :		0.0006		

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :				
Methane (CH4) :				

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:	Miratech, IQ-10
Catalyst Element Type:	3-Way
Number of Catalyst Elements currently in Housing:	1
Air/Fuel Ratio Control :	Emit Advance AFRC
Other Engine Emissions Control Equipment :	

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	TPY
Nitrogen Oxides (NOx) :	0		
Carbon Monoxide (CO) :	0		
Volatile Organic Compounds (NMNEHC excluding CH2O) :	0		
Formaldehyde (CH2O) :	0		
Particulate Matter (PM) Filterable+Condensable :	0		
Sulfur Dioxide (SO2) :	0		

	% Reduction Required to Comply with JJJJ & Non-Attainment / General Permit Limits	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :	0		
Methane (CH4) :	0		

1) g/bhp-hr are based on Engine Manufacturer Specifications assuming a "Pipeline Quality" fuel gas composition, 1200 ft elevation, and 100- 110 F Max Air Inlet. Note that g/bhp-hr values are based on 100% engine load operation and some g/hp-hr values are Nominal and are not representative of Not- To-Exceed values. It is recommended to apply safety factor (i.e. increase the value by a nominal percentage) to the g/hp- hr values for Air Permitting to allow for operational flexibility and variations in fuel gas composition .

2) lb/MMBTU emission Factors are based on EPA's AP-42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combution Sources (Section 3.2 Natural Gas-Fired Reciprocating Engines).

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Arrow
Model Number:	VRG 330
Power Output:	68 bhp
Power Output:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	8500 scfh
Exhaust Temperature:	1180 F

System Details

Housing Model Number:	IQ-10-04-HSG
Element Model Number:	IQ-RE-10C
Number of Catalyst Layers:	1
Number of Spare Catalyst Layers:	1
System Pressure Loss:	2.0 inches of WC (Clean)
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	IQ-10-04-C1
Material:	Carbon Steel
Inlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	4 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	28 inches
Weight Without Catalyst:	56 lbs
Weight Including Catalyst:	66 lbs
Instrumentation Ports:	2 inlet/2 outlet (1/2" NPT)
Oxygen Sensor Ports:	1 inlet/1 outlet (18mm)

Emission Requirements

Exhaust Gases	Engine Outputs (g/bhp-hr)	Reduction (%)	Warranted Converter Ouputs (g/bhp-hr)	Requested Emissions Targets
CH_2O	0.09			
CO	16.3	75.5	4	4 g/bhp-hr
NMHC*				
NMNEHC**	0.04			
NO_x***	14.4	86.1	2	2 g/bhp-hr
PM_{10}				
THC				
O2	0.5%			
H2O	18.5%			

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

*MW referenced as CH_4 **MW referenced as CH_4 ***MW referenced as NO_2

ENGINE MODEL:	K-6	C-46	C-66	C-96	C-101	C-106	C-255	L-795	A-42 (VRG 260)	A-54 (VRG 330)	A-54 CF (VRG 330 CF)	A-62 (VRG 380)	A-62 TA (VRG 380 TA)	A32	A90
Rich/Lean Burn	Rich	Rich	Rich	Rich	Rich	Rich	Rich	Lean	Rich	Rich	Rich	Rich	Rich	Rich	Rich
2 or 4 Cycle	4	4	4	4	4	4	4	2	4	4	4	4	4	4	4
Bore	4.00	5.00	5.25	7.00	7.50	7.50	7.50	7.50	4.134	3.875	3.875	4.134	4.134	4.134	4.65
Stroke	4.50	6.25	7.50	8.50	8.50	8.50	7.50	9.00	4.724	4.665	4.665	4.724	4.724	4.724	5.32
Displacement (CI.)	56.5	122.7	195	327	376	376	660	795	253	330	330	380.8	380.8	190	537
No. Cylinders	1	1	1	1	1	1	2	2	4	6	6	6	6	3	6
RPM Max/Min.	800/400	800/400	700/350	600/300	800/400	800/400	750/400	600/300	1800/1000	1800/1000	1800/1000	1800/1000	1800/1000	1200/1000	1800/1000
Max HP (cont.)	4.8	9	13	19	24.5	32	55	65	47	68	72	80	115	24.7	109
BMEP	84	73	75	77	65	84	88	54	82	91	96	92	133	86	89
BSFC (BTU/HP-HR)	14950	11640	11450	13000	13050	10350	11900	13500	8900	9000	8800	8268	8580	12000	8200
Exhaust Stack															
NPT Dia. (in.)	1 1/4"	1 1/2"	2"	2 1/2"	2 1/2"	2 1/2"	4"	4"	2"	2 1/2"	2 1/2"	*3"	*3"	2"	3"
Height (in.) **	©28.5"	"5.5"	"7.5"	"11"	"11"	"11"	©20"	©7"	27"	28"	27 1/4"	28"	29 1/2"		
Temp. (Deg. F)	1260	1300	1300	1300	1275	1302	1300	900	1230	1238	1238	1230	1350	1180	1250
Flow (acfm)	31	70	97	139	210	213	350	625	310	406	406	466	600	210	600
Emissions (g/hp-hr)															
Pre-Cat Nox	N/A	N/A	N/A	N/A	N/A	14	IP	1.89	12.8	14.4	12.3	14.7	15.5	N/A	9.0
Pre-Cat CO	N/A	N/A	N/A	N/A	N/A	11.5	IP	2.58	5.1	16.3	11	5.8	11.15	N/A	12.76
Pre-Cat VOC	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.04	0.04	0.04	0.04	0.10	N/A	0.05
Pre-Cat HCHO	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.09	0.09	0.09	0.09	0.09	N/A	0.09
Post Cat Nox	*6Ⓟ	*6Ⓟ	*6Ⓟ	*6Ⓟ	*6Ⓟ	*2.8	*2.8	*2.8	*2.8	*2.8	*2.8	*2.8	*1.0	*6	*1.0
Post Cat CO	*455Ⓟ	*455Ⓟ	*455Ⓟ	*455Ⓟ	*455Ⓟ	*4.8	*4.8	*4.8	*4.8	*4.8	*4.8	*4.8	*2.0	*455	*2.0
Post Cat VOC	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0.02	0.05	0.02	0.02	.06/*0.7	N/A	.06/*.07
Post Cat HCHO	N/A	N/A	N/A	N/A	N/A	N/A	IP	N/A	0	0	0	0	0	N/A	0
Max. Exhaust Back Pressure ("W.C.)	20	20	20	20	20	20	20	TE	20	20	20	20	20	20	20
Weight (lb.)Dry	670	1360	1640	2580	2690	2690	3980	4510	1234	1000	1000	1851	1900	1350	3450

* = EPA emission regulation limits as of March 1, 2011.
Check with your local DEQ, as they maybe lower than the EPA requirements.
BSFC (BTU/HP-HR) @ max rated RPM
** = Stack height is from the base of the mounting feet to the exhaust manifold outlet.
*= Catalyst equiped engines. © = Center of exhaust outlet
ⁿ = MUF-1 standard muffler outlet height. N/A = Not available at this time.
TE = Tuned Exhaust. Ⓟ = Does not require a catalyst to meet the current requirements
IP = In Process
Emissions vary depending on AFR set point and emission equipment from engine to engine.
This information is for reference only - Not to be used for permitting, field testing is required

NATIONAL OILWELL VARCO

QUOTATION

CLIENT: Consol Energy

SUBJECT: Mission Enclosed Vapor Combustor with High Pressure Open Flare (MEVC200.03-PGF3000-DT)

NOV PROPOSAL: H-15006-11 Rev.1.1

0	1/14/2015	RC	RC	PM	Quotation
REV	DATE	BY	CHECKED	APPROVED	COMMENTS

NOV
10011 MEADOWGLEN LANE, 2ND FLOOR
HOUSTON, TX 77042
TEL: 1-713-395-5000 FAX: 1-713-395-5001

CONTENTS

1 COMMERCIAL AND TECHNICAL

1.1 Introduction

1.1.1 MEVC 200.03

In response to your inquiry, NOV is pleased to offer the following proposal for a NOV Mission Enclosed Vapor Combustor (MEVC). The model MEVC200.03 is capable of 18.42 MMBTU/HR, Medium Temperature Flares (MTF). NOV Mission offers a full line of reliable enclosed combustors for the ever changing requirements of today's regulation filled oil and gas industry. Mission's MEVC design incorporates years of experience with tank vapors with a combustor design which is highly effective tested and certified "99%" for destruction of vent emissions from oil and condensate tank batteries, loading operations and storage facilities. NOV's stainless steel enclosed flare design is capable of meeting industry regulations while offering significant cost savings. Scalable to customer application, this flare is proven throughout the world. The following items will show the advantages and benefits to incorporating this equipment into the Storage Tank facility:

APPLICATIONS

- Associated gas
- Dehydrators
- Pipeline blow down
- Oil and condensate loading facilities
- Equipment maintenance
- Oil and condensate storage tanks

FEATURES AND BENEFITS:

- Meets EPA 40 CFR 60.00 regulations
- Remote location solar panel option available
- 98%+ destruction efficiency (independent 3rd party tested)
- Flexible & fully automated and programmable system (additional parameters optional)
- Quad O compliant ready
- Special custom application larger units available
- Low capital and operating costs
- Very high turndown ratio
- Scalable flow rates
- Field proven design
- Only requires 300 btu/ft3 gas to maintain combustion
- High Temperature Flares (HTF) with 99.99% DRE are also available

1.1.2 HP 3000 High Pressure Open Flare General Sequence of Operation

The high pressure flare process gas stream will be ignited once manual isolation valve is opened and gas passes through the burner nozzle and is ignited by the continuous pilot flame.

Thank you for this opportunity to quote on your combustor needs. Should you have any questions or concerns regarding the commercial terms, the scope of supply offered, or any technical points which may need clarification, please feel free to contact NOV at:

Contact	:	Pete Magnani
Email	:	pete.magnani@nov.com
Telephone	:	1-713-395-5000
Fax	:	1-713-395-5001
Address	:	10011 Meadowglen Lane, 2nd Floor Houston, TX 77042 USA

1.3 Technical Summary

Flare Gas Stream

- Type: Low Pressure Enclosed and High Pressure Open Flares

Open Flare Stream

- Gas Heating Value: TBD
- Gas Temperature: Less than 120 deg F
- Flow Rate: TBD
- Inlet Pressure: **30-100psi (range)**
- Burner Rate: Up to 3 MMSCFD Gas Capacity

Enclosed Combustor Stream

- Gas Heating Value: 2200 BTU/ft3
- Flow: 200 MSCFD
- Pressure: 4 oz/in^2 (7"w.c.) Minimum start pressure
- Burner Size: MEVC 200: 18.44 MMBTU/hr (5.4 MW)

Mechanical

- Design Wind Speed 110 mph
- Ambient Temperature -20 deg F up to 120 deg F
- Electrical Area Classification General Area Classification
- Elevation 5000' ASL

Process

- Smokeless Capacity 100%
- Operating Temperature 1400 deg F to 1650 deg F (1500 deg F Normal);
- Retention Time **0.3 sec** (For tank battery combustion)

Utilities

- Pilot Gas Fuel Gas supplied at 10psig
- Instrument Air Pneumatic Air Supply @30 psig
- Electricity 120V / 20 Amp

Emissions:

Destruction Rate Efficiency: Greater than 98% DRE, In Full Operation Range

MEVC 200.03

Preliminary Design Parameters*		Materials of Construction:	
Number of Burners*	1 Internal Multi-Nozzle Burner Assembly	Flare Stack Enclosure	Stainless Steel 304 Stack
Inlet Line Size*	**3" Flanged**	Base Frame / Stand	Stainless Steel 304 Stack
Total Height Excluding Foundation*	**20ft.**	Burner	Stainless Steel 316 or equivalent
Base Dimensions* Weight (lbs)	**51 in. Diameter ~1,600 lbs**	Piping	Stainless Steel 304
Combustion Chamber Diameter*	**~47 in.**	Gas Fittings	In accordance with NFPA, UL, and/or CSA

***Actual values determined in Design Phase and sent to customer for Review & Approval**

PGF 3000

Preliminary Design Parameters*		**Materials of Construction:**	
Number of Burners*	1 Open Nozzle	Flare Stack	Stainless Steel 304
Inlet Line Size*	**3" Flanged**	Base Frame / KO Pot	Stainless Steel 304
Total Height Excluding Foundation*	**22 ft. 9 in.**	Nozzle	Stainless Steel 316 or equivalent
Base Dimensions* Weight (lbs)	**5 ft. x 5 ft. ~709 lbs**	Piping	Stainless Steel 304

***Actual values determined in Design Phase and sent to customer for Review & Approval**

1.4 Delivery

The delivery for the Equipment listed in NOV Scope of Supply is as follows:

- Delivery:
  - Stock to 2 to 4 weeks ARO, Ex-Works Chattanooga, TN

1.5 Commercial Clarifications/Exceptions

1.5.1 Terms are net 30 days:

- 100% - Upon notice of readiness to ship.

1.5.2 Quoted prices exclude all taxes, import duties, freight and/or insurance charges.

1.5.3 Delivery to be confirmed upon acceptance of purchase order.

1.5.4 NOV Worldwide Terms and Conditions shall apply.

1.5.5 NOV standard documentation will apply.

1.6 Quotation Validity

Validity is 30 days from the date of this proposal.

1.7 Service

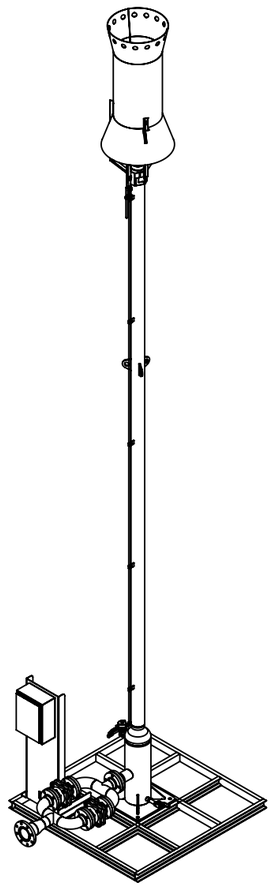
Available upon request.

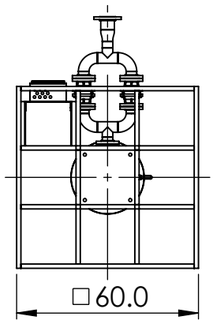
2 ATTACHMENTS

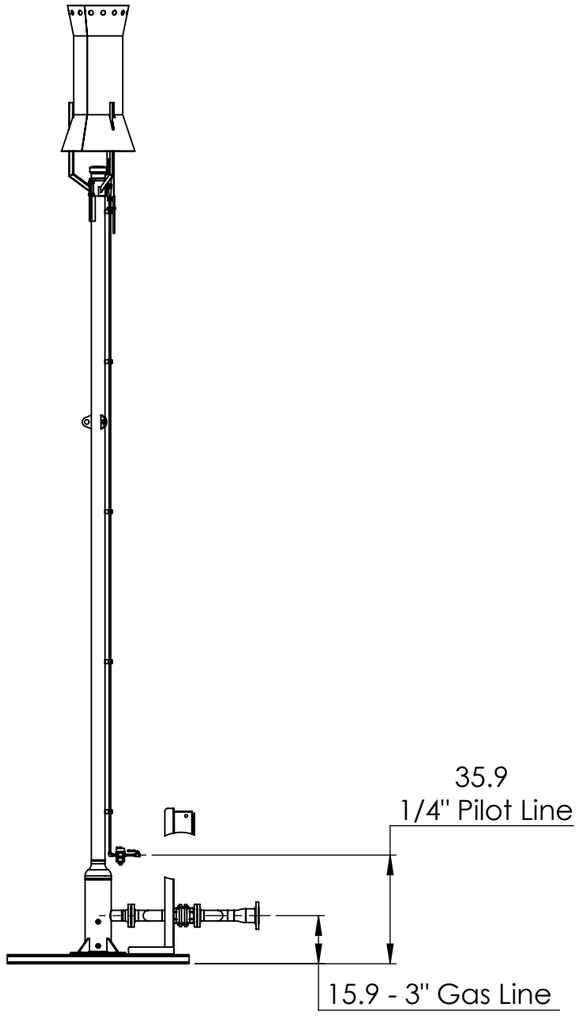
2.1 NOV Documents

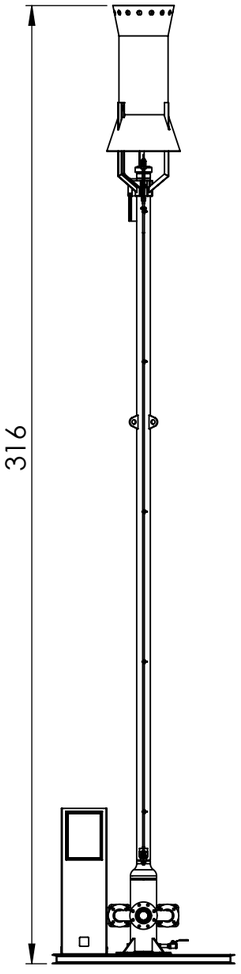
- NOV Terms and Conditions

ITEM NO.	PART/DRAWING	DESCRIPTION	WEIGHT	QTY.
1	PGF1500 Skid	Base Assembly - PGF1500	205.00	1
2	Frame PGF3000 -	Standard Candlestick Flare	686.01	1
3	Flare Panel Mount			1









By	JS				
Date	01/13/2015				
DRAWING STATUS	For Review				

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±

SCALE: 1:50 **B**

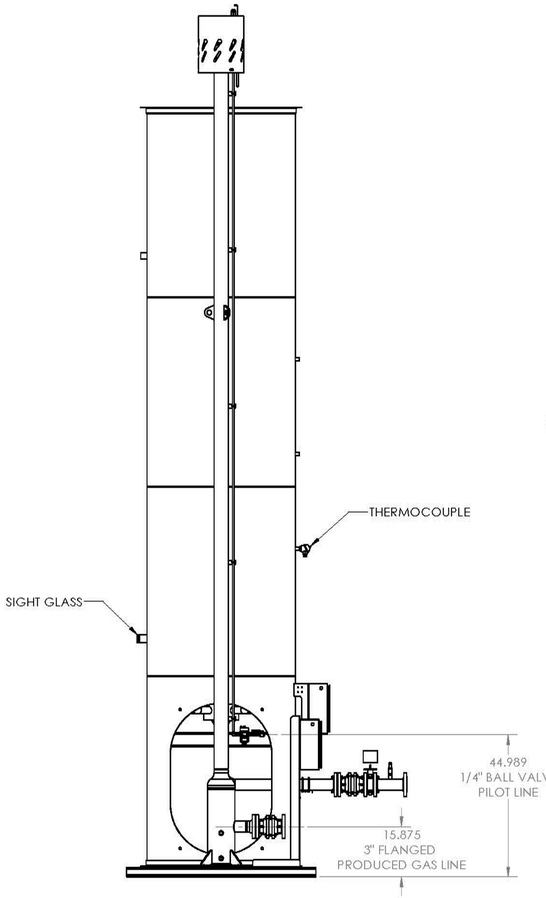
DRAWN:	J.Savor	DATE:	1/13/2015
APP'D.:		WEIGHT (lbs):	936.69
DWG #:	1 OF 1	MAT'L:	

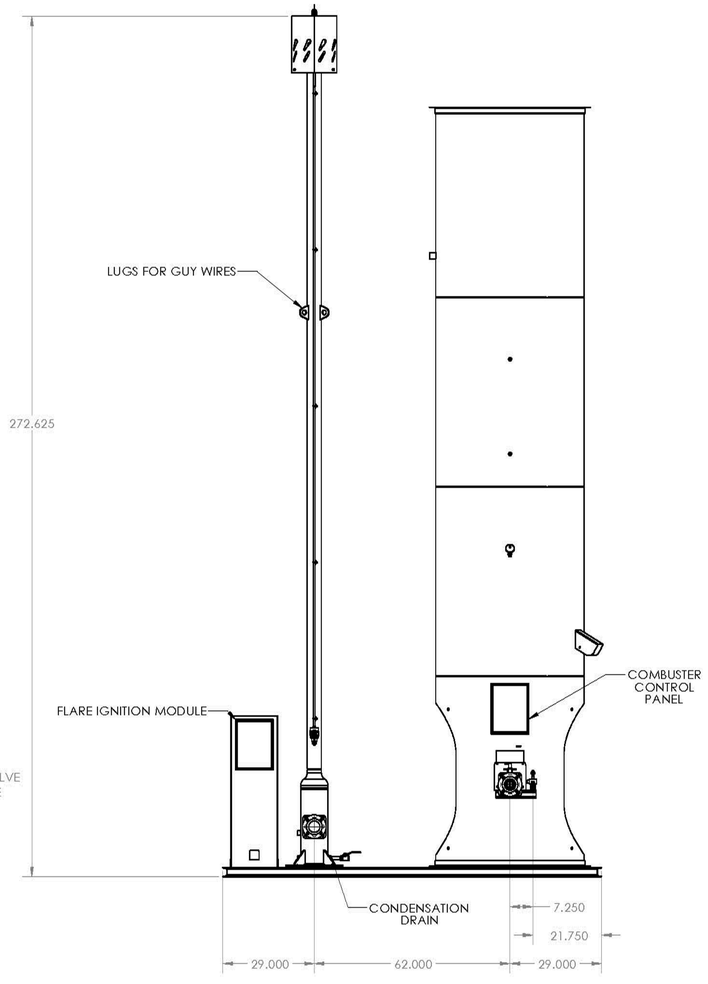
Dwg Title: **HP3000 GAD**

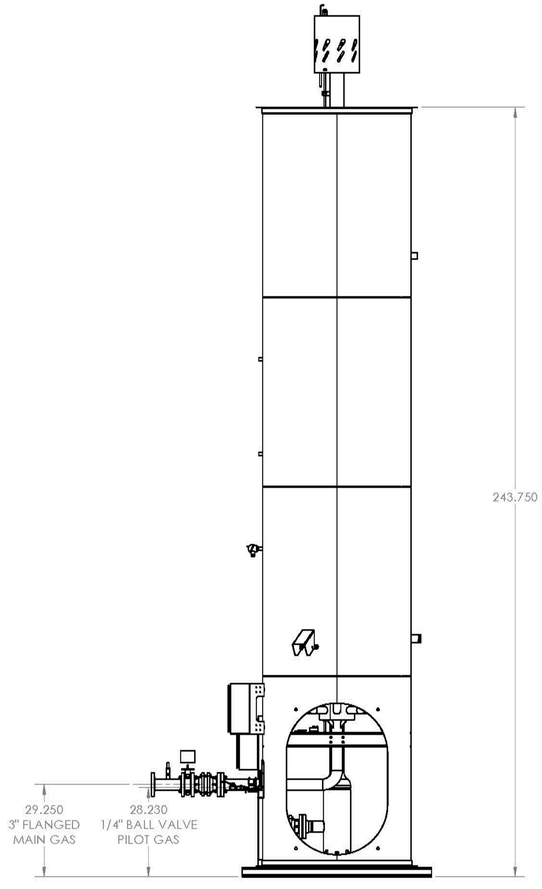
PART #: 128 **HP3000**

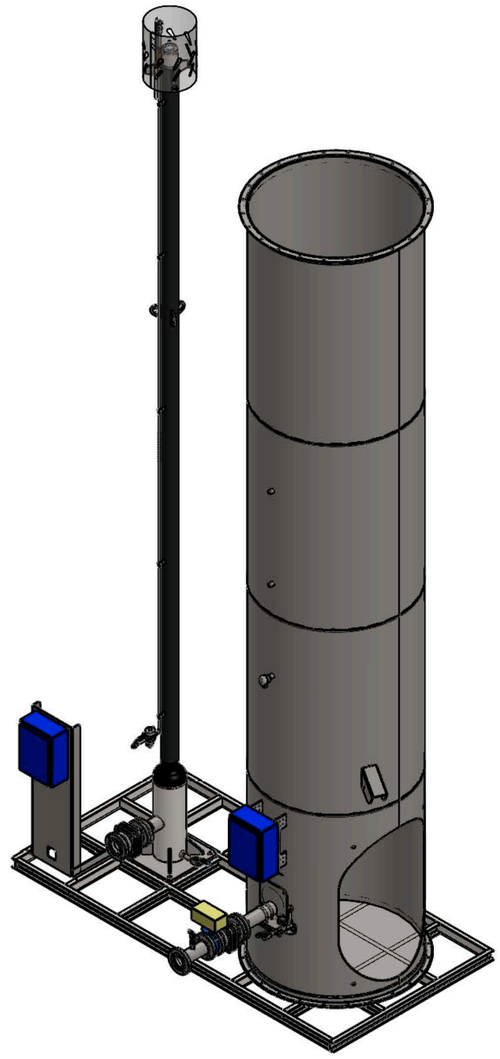
General Arrangement Drawing

NOTE: This drawing is intended for your review and approval of the general arrangement for project
Some dimensions are subject to change during the final engineering phase of this project. "As Built" drawings will be provided at engineering completion.









MATERIAL	
UNLESS OTHERWISE SPECIFIED: TOLERANCES	
DECIMAL X.X ± X.XX ± X.XXX ±	FRACTIONAL ± 1/16 ANGULAR ± °
DIMENSIONS ARE IN INCHES	
RELEASE DATE	01/20/14
LAST UPDATED	Wednesday, August 20, 2014 11:46:07 AM
DRAFTED BY	
APPROVAL	
ENG. APPR.	HvP

NATIONAL OILWELL VARCO

TITLE:
MEVC 200-DT

SIZE	DWG. NO.	REV
B	ASF-200.GAD	
SCALE: 1:1	WEIGHT:	SHEET 1 OF 2

Model 1120 Thermoelectric Generators

Standard Features

- Automatic Spark Ignition (SI)
- Automatic Fuel Shut-off (SO)
- Fuel Filter
- Low Voltage Alarm Contacts (VSR)
- Volt & Amp Meters
- Flame Arrestor
- Corrosive Environment Fuel System
- CSA Certification
  (Class 1, Div. 2 Group D, Temp T3)

Optional Features

- FM certification (Class 1, Div. 1, Temp T3)
- Corrosion resistant upgrade (Div. 2 version)
  - 316 SS regulator & fuel valve
  - Corrosion resistant alloy coated combustion chamber
  - up to 1% H_2S in fuel
- Cathodic Protection Interface Panel
- Pole Mount or Bench Stand
- Intake Air Filter

Note: Specifications shown are for standard configurations. Global Thermoelectric's Integrated Systems Engineering Department is available to design custom voltages, fuel supply systems and non-standard operating temperatures.

Global Thermoelectric
ISO Registered 9001:2008

Hazardous Area Generator

Global Thermoelectric's Model 1120 Thermoelectric Generator is Class 1, Div. 2 or Class 1, Div. 1 Hazardous area rated. With no moving parts it is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable.

Power Specifiations

Power Rating at 20°C
110 Watts at 6.7 Volts
100 Watts at 12 Volts
100 Watts at 24 Volts
100 Watts at 48 Volts

Electrical

Adjustment:	6.7 V	up to 11 Volts
	12 V	12 -18 Volts
	24 V	24 - 30 Volts
	48 V	48 - 60 Volts

Reverse current protection included.

Output: Terminal block which accepts up to 00 AWG wire. Opening for two 3/4" NPT ports in the base of the electronics enclosure.

Fuel

Natural Gas:	8.8 m^3/day (311 Sft^3/day)
	1000 BTU/Sft^3 (37.7 MJ/SM^3) gas
	max 115 mg/Sm^3 (~170 ppm) H_2S
	max 120 mg/Sm^3 H_2O
	max 1% free O_2
Propane:	11.4 l/day (3.0 US gal/day)
Max. Supply Pressure:	172 kPa (25 psi)
Min. Supply Pressure:	69 kPa (10 psi)
Fuel Connection:	1/4" MNPT

Environmental

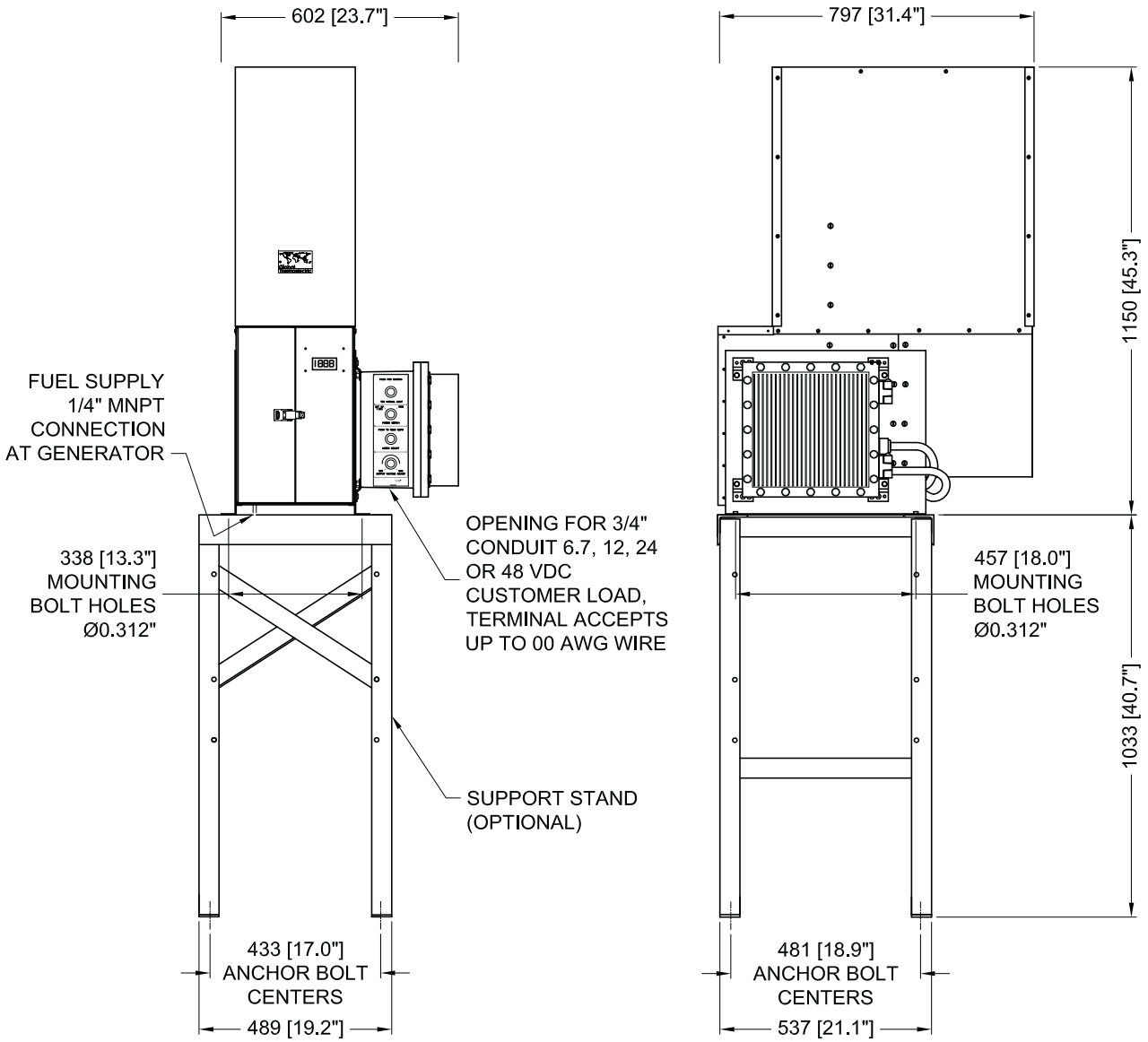
Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).
Operating Conditions: Unsheltered operation certified for use in hazardous areas.
Please contact Global for operating conditions below -40°C or above +45°C.

Materials of Construction

Cabinet:	316 SS
Cooling Type:	Natural Convection
Fuel System:	Aluminum & Stainless Steel

Rev 01-12

Typical Installation



42359 rev0

NOTES:
1. GENERATOR WEIGHT: 130 kg [285 lb]
2. DIMENSIONS IN mm [INCHES].

Global Thermoelectric

Power where you need it.®

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Calgary, Alberta T2C 2L8 CANADA
Phone: (403) 236-5556
Fax: (403) 236-5575
www.globalte.com

US Sales
P.O. Box 38624
Houston, TX 77238
Phone: (281) 445-1515
Fax: (281) 445-6060
Toll Free: 1 800 848-4113

Sulfur Concentration Conversion Factors

Galvanic

1 Grain	= 0.0648 grams	
1cu ft.	= 28.316 liters	= 0.28316m^3
Molecular wt. H_2S	= 34.08	
Molecular wt. S	= 32.064	
1 gram mole gas	= 22.414 litres	@0°C & 14.75 PSI @-STP
1 gram mole gas	= 23.718 litres	@60° & 14.73 ST(commonSTP)
1 grain H_2S/100 SCF	= 22.88 mg/m^3	
1 grain H_2S/100 SCF	= 15.05 ppmv H_2S	@0°C & 14.75 PSI @ STP
1 grain H_2S/100 SCF	= 15.26 ppmv H_2S	@ 60°F & 14.73 PSI @STP
1 grain Sulf/100 SCF	= 15.99 ppmv/Sulfur	@ 0°C & 14.75 PSI @STP
1 grain Sulf/100 SCF	= 16.92 ppmv/ Sulfur	@ 60°F & 14.73 PSI @ STP
1 grain H_2S/100 SCF(Methane)	= 32 ppm wt./wt.	@ 0°C & 14.75 PSI @STP
1 grain H_2S/100 SCF(Methane)	= 33.9 ppm wt./wt.	@ 60°F & 14.73 PSI @ STP

Dow Gas Conditioning Fact □oo□

Multiply U.S.	By	To Obtain
Grains per Gallon	17.1	Parts per Million by weight
Grains H_2S per 100 SCF	0.001588	Mole percent H_2S
Grains H_2S per 100 SCF	1588 X 10 -8	Mole Fraction
Grains H_2S per 100 SCF	15	ppm (w/v)
Mole Percent H_2S	615	Grains H_2S per 100 SCF

Conversion Factors Commonly used by pipeline transmission companies for H_2S in Natural Gas

ppm to mg/m_3	multiply by 1.4331
mg/m_3 to grains/100SCF	multiply by 0.0437
ppm to grains/100 SCF	multiply by 0.0626285
grains/100 SCF to mg/m^3	multiply by 22.88277
mg/m^3 to ppm	multiply by 0.69778
grains/100SCF to ppm	multiply by 15.967

Specification for Sulfur Levels

Tariff Limits - H_2S

TCPL	23mg/m^3 OR 1 grain/100 SCF/100 SCF OR 16 ppm
NOVA	23mg/m^3 OR 1 grain/100 SCF/100 SCF OR 16 ppm
TRANS GAS	6mg/m^3 OR .26grain/100 SCF OR 4.2 ppm

Tariff Limits - Total Sulfur

TCPL	460 mg/m^3 OR 20.1 grains or 321 ppm
NOVA	115 mg/m^3 OR 5.03 grains OR 80 ppm
TRANS GAS	23mg/m^3 OR 1.00 grains OR 16 ppm

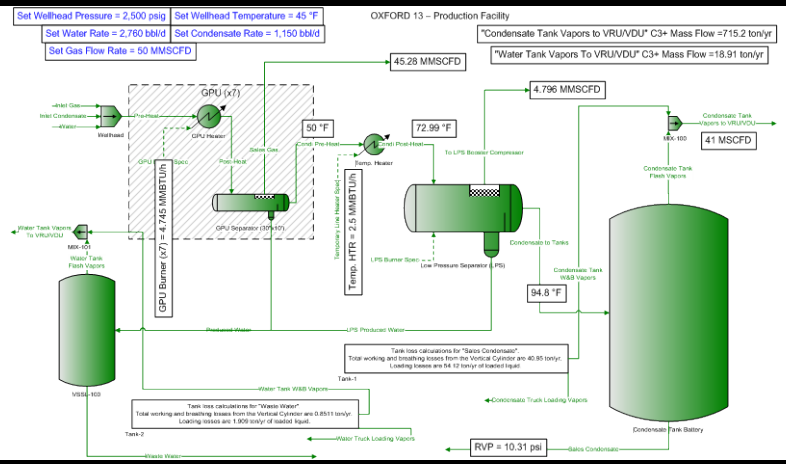
Total Sulfur Limits by Environment Canada

Gasoline	360 ppm,	Recommended interim measure as of January 1, 1997
	30 ppm by 2005	Canadian Environmental Protection Act, Registration SOR/97-110
Diesel	0.05 wt%	

Total Sulfur Limits by □nited States Environmental Protection Agency Code of Federal Regulations□Title □0□Part □□□Section □□□□□

Methane Base Fuel Specification	16 ppmv
Propane Base Fuel Specification	123 ppmw
Methanol Base Fuel Properties	40 ppmw
Ethanol Base Fuel Properties	40 ppmw
Gasoline Base Fuel Properties	339 ppmw
Diesel Base Fuel Properties	0.05 wt%

	TOTAL PAD (7GPUs) **Plant Schematic**	
Client Name:	CONSOL ENERGY	Job: Condensate Tank and Produced Water Tank Emissions Estimate
Location:	OXFORD 13	
Flowsheet:	TOTAL PAD (7GPUs)	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	CONSOL ENERGY	Job: Condensate Tank and Produced Water Tank Emissions Estimate
Location:	OXFORD 13	
Flowsheet:	TOTAL PAD (7GPUs)	

Connections

	Condensate Tank Flash Vapors	Condensate Tank Vapors to VRU/VDU	Condensate Tank W&B Vapors	Condensate to Tanks	Condensate Truck Loading Vapors
From Block	Condensate Tank Battery	MIX-100	--	Low Pressure Separator (LPS)	--
To Block	MIX-100	--	MIX-100	Condensate Tank Battery	--

Stream Composition

Mole Fraction	Condensate Tank Flash Vapors %	Condensate Tank Vapors to VRU/VDU %	Condensate Tank W&B Vapors %	Condensate to Tanks %	Condensate Truck Loading Vapors %
Methane	12.5131	12.1056	3.9542 *	0.566029	3.9542 *
Ethane	25.438	26.0307	37.887 *	1.71702	37.887 *
Propane	25.2313	25.4143	29.0746 *	3.39586	29.0746 *
i-Butane	5.67028	5.67928	5.85943 *	1.55704	5.85943 *
n-Butane	13.0233	13.0217	12.9892 *	4.8319	12.9892 *
i-Pentane	4.36791	4.34816	3.95305 *	3.75772	3.95305 *
n-Pentane	4.53938	4.51375	4.00091 *	5.1037	4.00091 *
Nitrogen	0.0134845	0.012893	0.00106163 *	0.000569768	0.00106163 *
Carbon Dioxide	0.150506	0.152265	0.187455 *	0.00834716	0.187455 *
Oxygen	0.000431174	0.00041496	9.06068E-05 *	1.87394E-05	9.06068E-05 *
Hexane	6.51717	6.22406	0.360624 *	22.9682	0.360624 *
Isohexane	0.847781	0.840941	0.704124 *	2.19347	0.704124 *
Neohexane	0	0	0 *	0	0 *
2,2,4-Trimethylpentane	0.00222792	0.00219653	0.00156861 *	0.021661	0.00156861 *
Benzene	0.0563851	0.0538235	0.00258022 *	0.202827	0.00258022 *
Heptane	0.970366	0.956557	0.680301 *	10.3275	0.680301 *
Toluene	0.0736159	0.0704403	0.00691231 *	0.926036	0.00691231 *
Octane	0.459828	0.451441	0.283664 *	14.5461	0.283664 *
Ethylbenzene	0.00420328	0.00403656	0.000701245 *	0.150772	0.000701245 *
o-Xylene	0.00500943	0.00481451	0.000914989 *	0.235831	0.000914989 *
Nonane	0.0940342	0.0919477	0.0502073 *	8.68813	0.0502073 *
Water	0.0174718	0.0166404	8.66153E-06 *	0.000979492	8.66153E-06 *
C10+	0.00418303	0.00405187	0.00142807 *	18.8003	0.00142807 *

Mass Fraction	Condensate Tank Flash Vapors %	Condensate Tank Vapors to VRU/VDU %	Condensate Tank W&B Vapors %	Condensate to Tanks %	Condensate Truck Loading Vapors %
Methane	4.34092	4.21091	1.45406 *	0.0845485	1.45406 *
Ethane	16.5405	16.9716	26.1134 *	0.480721	26.1134 *
Propane	24.0592	24.2991	29.3875 *	1.39425	29.3875 *
i-Butane	7.12676	7.15736	7.80641 *	0.842635	7.80641 *
n-Butane	16.3685	16.4107	17.3053 *	2.61491	17.3053 *
i-Pentane	6.81472	6.80224	6.53755 *	2.52435	6.53755 *
n-Pentane	7.08225	7.06128	6.6167 *	3.42855	6.6167 *
Nitrogen	0.00816855	0.00783139	0.000681696 *	0.000148614	0.000681696 *
Carbon Dioxide	0.143234	0.1453	0.189103 *	0.00342044	0.189103 *
Oxygen	0.000298354	0.000287911	6.64582E-05 *	5.58324E-06	6.64582E-05 *
Hexane	12.1447	11.6299	0.712347 *	18.4292	0.712347 *
Isohexane	1.57984	1.57133	1.39087 *	1.76	1.39087 *
Neohexane	0	0	0 *	0	0 *
2,2,4-Trimethylpentane	0.00550325	0.00544038	0.00410717 *	0.0230382	0.00410717 *
Benzene	0.0952416	0.0911605	0.00461984 *	0.147516	0.00461984 *
Heptane	2.1026	2.07828	1.56254 *	9.63537	1.56254 *

Mass Fraction	Condensate Tank Flash Vapors %	Condensate Tank Vapors to VRU/VDU %	Condensate Tank W&B Vapors %	Condensate to Tanks %	Condensate Truck Loading Vapors %
Toluene	0.146676	0.140728	0.0145988 *	0.794447	0.0145988 *
Octane	1.13584	1.11813	0.742734 *	15.4709	0.742734 *
Ethylbenzene	0.00964974	0.00929202	0.00170649 *	0.149038	0.00170649 *
o-Xylene	0.0115005	0.0110828	0.00222664 *	0.23312	0.00222664 *
Nonane	0.260799	0.255701	0.147603 *	10.3752	0.147603 *
Water	0.0068065	0.00650013	3.57676E-06 *	0.0001643	3.57676E-06 *
C10+	0.0163334	0.015864	0.00591077 *	31.6084	0.00591077 *

Mass Flow	Condensate Tank Flash Vapors lb/h	Condensate Tank Vapors to VRU/VDU lb/h	Condensate Tank W&B Vapors lb/h	Condensate to Tanks lb/h	Condensate Truck Loading Vapors lb/h
Methane	8.60578	8.74172	0.13594 *	9.55551	0.179671 *
Ethane	32.7911	35.2325	2.44134 *	54.3301	3.22669 *
Propane	47.6968	50.4442	2.74744 *	157.576	3.63125 *
i-Butane	14.1286	14.8585	0.729821 *	95.233	0.964595 *
n-Butane	32.4502	34.068	1.61787 *	295.532	2.13832 *
i-Pentane	13.51	14.1212	0.611195 *	285.298	0.807809 *
n-Pentane	14.0404	14.659	0.618595 *	387.489	0.817589 *
Nitrogen	0.016194	0.0162577	6.37317E-05 *	0.0167961	8.42334E-05 *
Carbon Dioxide	0.283959	0.301638	0.0176792 *	0.386572	0.0233664 *
Oxygen	0.00059148	0.000597693	6.21317E-06 *	0.000631008	8.21187E-06 *
Hexane	24.0766	24.1432	0.0665973 *	2082.83	0.0880208 *
Isohexane	3.13199	3.26202	0.130032 *	198.911	0.171862 *
Neohexane	0	0	0 *	0	0 *
2,2,4-Trimethylpentane	0.0109101	0.0112941	0.000383979 *	2.60374	0.000507501 *
Benzene	0.188814	0.189246	0.000431909 *	16.672	0.000570848 *
Heptane	4.16836	4.31445	0.146082 *	1088.97	0.193074 *
Toluene	0.290781	0.292146	0.00136484 *	89.787	0.0018039 *
Octane	2.25177	2.32121	0.0694381 *	1748.5	0.0917755 *
Ethylbenzene	0.0191304	0.0192899	0.00015954 *	16.8441	0.000210862 *
o-Xylene	0.0227994	0.0230076	0.000208169 *	26.3467	0.000275134 *
Nonane	0.517029	0.530828	0.0137994 *	1172.59	0.0182385 *
Water	0.0134937	0.0134941	3.34391E-07 *	0.0185689	4.4196E-07 *
C10+	0.0323806	0.0329332	0.000552598 *	3572.33	0.000730361 *

Stream Properties

Property	Units	Condensate Tank Flash Vapors	Condensate Tank Vapors to VRU/VDU	Condensate Tank W&B Vapors	Condensate to Tanks	Condensate Truck Loading Vapors
Temperature	°F	89.6707	89.0067	75.9425 *	94.7962	75.9425 *
Pressure	psig	0 *	0	6.51323	25	6.51323
Mole Fraction Vapor	%	100	100	100 *	0	100 *
Mole Fraction Light Liquid	%	0	0	0	100	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	46.2439	46.1193	43.6261	107.4	43.6261
Mass Density	lb/ft^3	0.117239	0.117062	0.164855	43.242	0.164855
Mass Flow	lb/h	198.248	207.597	9.349 *	11301.8	12.3565 *
Std Vapor Volumetric Flow	MMSCFD	0.0390444	0.0409962	0.00195175	0.958407	0.0025796
Std Liquid Volumetric Flow	sgpm	0.782255	0.821037	0.0387823	32.1802	0.0512581
Specific Gravity		1.59668	1.59237	1.50629	0.693325	1.50629
API Gravity					67.7246	
Net Ideal Gas Heating Value	Btu/ft^3	2414.48	2408.35	2285.76	5429.93	2285.76
Gross Ideal Gas Heating Value	Btu/ft^3	2622.72	2616.15	2484.78	5841.23	2484.78

Connections

	Condi Post-Heat	Condi Pre-Heat	Inlet Condensate	Inlet Gas	LPS Produced Water
From Block	Temp. Heater	GPU Separator (30"x10')	--	--	Low Pressure Separator (LPS)
To Block	Low Pressure Separator (LPS)	Temp. Heater	Wellhead	Wellhead	VSSL-100

Stream Composition

Mole Fraction	Condi Post-Heat %	Condi Pre-Heat %	Inlet Condensate %	Inlet Gas %	LPS Produced Water %
Methane	38.0233	38.0233	6.058 *	76.0978 *	
Ethane	20.3528	20.3528	6.04 *	14.9153 *	
Propane	12.21	12.21	6.616 *	4.8556 *	
i-Butane	2.44673	2.44673	2.147 *	0.660901 *	
n-Butane	5.64795	5.64795	5.927 *	1.3067 *	
i-Pentane	2.17716	2.17716	3.831 *	0.3557 *	
n-Pentane	2.45468	2.45468	4.687 *	0.3555 *	
Nitrogen	0.11135	0.11135	0 *	0.4433 *	
Carbon Dioxide	0.17768	0.17768	0.061 *	0.1889 *	
Oxygen	0.00205904	0.00205904	0 *	0.00550001 *	
Hexane	6.12825	6.12825	4.365 *	0.814801 *	
Isohexane	0.663842	0.663842	4.844 *	0 *	
Neohexane	0	0	0 *	0 *	
2,2,4-Trimethylpentane	0.0044068	0.0044068	0.028 *	0 *	
Benzene	0.0536479	0.0536479	0.369 *	0 *	
Heptane	2.07	2.07	12.966 *	0 *	
Toluene	0.180686	0.180686	1.1 *	0 *	
Octane	2.59239	2.59239	15.2 *	0 *	
Ethylbenzene	0.0266561	0.0266561	0.154 *	0 *	
o-Xylene	0.0411291	0.0411291	0.235 *	0 *	
Nonane	1.48245	1.48245	8.354 *	0 *	
Water	0.0200111	0.0200111	0 *	0 *	
C10+	3.13286	3.13286	17.018 *	0 *	

Mass Fraction	Condi Post-Heat %	Condi Pre-Heat %	Inlet Condensate %	Inlet Gas %	LPS Produced Water %
Methane	13.7087	13.7087	0.991163 *	57.0414 *	
Ethane	13.7537	13.7537	1.85226 *	20.9556 *	
Propane	12.1001	12.1001	2.97534 *	10.0043 *	
i-Butane	3.19598	3.19598	1.27268 *	1.79484 *	
n-Butane	7.37749	7.37749	3.51335 *	3.54867 *	
i-Pentane	3.53018	3.53018	2.81894 *	1.19911 *	
n-Pentane	3.98015	3.98015	3.44881 *	1.19844 *	
Nitrogen	0.0701023	0.0701023	0 *	0.580245 *	
Carbon Dioxide	0.175736	0.175736	0.0273792 *	0.388442 *	
Oxygen	0.00148072	0.00148072	0 *	0.00822326 *	
Hexane	11.8685	11.8685	3.8363 *	3.28081 *	
Isohexane	1.28565	1.28565	4.25728 *	0 *	
Neohexane	0	0	0 *	0 *	
2,2,4-Trimethylpentane	0.0113129	0.0113129	0.0326195 *	0 *	
Benzene	0.0941772	0.0941772	0.29396 *	0 *	
Heptane	4.66146	4.66146	13.2503 *	0 *	
Toluene	0.374147	0.374147	1.03366 *	0 *	
Octane	6.65505	6.65505	17.7077 *	0 *	
Ethylbenzene	0.0635997	0.0635997	0.166743 *	0 *	
o-Xylene	0.0981311	0.0981311	0.254445 *	0 *	

Mass Fraction	Condi Post-Heat %	Condi Pre-Heat %	Inlet Condensate %	Inlet Gas %	LPS Produced Water %
Nonane	4.27298	4.27298	10.9273 *	0 *	
Water	0.00810193	0.00810193	0 *	0 *	
C10+	12.7133	12.7133	31.3397 *	0 *	

Mass Flow	Condi Post-Heat lb/h	Condi Pre-Heat lb/h	Inlet Condensate lb/h	Inlet Gas lb/h	LPS Produced Water lb/h
Methane	3854.17	3854.17	113.583 *	67020.5 *	0
Ethane	3866.81	3866.81	212.26 *	24621.6 *	0
Propane	3401.9	3401.9	340.959 *	11754.5 *	0
i-Butane	898.54	898.54	145.843 *	2108.84 *	0
n-Butane	2074.16	2074.16	402.614 *	4169.49 *	0
i-Pentane	992.499	992.499	323.037 *	1408.89 *	0
n-Pentane	1119.01	1119.01	395.217 *	1408.1 *	0
Nitrogen	19.7091	19.7091	0 *	681.756 *	0
Carbon Dioxide	49.4078	49.4078	3.13753 *	456.398 *	0
Oxygen	0.416301	0.416301	0 *	9.66188 *	0
Hexane	3336.8	3336.8	439.621 *	3854.78 *	0
Isohexane	361.458	361.458	487.864 *	0 *	0
Neohexane	0	0	0 *	0 *	0
2,2,4-Trimethylpentane	3.18059	3.18059	3.73804 *	0 *	0
Benzene	26.4777	26.4777	33.6864 *	0 *	0
Heptane	1310.56	1310.56	1518.43 *	0 *	0
Toluene	105.19	105.19	118.453 *	0 *	0
Octane	1871.05	1871.05	2029.22 *	0 *	0
Ethylbenzene	17.8809	17.8809	19.1079 *	0 *	0
o-Xylene	27.5893	27.5893	29.1582 *	0 *	0
Nonane	1201.34	1201.34	1252.22 *	0 *	0
Water	2.27784	2.27784	0 *	0 *	0
C10+	3574.31	3574.31	3591.38 *	0 *	0

Stream Properties

Property	Units	Condi Post-Heat	Condi Pre-Heat	Inlet Condensate	Inlet Gas	LPS Produced Water
Temperature	°F	72.9915	50	45 *	45 *	94.7962
Pressure	psig	25 *	1300	2500 *	2500 *	25
Mole Fraction Vapor	%	80.2789	0	0	100	
Mole Fraction Light Liquid	%	19.7211	100	100	0	
Mole Fraction Heavy Liquid	%	0	0	0	0	
Molecular Weight	lb/lbmol	44.4963	44.4963	98.0517	21.4019	
Mass Density	lb/ft^3	0.39187	32.8331	45.2382	16.4239	
Mass Flow	lb/h	28114.7	28114.7	11459.5	117495	0
Std Vapor Volumetric Flow	MMSCFD	5.7546	5.7546	1.06443	50 *	0
Std Liquid Volumetric Flow	sgpm	111.092	111.092	33.5417 *	676.436	0
Specific Gravity			0.526433	0.725332	0.73895	
API Gravity			141.581	65.4593		
Net Ideal Gas Heating Value	Btu/ft^3	2318.79	2318.79	4964.11	1167.31	
Gross Ideal Gas Heating Value	Btu/ft^3	2517.94	2517.94	5342.59	1286.07	

Warnings

ProMax:ProMax!Project!Flowsheets!TOTAL PAD (7GPUs)!PStreams!Condi Pre-Heat

Warning: The temperature of 50 °F is below hydrate formation.

Remarks

Connections					
	Post-Heat	**Pre-Heat**	**Produced Water**	**Sales Condensate**	**Sales Gas**
From Block	GPU Heater	Wellhead	GPU Separator (30"x10')	Condensate Tank Battery	GPU Separator (30"x10')
To Block	GPU Separator (30"x10')	GPU Heater	VSSL-100	--	--

Stream Composition					
Mole Fraction	**Post-Heat %**	**Pre-Heat %**	**Produced Water %**	**Sales Condensate %**	**Sales Gas %**
Methane	53.3634	53.3634	0.155991	0.0586474	79.2652
Ethane	10.5317	10.5317	0.0172971	0.709618	14.0168
Propane	3.49782	3.49782	0.00376432	2.46853	3.96358
i-Butane	0.494669	0.494669	9.05686E-05	1.38236	0.469242
n-Butane	1.0031	1.0031	0.000316418	4.48402	0.864253
i-Pentane	0.306107	0.306107	3.21592E-05	3.73181	0.206115
n-Pentane	0.318724	0.318724	2.75204E-05	5.12767	0.190751
Nitrogen	0.310338	0.310338	0.000674065	2.12931E-05	0.475026
Carbon Dioxide	0.133151	0.133151	0.00622032	0.0023098	0.184632
Oxygen	0.00385034	0.00385034	1.53366E-05	1.22372E-06	0.00580438
Hexane	0.635464	0.635464	7.23243E-06	23.6668	0.223495
Isohexane	0.0721917	0.0721917	1.35823E-06	2.25062	0.0295017
Neohexane	0	0	0	0	0
2,2,4-Trimethylpentane	0.000417293	0.000417293	2.19185E-10	0.0224863	9.81531E-05
Benzene	0.00549933	0.00549933	5.62035E-05	0.209046	0.00183086
Heptane	0.193237	0.193237	1.48252E-06	10.7249	0.0417236
Toluene	0.0163937	0.0163937	4.25099E-05	0.962237	0.00287588
Octane	0.226531	0.226531	2.60234E-07	15.1443	0.0278502
Ethylbenzene	0.00229511	0.00229511	1.94583E-06	0.156997	0.000231589
o-Xylene	0.00350228	0.00350228	3.03163E-06	0.245634	0.000295865
Nonane	0.124502	0.124502	7.12077E-08	9.05311	0.00797926
Water	28.5035	28.5035	99.8155	0.00027908	0.0208405
C10+	0.253625	0.253625	1.29084E-09	19.5986	0.00190107

Mass Fraction	**Post-Heat %**	**Pre-Heat %**	**Produced Water %**	**Sales Condensate %**	**Sales Gas %**
Methane	39.672	39.672	0.138894	0.0085534	62.7336
Ethane	14.6753	14.6753	0.0288672	0.193983	20.7929
Propane	7.14765	7.14765	0.00921284	0.989584	8.62245
i-Butane	1.33237	1.33237	0.000292167	0.730436	1.34551
n-Butane	2.70183	2.70183	0.00102074	2.36935	2.47817
i-Pentane	1.02346	1.02346	0.00012878	2.44775	0.733646
n-Pentane	1.06565	1.06565	0.000110204	3.36332	0.678959
Nitrogen	0.402875	0.402875	0.00104804	5.42281E-06	0.656493
Carbon Dioxide	0.271557	0.271557	0.015194	0.000924145	0.400868
Oxygen	0.00570956	0.00570956	2.72379E-05	3.55988E-07	0.00916298
Hexane	2.53772	2.53772	3.45923E-05	18.5414	0.950164
Isohexane	0.288297	0.288297	6.49632E-06	1.76321	0.125423
Neohexane	0	0	0	0	0
2,2,4-Trimethylpentane	0.00220895	0.00220895	1.38963E-09	0.0233513	0.000553128
Benzene	0.0199066	0.0199066	0.000243664	0.148449	0.00705536
Heptane	0.897295	0.897295	8.24494E-06	9.76987	0.206255
Toluene	0.0699981	0.0699981	0.000217392	0.806013	0.0130725
Octane	1.19914	1.19914	1.64987E-06	15.7269	0.156946
Ethylbenzene	0.0112916	0.0112916	1.14656E-05	0.151527	0.00121296
o-Xylene	0.0172307	0.0172307	1.78636E-05	0.237076	0.00154961
Nonane	0.739983	0.739983	5.0689E-07	10.5558	0.0504875
Water	23.7963	23.7963	99.8047	4.57077E-05	0.0185224

Mass Fraction	Post-Heat %	Pre-Heat %	Produced Water %	Sales Condensate %	Sales Gas %
C10+	2.12228	2.12228	1.29367E-08	32.1725	0.016935

Mass Flow	Post-Heat lb/h	Pre-Heat lb/h	Produced Water lb/h	Sales Condensate lb/h	Sales Gas lb/h
Methane	67134.1	67134.1	56.0111	0.949732	63223.9
Ethane	24833.9	24833.9	11.6411	21.539	20955.4
Propane	12095.4	12095.4	3.71522	109.879	8689.83
i-Butane	2254.68	2254.68	0.117821	81.1044	1356.02
n-Butane	4572.11	4572.11	0.411629	263.082	2497.53
i-Pentane	1731.93	1731.93	0.0519323	271.788	739.379
n-Pentane	1803.32	1803.32	0.0444413	373.448	684.265
Nitrogen	681.756	681.756	0.422639	0.000602125	661.624
Carbon Dioxide	459.535	459.535	6.12719	0.102613	404
Oxygen	9.66188	9.66188	0.0109841	3.95274E-05	9.23459
Hexane	4294.4	4294.4	0.0139499	2058.75	957.589
Isohexane	487.864	487.864	0.00261974	195.779	126.403
Neohexane	0	0	0	0	0
2,2,4-Trimethylpentane	3.73804	3.73804	5.60387E-07	2.59283	0.557451
Benzene	33.6864	33.6864	0.0982613	16.4832	7.11049
Heptane	1518.43	1518.43	0.00332489	1084.8	207.867
Toluene	118.453	118.453	0.0876665	89.4962	13.1747
Octane	2029.22	2029.22	0.000665336	1746.24	158.173
Ethylbenzene	19.1079	19.1079	0.00462368	16.8249	1.22244
o-Xylene	29.1582	29.1582	0.00720378	26.3239	1.56172
Nonane	1252.22	1252.22	0.000204411	1172.07	50.8821
Water	40268.7	40268.7	40247.7	0.00507518	18.6671
C10+	3591.38	3591.38	5.21693E-06	3572.29	17.0673

Stream Properties

Property	Units	Post-Heat	Pre-Heat	Produced Water	Sales Condensate	Sales Gas
Temperature	°F	50	47.061	50	89.6707	50 *
Pressure	psig	1300 *	2500	1300	0	1300 *
Mole Fraction Vapor	%	63.4015	71.4317	0	0	100
Mole Fraction Light Liquid	%	8.05715	28.5683	100	100	0
Mole Fraction Heavy Liquid	%	28.5413	0	0	0	0
Molecular Weight	lb/lbmol	21.579	21.579	18.0172	109.997	20.27
Mass Density	lb/ft^3	11.0178	21.8212	62.3735	43.5924	7.27339
Mass Flow	lb/h	169223	169223	40326.5	11103.6	100781
Std Vapor Volumetric Flow	MMSCFD	71.4223	71.4223	20.3849	0.919363	45.2828
Std Liquid Volumetric Flow	sgpm	790.478	790.478	80.9302	31.398	598.456
Specific Gravity				1.00007	0.698943	0.699867
API Gravity				10.1627	66.9092	
Net Ideal Gas Heating Value	Btu/ft^3	891.171	891.171	1.80478	5558	1110.11
Gross Ideal Gas Heating Value	Btu/ft^3	994.29	994.29	52.2139	5977.92	1224.76

Warnings

ProMax:ProMax!Project!Flowsheets!TOTAL PAD (7GPUs)!PStreams!Post-Heat
Warning: The temperature of 50 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!TOTAL PAD (7GPUs)!PStreams!Pre-Heat
Warning: The temperature of 47.061 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!TOTAL PAD (7GPUs)!PStreams!Produced Water
Warning: The temperature of 50 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!TOTAL PAD (7GPUs)!PStreams!Sales Gas
Warning: The temperature of 50 °F is below hydrate formation.

Connections					
	To LPS Booster Compressor	Waste Water	Water	Water Tank Flash Vapors	Water Tank Vapors To VRU/VDU
From Block	Low Pressure Separator (LPS)	VSSL-100	--	VSSL-100	MIX-101
To Block	--	--	Wellhead	MIX-101	--

Stream Composition					
Mole Fraction	To LPS Booster Compressor %	Waste Water %	Water %	Water Tank Flash Vapors %	Water Tank Vapors To VRU/VDU %
Methane	45.5082	0.00238047	0 *	84.1442	83.9434
Ethane	24.0767	0.0003265	0 *	9.29613	9.27397
Propane	13.9713	9.2187E-05	0 *	2.01153	2.00658
i-Butane	2.62451	7.43792E-07	0 *	0.0492031	0.0490803
n-Butane	5.81101	5.39085E-06	0 *	0.170373	0.169949
i-Pentane	1.86133	4.15525E-07	0 *	0.0173883	0.0173449
n-Pentane	1.92533	3.26212E-07	0 *	0.0148962	0.014859
Nitrogen	0.133487	5.05482E-06	0 *	0.366461	0.365558
Carbon Dioxide	0.211518	0.00161271	0 *	2.52547	2.52873
Oxygen	0.00246674	2.41644E-07	0 *	0.00826861	0.008249
Hexane	2.76319	3.26428E-08	0 *	0.00394378	0.00393393
Isohexane	0.358182	7.54645E-09	0 *	0.000739855	0.000738007
Neohexane	0	0	0 *	0	0
2,2,4-Trimethylpentane	0.000958954	1.22165E-13	0 *	1.19994E-07	1.19694E-07
Benzene	0.0238379	4.1522E-05	0 *	0.00808342	0.00806327
Heptane	0.419924	1.19586E-08	0 *	0.000805522	0.000803511
Toluene	0.0317457	2.97684E-05	0 *	0.00700902	0.00699153
Octane	0.203731	9.7568E-10	0 *	0.000142012	0.000141657
Ethylbenzene	0.0018545	1.37686E-06	0 *	0.000313035	0.000312254
o-Xylene	0.00222249	2.30804E-06	0 *	0.000398662	0.000397667
Nonane	0.0425664	4.58397E-10	0 *	3.8754E-05	3.86573E-05
Water	0.0238141	99.9955	100 *	1.37464	1.60086
C10+	0.0020837	3.7836E-12	0 *	7.04999E-07	7.03239E-07

Mass Fraction	To LPS Booster Compressor %	Waste Water %	Water %	Water Tank Flash Vapors %	Water Tank Vapors To VRU/VDU %
Methane	22.867	0.00211973	0 *	71.745	71.5722
Ethane	22.6759	0.000544941	0 *	14.8566	14.8208
Propane	19.2966	0.000225638	0 *	4.71433	4.7026
i-Butane	4.77792	2.39961E-06	0 *	0.151996	0.151613
n-Butane	10.579	1.73919E-05	0 *	0.526308	0.524984
i-Pentane	4.2063	1.66408E-06	0 *	0.0666782	0.0665101
n-Pentane	4.35094	1.3064E-06	0 *	0.0571218	0.0569778
Nitrogen	0.117126	7.85992E-06	0 *	0.545621	0.544263
Carbon Dioxide	0.291569	0.00393957	0 *	5.90726	5.91473
Oxygen	0.00247233	4.29196E-07	0 *	0.0140625	0.0140288
Hexane	7.45835	1.56141E-07	0 *	0.0180631	0.0180176
Isohexane	0.966797	3.60971E-08	0 *	0.00338865	0.00338011
Neohexane	0	0	0 *	0	0
2,2,4-Trimethylpentane	0.003431	7.74582E-13	0 *	7.28501E-07	7.26665E-07
Benzene	0.0583222	0.000180029	0 *	0.033559	0.0334746
Heptane	1.31794	6.65124E-08	0 *	0.00428994	0.00427912
Toluene	0.0916167	0.000152245	0 *	0.0343238	0.0342373
Octane	0.728921	6.18627E-09	0 *	0.000862178	0.000860004
Ethylbenzene	0.00616676	8.11367E-06	0 *	0.00176633	0.00176188

Mass Fraction	To LPS Booster Compressor %	Waste Water %	Water %	Water Tank Flash Vapors %	Water Tank Vapors To VRU/VDU %
o-Xylene	0.00739042	1.3601E-05	0 *	0.00224948	0.00224382
Nonane	0.170998	3.26335E-09	0 *	0.000264173	0.000263507
Water	0.0134377	99.9928	100 *	1.31622	1.53279
C10+	0.0117848	3.79222E-11	0 *	6.76591E-06	6.74886E-06

Mass Flow	To LPS Booster Compressor lb/h	Waste Water lb/h	Water lb/h	Water Tank Flash Vapors lb/h	Water Tank Vapors To VRU/VDU lb/h
Methane	3844.61	0.853183	0 *	55.1579	55.1641
Ethane	3812.48	0.219337	0 *	11.4218	11.4231
Propane	3244.32	0.0908185	0 *	3.6244	3.62452
i-Butane	803.307	0.000965835	0 *	0.116855	0.116855
n-Butane	1778.63	0.00700016	0 *	0.404628	0.404631
i-Pentane	707.202	0.000669784	0 *	0.0512625	0.0512626
n-Pentane	731.52	0.000525821	0 *	0.0439155	0.0439155
Nitrogen	19.6923	0.00316359	0 *	0.419476	0.41949
Carbon Dioxide	49.0213	1.58566	0 *	4.54153	4.55877
Oxygen	0.41567	0.00017275	0 *	0.0108113	0.0108127
Hexane	1253.97	6.28462E-05	0 *	0.013887	0.013887
Isohexane	162.547	1.4529E-05	0 *	0.00260521	0.00260521
Neohexane	0	0	0 *	0	0
2,2,4-Trimethylpentane	0.576851	3.11766E-10	0 *	5.60076E-07	5.60076E-07
Benzene	9.80566	0.072461	0 *	0.0258003	0.0258005
Heptane	221.584	2.6771E-05	0 *	0.00329812	0.00329812
Toluene	15.4034	0.0612782	0 *	0.0263883	0.0263884
Octane	122.553	2.48995E-06	0 *	0.000662846	0.000662846
Ethylbenzene	1.03681	0.00326572	0 *	0.00135796	0.00135796
o-Xylene	1.24255	0.00547436	0 *	0.00172942	0.00172942
Nonane	28.7497	1.31349E-06	0 *	0.000203098	0.000203098
Water	2.25927	40246.7	40268.7 *	1.01192	1.18139
C10+	1.98138	1.52635E-08	0 *	5.20167E-06	5.20167E-06

Stream Properties

Property	Units	To LPS Booster Compressor	Waste Water	Water	Water Tank Flash Vapors	Water Tank Vapors To VRU/VDU
Temperature	°F	94.7962	53.2947	45 *	53.2947	52.1717
Pressure	psig	25 *	0	2500 *	0 *	-14.2137
Mole Fraction Vapor	%	100	0	0	100	100
Mole Fraction Light Liquid	%	0	100	100	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	31.9265	18.0158	18.0153	18.8149	18.8154
Mass Density	lb/ft^3	0.217612	62.4146	62.6023	0.0503942	0.00165192
Mass Flow	lb/h	16812.9	40249.6	40268.7	76.8805	77.0748
Std Vapor Volumetric Flow	MMSCFD	4.79619	20.3477	20.3578	0.037215	0.0373082
Std Liquid Volumetric Flow	sgpm	78.9113	80.4676	80.5 *	0.462574	0.463004
Specific Gravity		1.10234	1.00073	1.00374	0.649629	0.649645
API Gravity			10.0154	9.71145		
Net Ideal Gas Heating Value	Btu/ft^3	1697.1	0.0322288	0	970.963	968.642
Gross Ideal Gas Heating Value	Btu/ft^3	1853.85	50.3432	50.31	1075.06	1072.6

Remarks

Connections					
	Water Tank W&B Vapors	**Water Truck Loading Vapors**			
From Block	--	--			
To Block	MIX-101	--			

Stream Composition					
Mole Fraction	**Water Tank W&B Vapors %**	**Water Truck Loading Vapors %**			
Methane	3.75882 *	3.75882 *			
Ethane	0.420813 *	0.420813 *			
Propane	0.0266826 *	0.0266826 *			
i-Butane	5.87106E-05 *	5.87106E-05 *			
n-Butane	0.000364798 *	0.000364798 *			
i-Pentane	9.37262E-06 *	9.37262E-06 *			
n-Pentane	5.40491E-06 *	5.40491E-06 *			
Nitrogen	0.00483301 *	0.00483301 *			
Carbon Dioxide	3.82782 *	3.82782 *			
Oxygen	0.000417896 *	0.000417896 *			
Hexane	7.21172E-09 *	7.21172E-09 *			
Isohexane	3.82287E-08 *	3.82287E-08 *			
Neohexane	0 *	0 *			
2,2,4-Trimethylpentane	0 *	0 *			
Benzene	1.51551E-05 *	1.51551E-05 *			
Heptane	1.16268E-08 *	1.16268E-08 *			
Toluene	6.32089E-06 *	6.32089E-06 *			
Octane	2.24381E-10 *	2.24381E-10 *			
Ethylbenzene	1.81734E-07 *	1.81734E-07 *			
o-Xylene	2.5426E-07 *	2.5426E-07 *			
Nonane	3.98935E-11 *	3.98935E-11 *			
Water	91.9602 *	91.9602 *			
C10+	2.43029E-15 *	2.43029E-15 *			

	Water Tank W&B Vapors	**Water Truck Loading Vapors**			
Mass Fraction	**%**	**%**			
Methane	3.17463 *	3.17463 *			
Ethane	0.666161 *	0.666161 *			
Propane	0.0619432 *	0.0619432 *			
i-Butane	0.000179651 *	0.000179651 *			
n-Butane	0.00111626 *	0.00111626 *			
i-Pentane	3.56009E-05 *	3.56009E-05 *			
n-Pentane	2.053E-05 *	2.053E-05 *			
Nitrogen	0.00712778 *	0.00712778 *			
Carbon Dioxide	8.86888 *	8.86888 *			
Oxygen	0.000704001 *	0.000704001 *			
Hexane	3.27185E-08 *	3.27185E-08 *			
Isohexane	1.73438E-07 *	1.73438E-07 *			
Neohexane	0 *	0 *			
2,2,4-Trimethylpentane	0 *	0 *			
Benzene	6.23226E-05 *	6.23226E-05 *			
Heptane	6.13351E-08 *	6.13351E-08 *			
Toluene	3.06612E-05 *	3.06612E-05 *			
Octane	1.34937E-09 *	1.34937E-09 *			
Ethylbenzene	1.01575E-06 *	1.01575E-06 *			
o-Xylene	1.42112E-06 *	1.42112E-06 *			
Nonane	2.69369E-10 *	2.69369E-10 *			

Mass Fraction	Water Tank W&B Vapors %		Water Truck Loading Vapors %				
Water	87.2191	*	87.2191	*			
C10+	2.31031E-14	*	2.31031E-14	*			

Mass Flow	Water Tank W&B Vapors lb/h		Water Truck Loading Vapors lb/h				
Methane	0.00616871	*	0.0138335	*			
Ethane	0.00129444	*	0.0029028	*			
Propane	0.000120364	*	0.000269918	*			
i-Butane	3.49084E-07	*	7.82828E-07	*			
n-Butane	2.16904E-06	*	4.86411E-06	*			
i-Pentane	6.9177E-08	*	1.55131E-07	*			
n-Pentane	3.98923E-08	*	8.94593E-08	*			
Nitrogen	1.38502E-05	*	3.10593E-05	*			
Carbon Dioxide	0.0172334	*	0.0386461	*			
Oxygen	1.36796E-06	*	3.06768E-06	*			
Hexane	6.35761E-11	*	1.42571E-10	*			
Isohexane	3.37011E-10	*	7.55754E-10	*			
Neohexane	0	*	0	*			
2,2,4-Trimethylpentane	0	*	0	*			
Benzene	1.21101E-07	*	2.71571E-07	*			
Heptane	1.19182E-10	*	2.67267E-10	*			
Toluene	5.95787E-08	*	1.33606E-07	*			
Octane	2.622E-12	*	5.87988E-12	*			
Ethylbenzene	1.97374E-09	*	4.42615E-09	*			
o-Xylene	2.76141E-09	*	6.19251E-09	*			
Nonane	5.23419E-13	*	1.17378E-12	*			
Water	0.169478	*	0.380057	*			
C10+	4.48922E-17	*	1.00672E-16	*			

Stream Properties

Property	Units	Water Tank W&B Vapors		Water Truck Loading Vapors				
Temperature	°F	75.9425	*	75.9425	*			
Pressure	psig	-14.2137		-14.2137				
Mole Fraction Vapor	%	100	*	100	*			
Mole Fraction Light Liquid	%	0		0				
Mole Fraction Heavy Liquid	%	0		0				
Molecular Weight	lb/lbmol	18.9946		18.9946				
Mass Density	lb/ft^3	0.00159418		0.00159418				
Mass Flow	lb/h	0.194313	*	0.43575	*			
Std Vapor Volumetric Flow	MMSCFD	9.31703E-05		0.000208936				
Std Liquid Volumetric Flow	sgpm	0.000429865		0.000963981				
Specific Gravity		0.65583		0.65583				
API Gravity								
Net Ideal Gas Heating Value	Btu/ft^3	41.6275		41.6275				
Gross Ideal Gas Heating Value	Btu/ft^3	92.363		92.363				

Remarks

Single Oil Report
C10+

Client Name:	CONSOL ENERGY	Job: Condensate Tank and Produced Water Tank Emissions Estimate
Location:	OXFORD 13	

Properties

	Volume Average Boiling Point	442.438 °F		Low Temperature Viscosity	1.33703 cP
*	Molecular Weight	180.568 lb/lbmol		Temperature of High T Viscosity	210 °F
*	Specific Gravity	0.783		High Temperature Viscosity	0.596724 cP
	API Gravity	49.2152		Watson K	12.3403
	Critical Temperature	751.423 °F		ASTM D86 10-90% Slope	0 °F/%
	Critical Pressure	252.245 psig		ASTM D93 Flash Point	187.082 °F
	Critical Volume	11.6634 ft^3/lbmol	?	Pour Point	2.2372 °F
	Acentric Factor	0.594716		Paraffinic Fraction	58.2683 %
	Carbon to Hydrogen Ratio	5.86724		Naphthenic Fraction	24.1977 %
	Refractive Index	1.43667		Aromatic Fraction	17.534 %
	Temperature of Low T Viscosity	100 °F		Ideal Gas Heat Capacity	66.2577 Btu/(lbmol*°F)

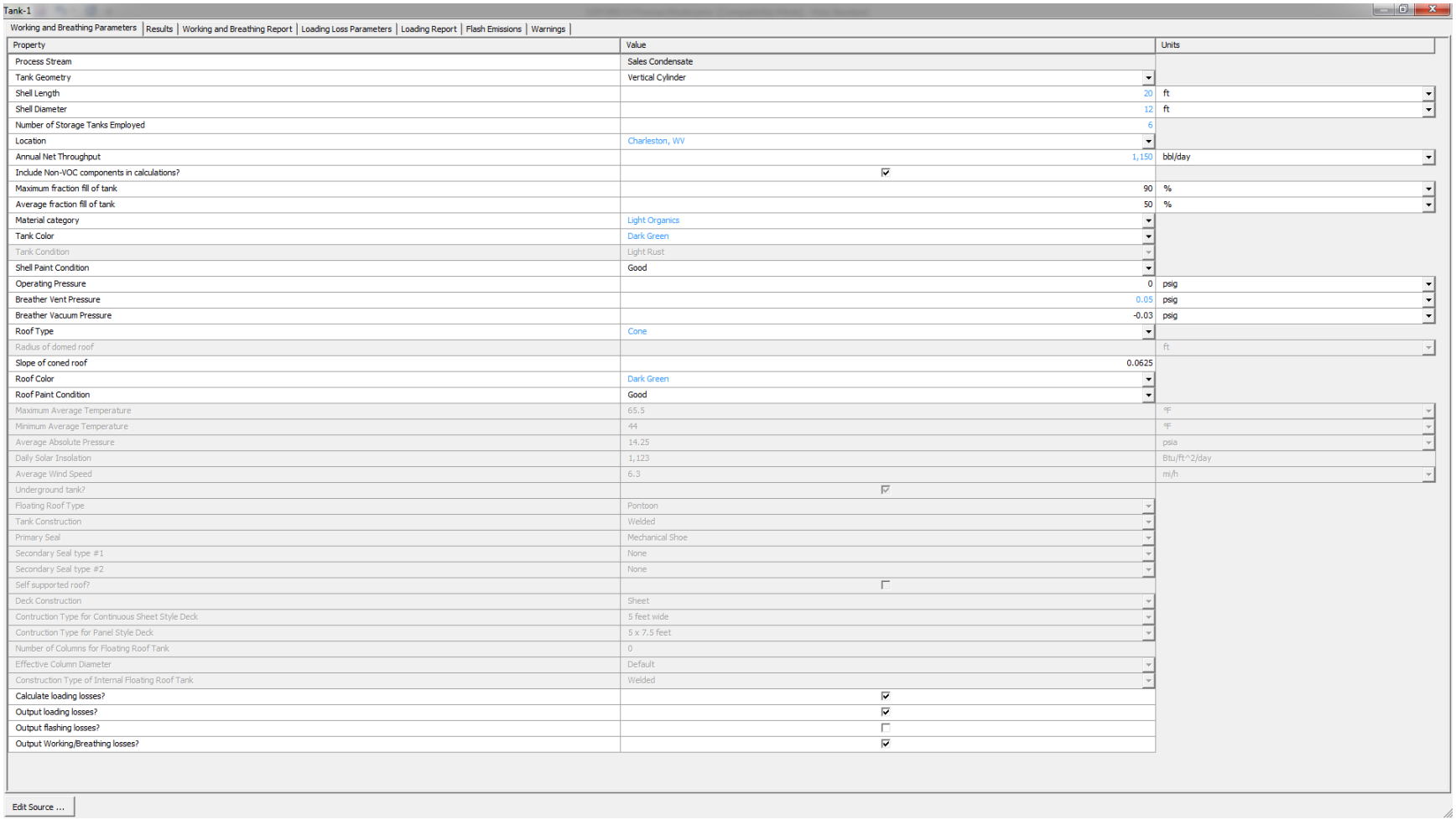
Warnings

ProMax:ProMax!Project!Oils!C10+!Properties!Pour Point

Warning: Pour Point calculation: The value of 0.783 for Specific Gravity should be between 0.8 and 1.

Remarks

Condensate Tank Working and Breathing Loss Inputs



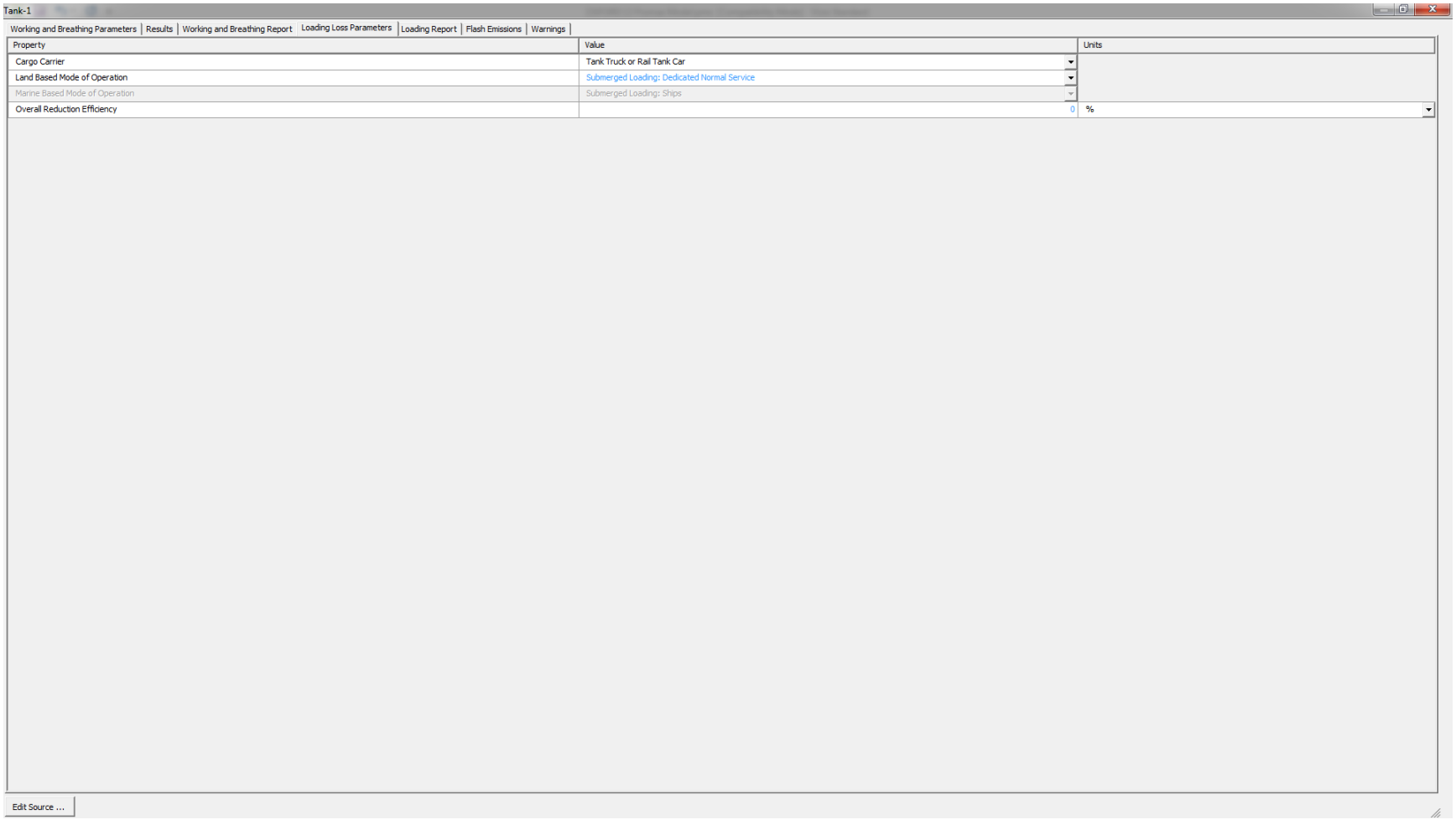
Tank-1

Working and Breathing Parameters | Results | Working and Breathing Report | Loading Loss Parameters | Loading Report | Flash Emissions | Warnings

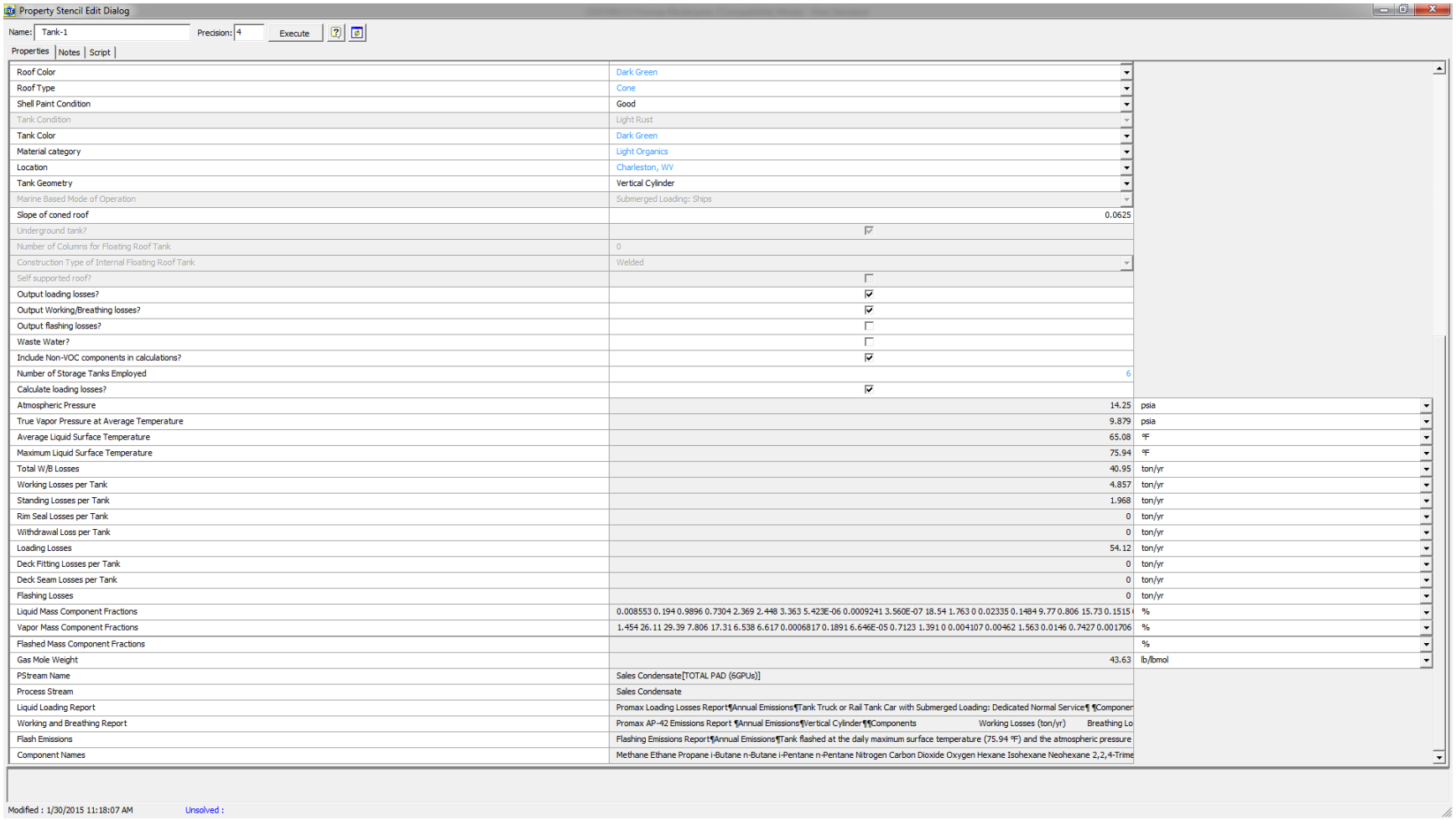
Property	Value	Units
Process Stream	Sales Condensate	
Tank Geometry	Vertical Cylinder	
Shell Length	20	ft
Shell Diameter	12	ft
Number of Storage Tanks Employed	6	
Location	Charleston, WV	
Annual Net Throughput	1,150	bbl/day
Include Non-VOC components in calculations?	☑	
Maximum fraction fill of tank	90	%
Average fraction fill of tank	50	%
Material category	Light Organics	
Tank Color	Dark Green	
Tank Condition	Light Rust	
Shell Paint Condition	Good	
Operating Pressure	0	psig
Breather Vent Pressure	0.05	psig
Breather Vacuum Pressure	-0.03	psig
Roof Type	Cone	
Radius of domed roof		ft
Slope of coned roof	0.0625	
Roof Color	Dark Green	
Roof Paint Condition	Good	
Maximum Average Temperature	65.5	°F
Minimum Average Temperature	44	°F
Average Absolute Pressure	14.25	psia
Daily Solar Insolation	1,123	Btu/ft^2/day
Average Wind Speed	6.3	mi/h
Underground tank?	☑	
Floating Roof Type	Pontoon	
Tank Construction	Welded	
Primary Seal	Mechanical Shoe	
Secondary Seal type #1	None	
Secondary Seal type #2	None	
Self supported roof?	☐	
Deck Construction	Sheet	
Contruction Type for Continuous Sheet Style Deck	5 feet wide	
Contruction Type for Panel Style Deck	5 x 7.5 feet	
Number of Columns for Floating Roof Tank	0	
Effective Column Diameter	Default	
Construction Type of Internal Floating Roof Tank	Welded	
Calculate loading losses?	☑	
Output loading losses?	☑	
Output flashing losses?	☐	
Output Working/Breathing losses?	☑	

Edit Source ...

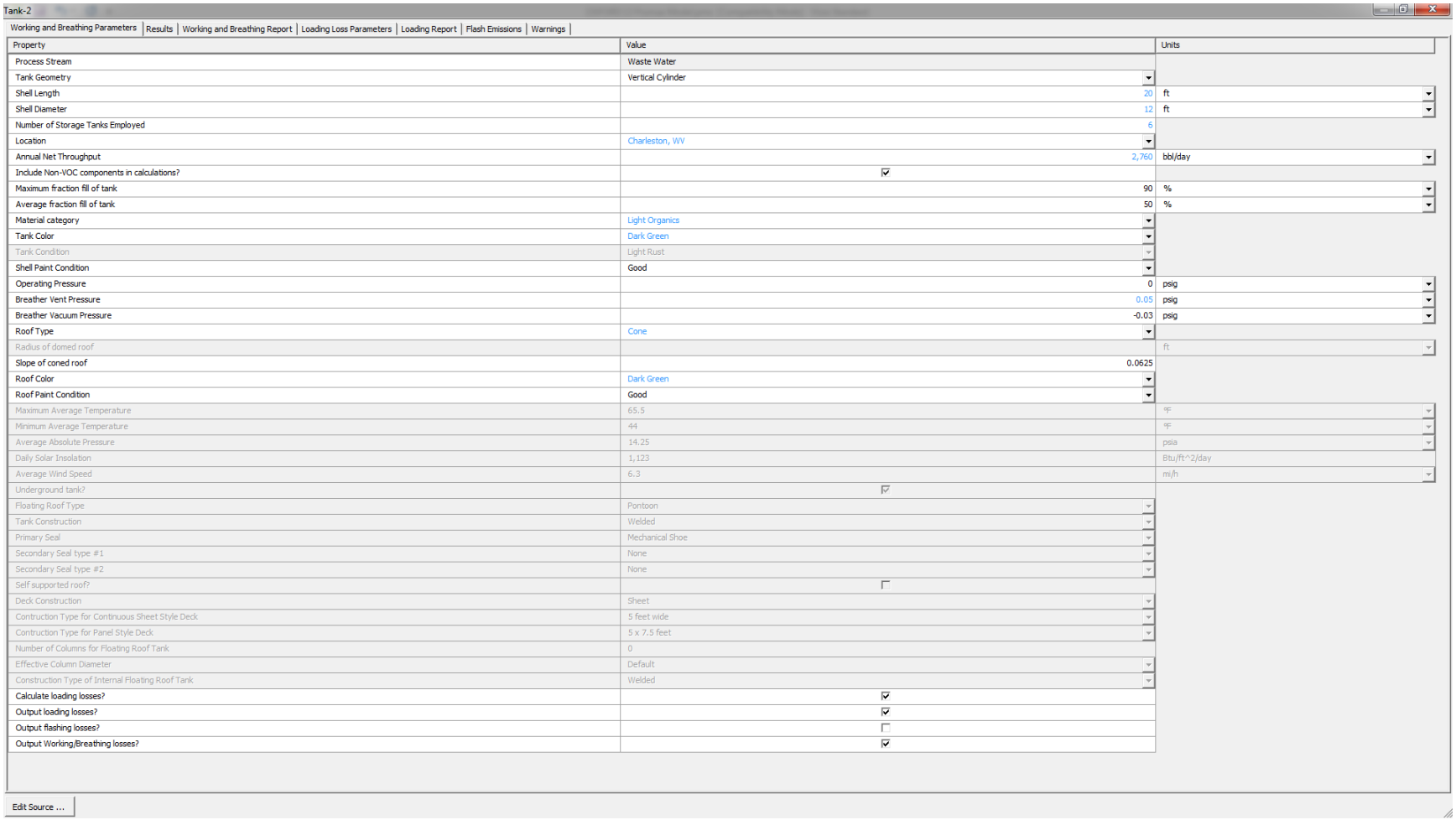
Condensate Truck Loading Loss Inputs



Condensate True Vapor Pressure and Vapor Molecular Weight



Produced Water Tank Working and Breathing Loss Inputs



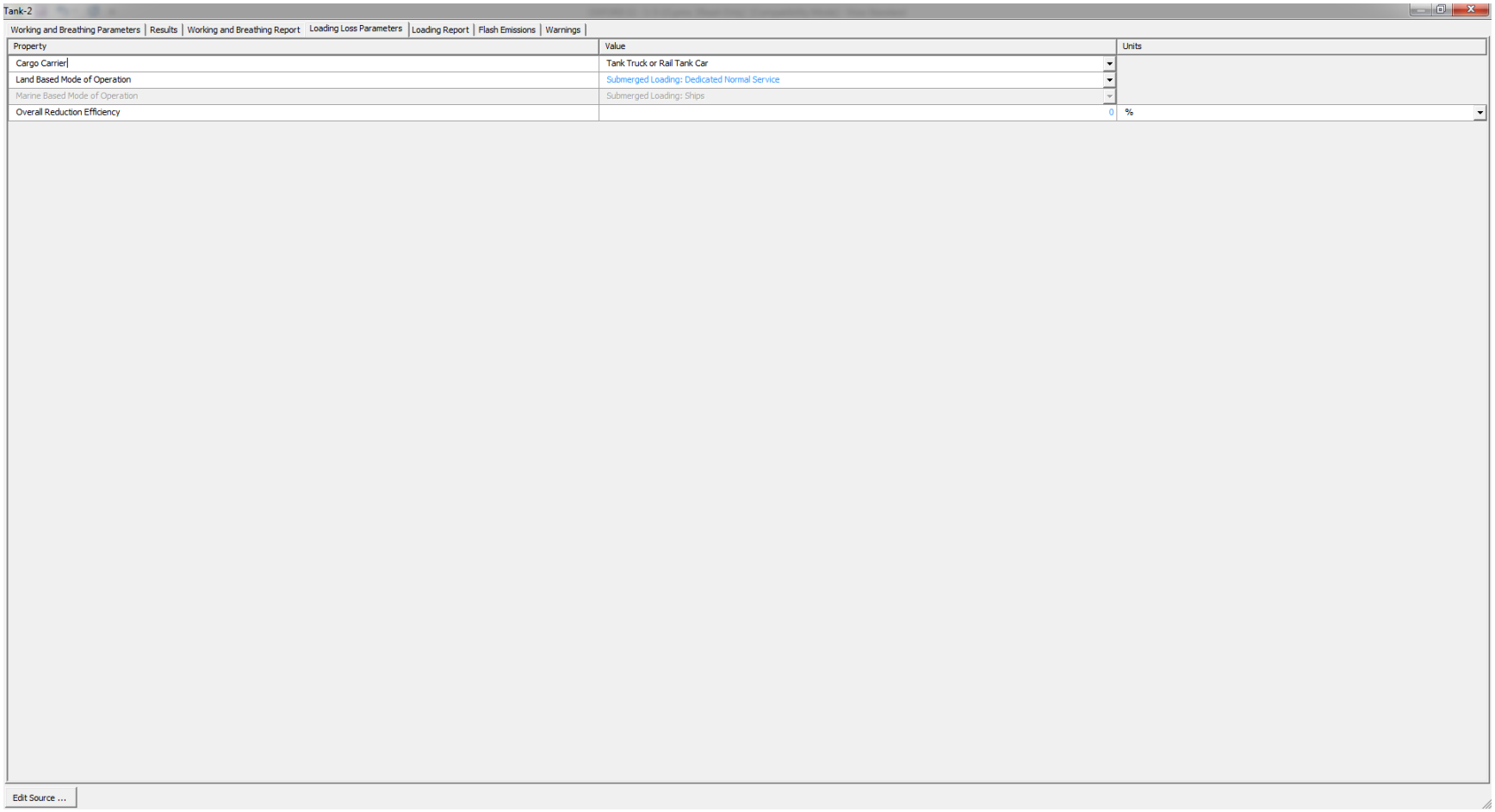
Tank-2

Working and Breathing Parameters | Results | Working and Breathing Report | Loading Loss Parameters | Loading Report | Flash Emissions | Warnings

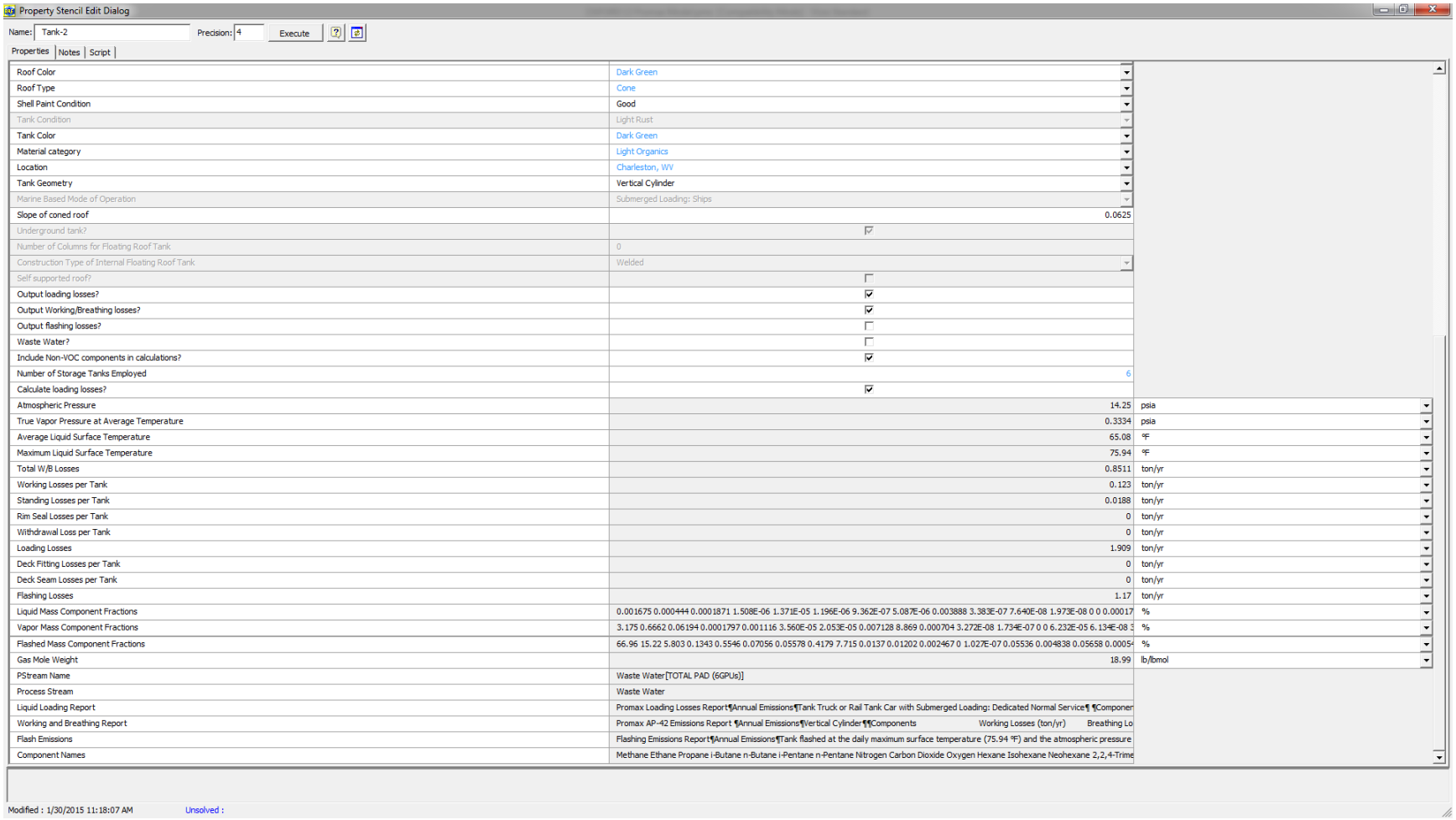
Property	Value	Units
Process Stream	Waste Water	
Tank Geometry	Vertical Cylinder	
Shell Length	20	ft
Shell Diameter	12	ft
Number of Storage Tanks Employed	6	
Location	Charleston, WV	
Annual Net Throughput	2,760	bbl/day
Include Non-VOC components in calculations?	☑	
Maximum fraction fill of tank	90	%
Average fraction fill of tank	50	%
Material category	Light Organics	
Tank Color	Dark Green	
Tank Condition	Light Rust	
Shell Paint Condition	Good	
Operating Pressure	0	psig
Breather Vent Pressure	0.05	psig
Breather Vacuum Pressure	-0.03	psig
Roof Type	Cone	
Radius of domed roof		ft
Slope of coned roof	0.0625	
Roof Color	Dark Green	
Roof Paint Condition	Good	
Maximum Average Temperature	65.5	°F
Minimum Average Temperature	44	°F
Average Absolute Pressure	14.25	psia
Daily Solar Insolation	1,123	Btu/ft^2/day
Average Wind Speed	6.3	mi/h
Underground tank?	☑	
Floating Roof Type	Pontoon	
Tank Construction	Welded	
Primary Seal	Mechanical Shoe	
Secondary Seal type #1	None	
Secondary Seal type #2	None	
Self supported roof?	☐	
Deck Construction	Sheet	
Contruction Type for Continuous Sheet Style Deck	5 feet wide	
Contruction Type for Panel Style Deck	5 x 7.5 feet	
Number of Columns for Floating Roof Tank	0	
Effective Column Diameter	Default	
Construction Type of Internal Floating Roof Tank	Welded	
Calculate loading losses?	☑	
Output loading losses?	☑	
Output flashing losses?	☐	
Output Working/Breathing losses?	☑	

Edit Source ...

Produced Water Truck Loading Loss Inputs



Produced Water True Vapor Pressure and Vapor Molecular Weight



ATTACHMENT O

MONITORING/RECORDKEEPING/REPORTING/ TESTING PLANS

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

Monitoring

The company will at a minimum monitor hours of operation, visual emissions, site production throughputs, and planned and unplanned maintenance of permitted equipment comprising the facility.

Recordkeeping

The company will retain records for five (5) years, two (2) years on site, certified by a company official at such time that the DAQ may request said records.

The company will keep records of the items monitored, such as station throughput, hours of operation, planned maintenance activities, unplanned maintenance activities, and complaints regarding the facility.

Reporting

The company will report any control equipment malfunctions, emission limit or opacity deviations.

Testing

Visual Emission (VE) testing will be conducted periodically.

ATTACHMENT P

PUBLIC NOTICE

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

CNX Gas Company, LLC
PO Box 1248
Jane Lew, West Virginia

May 2015

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that CNX Gas Company, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Regulation 13 construction permit for a well pad facility located at the Oxford 13 site, off Gain Run near New Milton, Doddridge County, WV. The latitude and longitude coordinates are: 39.16876 and -80.74779.

The applicant estimates the potential to discharge of the following Regulated Air Pollutants will be:

Pollutant	Tons/yr
NOx	27.7
CO	93.01
VOC	98.58
SO_2	4.10
PM_{10}	0.46
$PM_{2.5}$	0.46
CO_2e	33,575
Benzene	0.015
Toluene	0.012
Ethylbenzene	0.001
Xylenes	0.005
n-Hexane	0.028
Formaldehyde	1.93
Total HAPs	2.07

Startup of operation is planned to begin on or about the 1st day of August, 2015. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the 12th Day of May, 2015.

By: CNX Gas Company, LLC
David Morris
Air Quality Manager-env
1000 Consol Energy Drive
Canonsburg, PA 15317

ATTACHMENT Q

NOT APPLICABLE (SEE NOTE)

Note: No information contained within this application is claimed confidential.

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

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ATTACHMENT R

NOT APPLICABLE (SEE NOTE)

Note: No delegation of authority.

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

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ATTACHMENT S

NOT APPLICABLE (SEE NOTE)

Note: Not a Title V Permit Revision.

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

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ATTACHMENT T

PERMIT APPLICATION FEE

Rule 13 Permit Application

Oxford 13 Well Pad, New Facility
New Milton, West Virginia

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May 2015