AIR QUALITY PERMIT NOTICE

Notice of Intent to Approve

On May 5, 2015, CNX Gas Company, LLC applied to the WV Department of Environmental Protection, Division of Air Quality (DAQ) for a permit to construct the Oxford 13 natural gas production facility located in a rural area of Doddridge County approximately 5.49 miles south-southwest of New Milton, WV along a new access road created off of County Route (CR) 40 in Doddridge County, WV at latitude 39.16876 and longitude -80.74779. A preliminary evaluation has determined that all State and Federal air quality requirements will be met by the proposed facility. The DAQ is providing notice to the public of its preliminary determination to issue the permit as R13-3248.

The following potential emissions will be authorized by this permit action: Particulate Matter less than 2.5 microns, 1.08 tons per year (TPY); Particulate Matter less than 10 microns, 1.08 TPY; Particulate Matter, 1.08 TPY; Sulfur Dioxide, 4.11 TPY; Oxides of Nitrogen, 26.03 TPY; Carbon Monoxide, 92.11 TPY; Volatile Organic Compounds, 123.49 TPY; Hazardous Air Pollutants, 5.90 TPY.

Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on XXXXX. A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed construction will meet all State and Federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination. Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

Joe Kessler, PE
WV Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
Telephone: 304/926-0499, ext. 1219
FAX: 304/926-0478

Additional information, including copies of the draft permit, application and all other supporting materials relevant to the permit decision may be obtained by contacting the engineer listed above. The draft permit and engineering evaluation can be downloaded at:

http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx

Kessler, Joseph R

From: Adkins, Sandra K
Sent: Friday, July 24, 2015 9:09 AM
To: wentworth.paul@epa.gov; bradley.megan@epa.gov; craigneal@consolenergy.com
Cc: Durham, William F; McKeone, Beverly D; McCumbers, Carrie; Hammonds, Stephanie E; Taylor, Danielle R; Kessler, Joseph R; jhanshaw@slrconsulting.com
Subject: WV Draft Permit R13-3248 for CNX Gas, LLC; Oxford 13
Attachments: 3248.pdf; Eval3248.pdf; AttachmentA.pdf; AttachmentB.pdf; notice.pdf

Please find attached the Draft Permit R13-3248, Engineering Evaluation, Attachment A, Attachment B, and Public Notice for CNX Gas, LLC's Oxford 13 Natural Gas Production Facility, located in Doddridge County.

The notice will be published in *The Herald Record* on Tuesday, July 28, 2015, and the thirty day public comment period will end on Thursday, August 27, 2015.

Should you have any questions or comments, please contact the permit writer, Joe Kessler, at 304 926-0499 x1219.

Kessler, Joseph R

From: Adkins, Sandra K
Sent: Friday, July 24, 2015 9:09 AM
To: Wheeler, Cathy L
Cc: Kessler, Joseph R
Subject: DAQ Public Notice

Please see below the Public Notice for Draft Permit R13-3248 for CNX Gas, LLC's Oxford 13 Natural Gas Production Facility located in Doddridge County.

The notice will be published in *The Herald Record* on Tuesday, July 28, 2015, and the thirty day public comment period will end on Thursday, August 27, 2015.

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Written comments or requests for a public meeting must be received by the DAQ before 5:00 p.m. on Thursday, August 27, 2015. A public meeting may be held if the Director of the DAQ determines that significant public interest has been expressed, in writing, or when the Director deems it appropriate.

The purpose of the DAQ's permitting process is to make a preliminary determination if the proposed construction will meet all State and Federal air quality requirements. The purpose of the public review process is to accept public comments on air quality issues relevant to this determination. Only written comments received at the address noted below within the specified time frame, or comments presented orally at a scheduled public meeting, will be considered prior to final action on the permit. All such comments will become part of the public record.

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Division of Air Quality
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Charleston, WV 25304
Telephone: 304/926-0499, ext. 1219
FAX: 304/926-0478

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http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx

Kessler, Joseph R

From: Adkins, Sandra K
Sent: Thursday, July 23, 2015 3:04 PM
To: theheraldrecord1@gmail.com
Cc: Kessler, Joseph R
Subject: Publication of Class I Legal Ad for the WV Division of Air Quality

Please publish the information below as a Class I legal advertisement (one time only) in the Tuesday, July 28, 2015, issue of *The Herald Record*. I would like to bring to your attention that this is the second ad that we want published in the paper on the same date – this email is not a duplication. Please let me know that this has been received and will be published as requested. Thank you.

Send the invoice for payment and affidavit of publication to:

Sandra Adkins

WV Department of Environmental Protection
DIVISION OF AIR QUALITY

601- 57th Street

Charleston, WV 25304

Thank you for your assistance. Should you have any questions, please contact me at 304-926-0499 x1250.

AIR QUALITY PERMIT NOTICE

Notice of Intent to Approve

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Joe Kessler, PE
WV Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
Telephone: 304/926-0499, ext. 1219
FAX: 304/926-0478

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http://www.dep.wv.gov/daq/Pages/NSRPermitsforReview.aspx

REVISED & UPDATED APPLICATION

July 20, 2015

Joe Kessler
Permit Writer
WVDEP, Division of Air Quality
601 – 57th Street
Charleston, West Virginia 25304

Re: CNX Gas, Revised Application for Final Public Notice
Oxford 13 Well Pad, Facility ID 017-00153, Permit Number R13-3248

Dear Mr. Kessler,

Please find attached a hard copy and two electronic DVDs of the final Oxford 13 application for public notice. The application encompasses all updates reflected since the original May 5, 2015 submittal. CNX Gas appreciates your patience and assistance in working through this process to fine tune the equipment covered at the Oxford 13 site.

We look forward to working with you through the comment period and the final issuance of this permit. Please feel free to contact Jesse Hanshaw, with any questions or comments related to the application at (304) 545-8563 or by email at jhanshaw@slrconsulting.com.

Sincerely,

Craig Neal

Craig Neal
Vice President Gas Operations

Attachment: Oxford 13- Final Application for Public Notice

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: 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

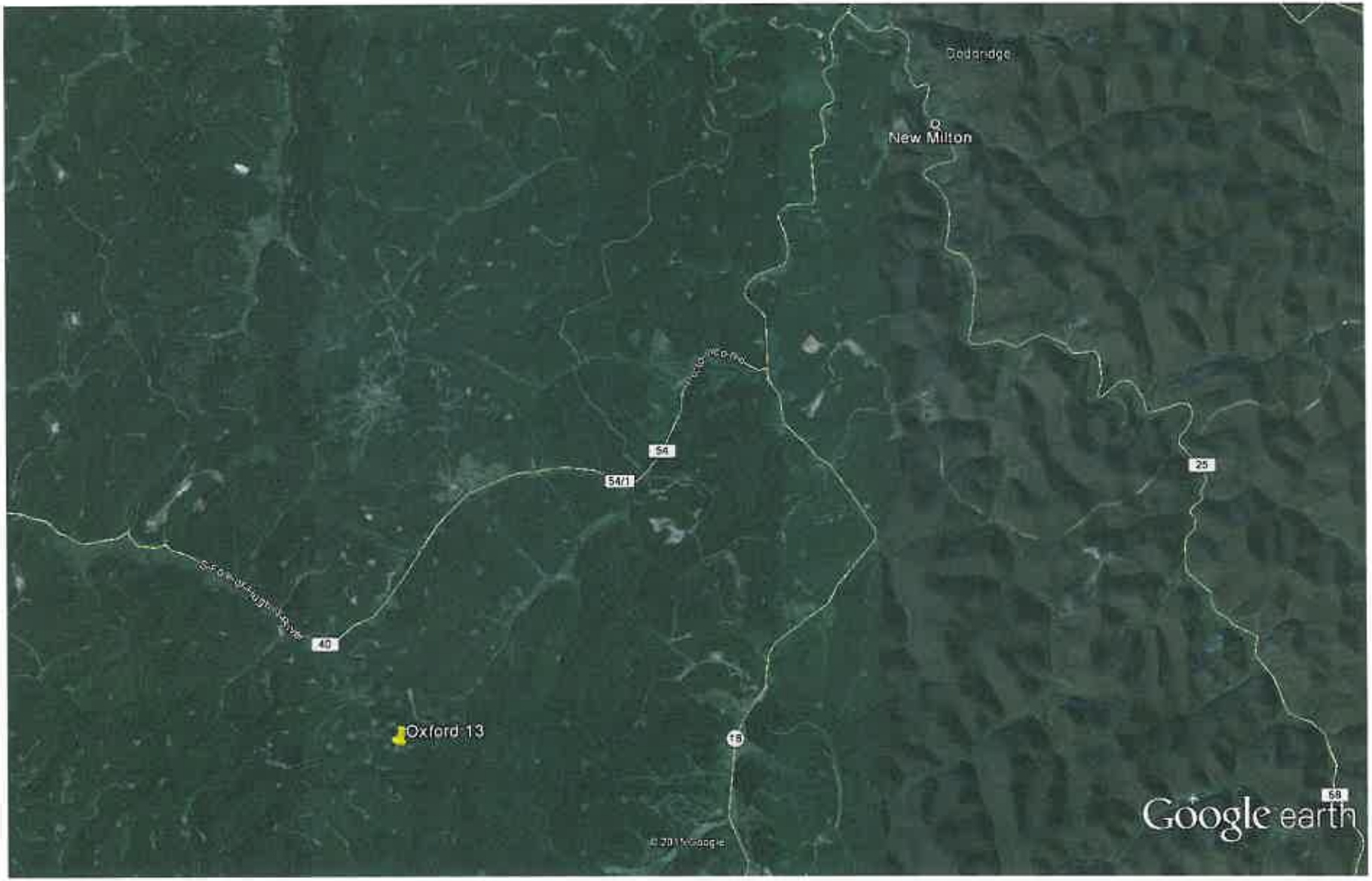
MAP

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



Google earth

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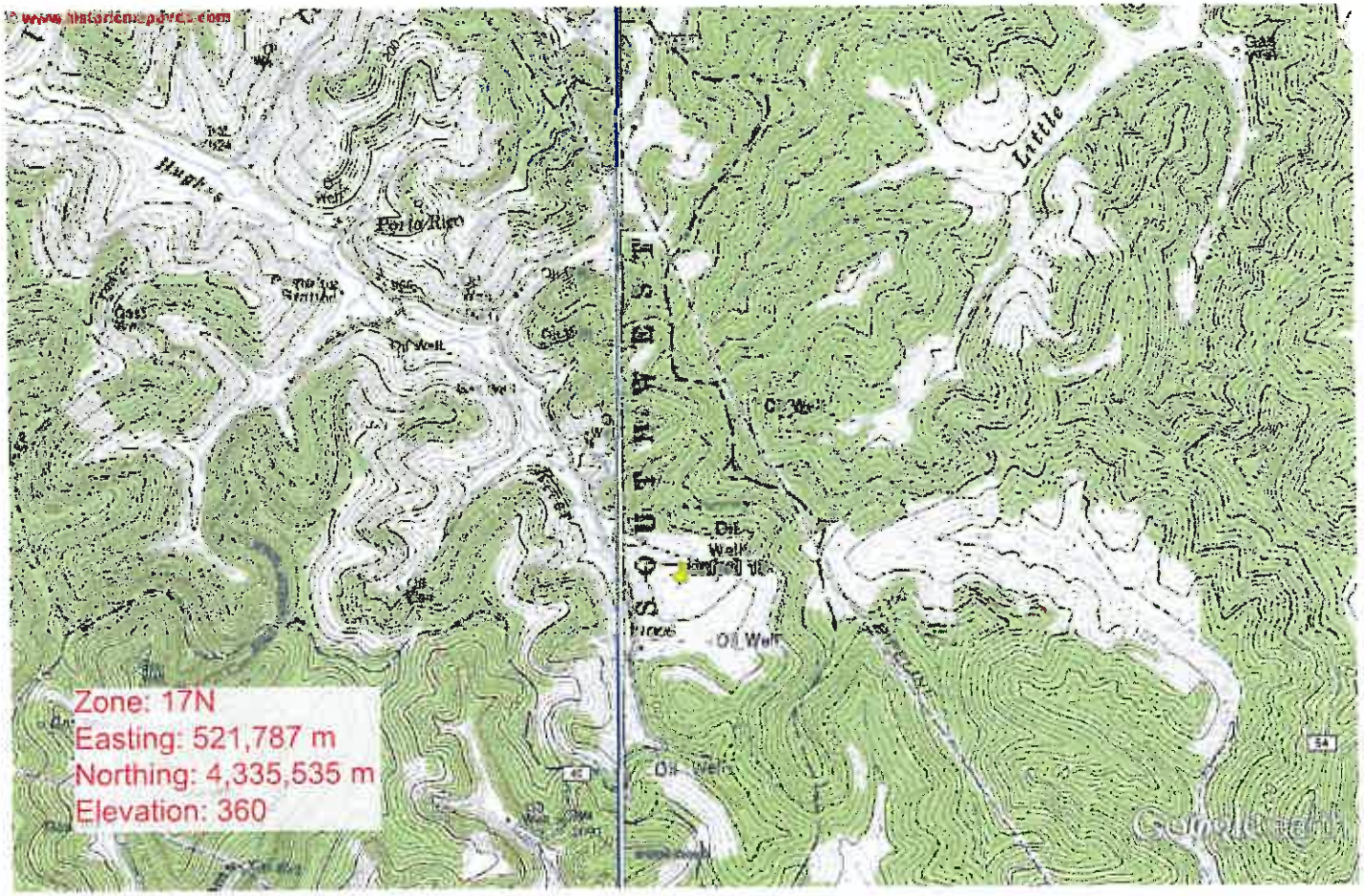

Hughes
Porto Rico
Little
Oil Well
Zone: 17N
Easting: 521,787 m
Northing: 4,335,535 m
Elevation: 360
Google earth
miles
km
1
2
07/20/2015

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

The natural gas fueled flash gas compressor (CE-2) is a 840 HP 4SLB Waukesha F3524GSI unit and is considered a new unit as a result of it commencing construction on January 4, 2007 when ordered by USA Compression Rentals. Due to the units manufacturing date of 11-27-2006 the emission standards of this subpart do not apply due to being manufactured before the applicability date of 7-1-2008 as defined in Table 1.

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

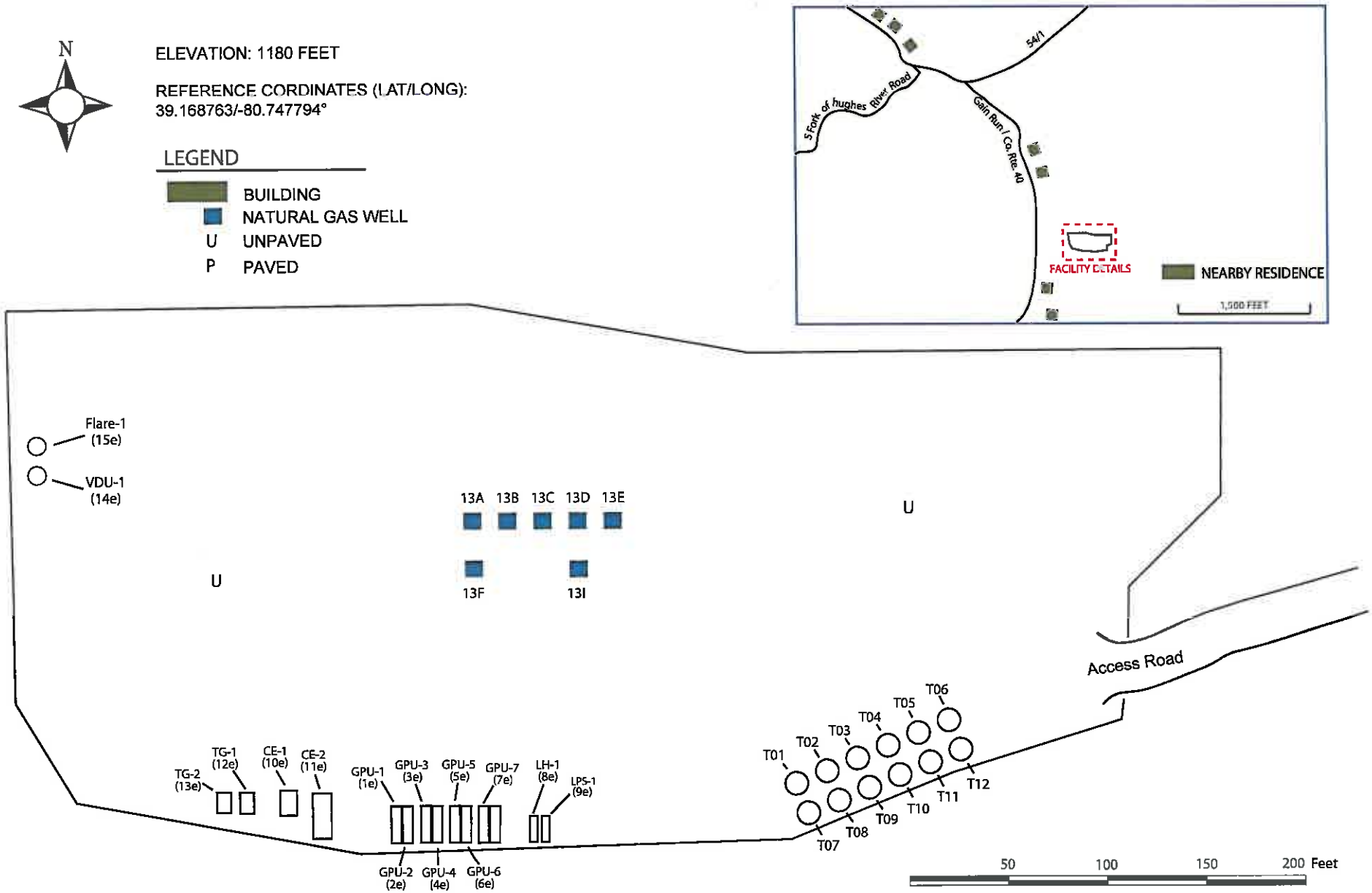
PLOT PLAN

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



Report: Regulation 13 Application	CNX Gas Company, LLC Oxford 13 Well Pad New Milton, West Virginia	SLR 07/20/2015
Drawing: PLOT PLAN		
Date: March 25, 2015	FIGURE 1	

ATTACHMENT F

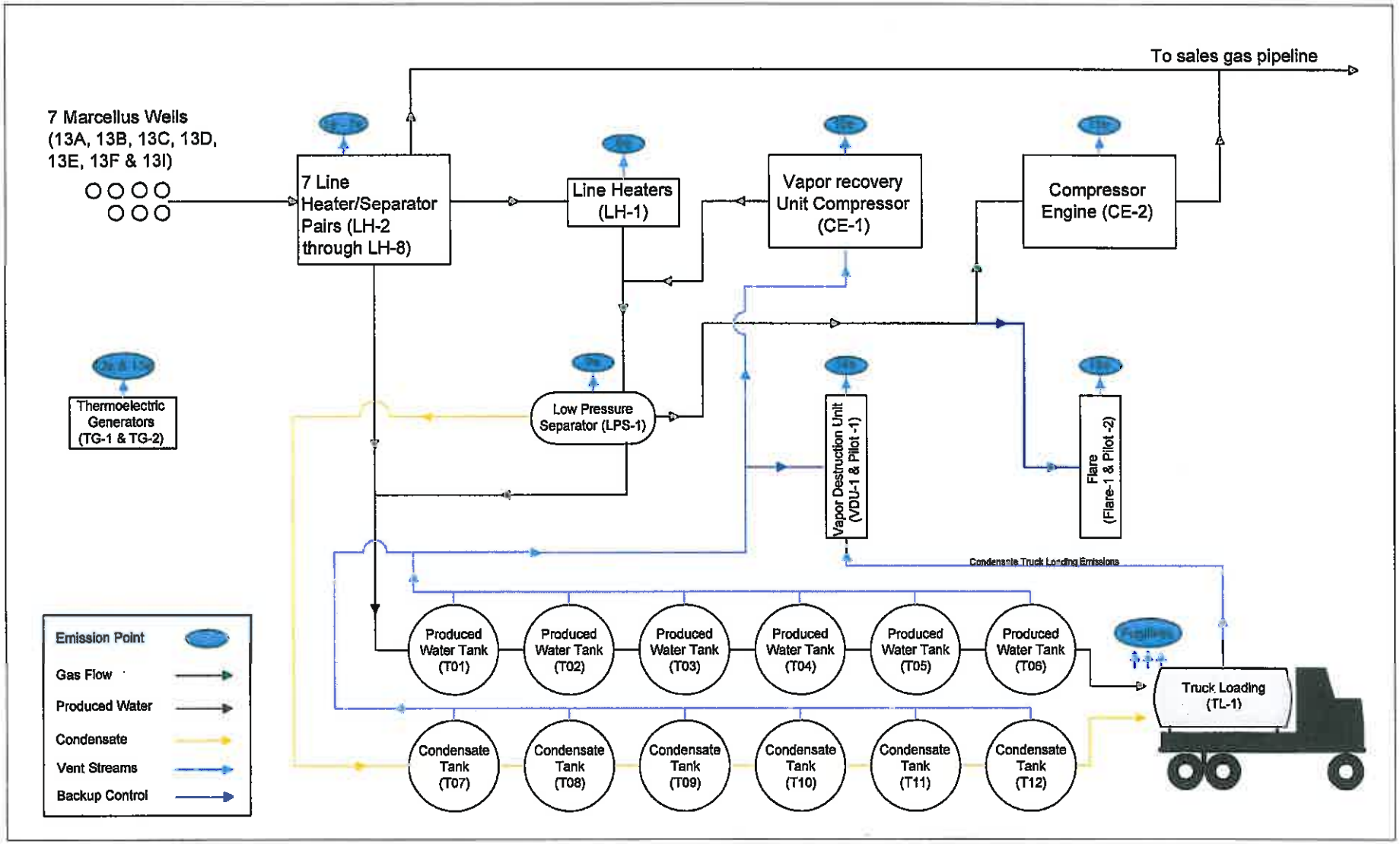
PROCESS FLOW DIAGRAM

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

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 line heater, separator pairs (LH-2 through LH-8).

In the separator, the well stream is divided into sales gas, produced water and a condensate. The gas will leave the separator 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 within this low pressure separator step will be sent to a flash gas compressor (CE-1). This flash gas stream is recycled to the sales gas line. In the event the flash gas compressor (CE-1) is down, this process 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 75% of max flow 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). The tank vapors will be compressed and recycled back into the sales line via the suction side of the flash gas compressor. If the vapor recovery unit is down, the 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 simulation modeling software. 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. Since, the VDU and VRU cannot run at the same time due to design constraints, the sites potential emissions take into account the greatest VOC value from the 98% VDU control scenario. Likewise, the facility wide total CO emissions eliminated those coming from the VRU compressor and counted the CO from the VDU to assure the worst case scenario.

With respect to 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

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:	For Health Emergencies:
Spill, Leak, Fire or Accident	California Poison
Call CHEMTREC	Control System
North America: (800)424-9300	(800)356-3129
Others: (703)527-3887(collect)	

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□ronment, 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□□ness
H315	Causes s□n 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

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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 □sion, 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□n 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□de 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□ng 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□ng 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□□e loc□ open de□ice. □se only appro□ed containers. □eep containers tightly closed. Place the container on the ground before filling. □eep the no□□e 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□n	1 ppm TWA 5 ppm STE□ S□n	0.5 ppm TWA 1 ppm STE□ S□n 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□n	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□n	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□n - 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 □fe and Health

Personal Protective Equipment

General Considerations Consider the potential ha□ards of this material, applicable exposure limits, □b 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□ng 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□ng glo□es. Also wash hands with plenty of mild soap and water before eating, drin□ng, smo□ng, using toilet facilities or lea□ng 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.

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□ng 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□n irritation. Repeated exposure may cause s□n dryness or crac□ng 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□□ness, 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□□ness, 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 □a 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□□lness, 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 □tro

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□n 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, □dneys 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 □□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□dence of □dney, 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 □dney (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□□ness, 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)

11□ TO□ICOLOGICAL INFORMATION

□C50 □ 8,000 ppm (4-hr, Rat)
Oral □D50 □ 2.5 - 7.□ g/□g (Rat)
Target Organs: Epidemiology studies suggest that chronic occupational o□rexposure to toluene may damage color □ision. Subchronic and chronic inhalation studies with toluene produced □dney 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, □dney, and central ner□ous system damage, including hearing loss and □sual 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□dual 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□ss)

Coating action of oil can □ll 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□dual 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□ng 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□ronment

Ris□ Phrases

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

Safety Phrases

S16-53-45-2-23-24-2□-43-62
□eep away from sources of ignition – No smo□ng. 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□n. 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 rece□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]
LH-2	1e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-3	2e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-4	3e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-5	4e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-6	5e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-7	6e	Line Heater	2015	1.0 MMBtu/hr	New	None
LH-8	7e	Line Heater	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	None
CE-2	11e	Flash Gas Compressor Engine	2015	840 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	LH2	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	LH3	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	LH4	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	LH5	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	LH6	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	LH7	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	LH8	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	NA	NA	NA	NA	PM SO2 NOx CO VOC Formaldehyde CO_2e	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	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 Rich Burn RICE	2C	Catalytic Converter	NA	NA	PM SO2 NOx CO VOC Formaldehyde CO_2e	0.14 0.01 28.89 23.15 0.35 0.09 878	0.62 0.02 126.53 101.39 1.54 0.41 3,478	0.14 0.01 0.38 0.56 0.35 0.09 878	0.62 0.02 1.64 2.43 1.54 0.41 3,478	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 n-Hexane HAPs CO_2e	6.81 1.25 145.18 0.35 6.93 7.66 2142.90	29.80 5.48 476.91 1.51 22.78 25.18 9385.90	6.81 1.25 2.91 0.35 0.14 0.16 2142.90	29.80 5.48 9.54 1.51 0.46 0.51 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 n-Hexane HAPs CO_2e	92.51 17.00 8808.68 5.11 396.69 435.37 29,223	46.28 8.51 3303.26 2.56 148.76 163.26 14,612	92.51 17.00 176.17 5.11 7.93 8.71 29,223	46.28 8.51 66.07 2.56 2.98 3.27 14,612	Gas/ Vapor	EE	Can Supply Upon Request
-	None	T01-T06	Produced Water Tanks	VDU-1	Vapor Destruction Unit	NA	NA	VOC	4.40	14.44	0.09	0.29	Gas/ Vapor	EE	Can Supply Upon Request

-	None	T07-T12	Condensate Tanks	VDU-1	Vapor Destruction Unit	NA	NA	VOC	140.78	462.46	2.82	9.25	Gas/ Vapor	EE	Can Supply Upon Request
14e	Vertical Stack	TL-1	Truck Loading	VDU-1	Vapor Destruction Unit	NA	NA	VOC	11.40	37.43	3.73	12.23	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. (°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

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 (ft²):	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/ft²-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]
LH-2	1e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-3	2e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-4	3e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-5	4e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-6	5e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-7	6e	Line Heater	2015	New	NA	1.0 MMBtu/hr	1020
LH-8	7e	Line Heater	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		Waukesha F3524GSI	
Manufacturer's Rated bhp/rpm		68/1800		840 1200	
Source Status[3]		NS		NS	
Date Installed/Modified/Removed[4]		2015		2015	
Engine Manufactured/Reconstruction Date[5]		06/01/1998		11/27/2006	
Is this engine subject to 40CFR60, Subpart JJJJ?		No		No	
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		Yes	
Engine, Fuel and Combustion Data	Engine Type[7]	4SRB		4SRB	
	APCD Type[8]	NA		NSCR	
	Fuel Type[9]	RG		RG	
	H_2S (gr/100 scf)	0.25		0.25	
	Operating bhp/rpm	68/1800		840/1200	
	BSFC (Btu/bhp-hr)	8,038		8676	
	Fuel throughput (ft^3/hr)	536		6220	
	Fuel throughput ($MMft^3$/yr)	4.70		54.5	
	Operation (hrs/yr)	8760		8760	
Reference[10]	Potential Emissions[11]	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO_X	1.39	6.09	0.38	1.64
	CO	2.28	9.98	0.56	2.43
	VOC	0.02	0.08	0.35	1.54
	SO_2	<0.01	<0.01	<0.01	0.02
	PM_{10}	0.03	0.13	0.15	0.62
	Formaldehyde	0.02	0.06	0.09	0.41
MRR[12]	Proposed Monitoring:	Hours of operation		Hours of operation	
	Proposed Recordkeeping:	Will keep records for 5 years and 2 years on site.		Wi ll 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 (°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	70	
Minimum control efficiency (%)	0	99	

* *Continued on next page*

Maximum Emission Rate	Loading (lb/hr)	0.44	3.29	
	Annual (ton/yr)	1.44	10.80	
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
(Non-Selective Catalytic Reduction Control)

Control Device ID No. (C2):

Equipment Information

1. Manufacturer: Miratech. Model No. RCS2-3024-10-EC2	2. Control Device Name: C2 Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. 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 4609 cfm at 1249 °F	
7. Guaranteed minimum collection efficiency for each pollutant collected: The catalyst manufacturer list 98.7% reduction efficiency for NOx and 97.6% for CO	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 1424 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 (%):	18.5 %	

16. Type of pollutant(s) controlled: ☐ Particulate (type):	☐ SO_x ☐ Odor ☒ Other CO & NOx
17. Inlet gas velocity: 43.15 scf/sec	18. Pollutant specific gravity:
19. Gas flow into the collector: 4609 cfm ACF @ 1249°F	20. Gas stream temperature: Inlet: 750-1250 °F Outlet: 1350 °F
21. Gas flow rate: Design Maximum: 4609 ACFM Average Expected: 4148 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 lb/hr	IN Pollutant grains/acf	Emission Capture Efficiency %	OUT Pollutant lb/hr	OUT Pollutant grains/acf	Control Efficiency %
A NOx	28.89		100	0.38		98.7
B CO	23.15		100	0.56		97.6
C						
D						
E						

24. Dimensions of stack: Height 16 ft. Diameter 0.83 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: Upon Request

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. 98.7% for NOx, and 97.6% for CO

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?	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.
☒ Yes ☐ No	

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?	28. If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, describe:
☒ Yes ☐ No	

29. Pollutant(s) Controlled	30. % Capture Efficiency	31. Manufacturer's Guaranteed Control Efficiency (%)
VOC	99	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[3]	CO[2]	VOC[1]	CO_{2e}
Tanks with VDU 98% DRE (ton/yr)	-	-	-	-	-	-	9.538	-
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)	0.749	0.749	0.749	0.020	7.730	12.405	1.622	4189.048
Vapor Destruction Unit (VDU) (tons/yr)	-	-	-	1.501	5.475	29.791	9.538	9385.892
Process Flare (ton/yr)	-	-	-	2.557	8.505	46.278	66.076	14611.250
Thermoelectic Burner (ton/yr)	-	-	-	-	0.011	0.005	-	-
Truck Loading (ton/yr)	-	-	-	-	-	-	12.228	-
Fugitive Equipment Leaks (ton/yr)	-	-	-	-	-	-	32.384	352.339
Total Point Source Emissions (ton/yr)	1.08	1.08	1.08	4.10	20.54	82.11	89.70	33663.56
Total Emissions (lb/hr)	0.25	0.25	0.25	0.94	4.69	18.75	20.48	7685.74

Notes:

(1) The VOC total does not include emissions from the tanks since it has already been included within the VDU.
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 and n-Hexane 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 VOC 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 not a listed source category under Title V or PSD Regulations
(2) The PTE for facility wide CO does not include emissions from CE1, the VRU compressor, because it assumes worst case VDU emissions operating 8760 hrs/yr
(3) The PTE for facility wide NOx does not include emissions from the VDU combustor, because it assumes worst case VRU Compressor emissions from CE1 operating 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
Flares (ton/yr)					3.431		3.769
Engines (ton/yr)	0.055	0.002	0.001	0.007	0.003	0.461	0.528
Total Emissions (ton/yr)	0.055	0.002	0.001	0.007	3.511	0.464	4.377
Total Emissions (lb/hr)	0.012	0.000	0.000	0.002	0.802	0.106	0.999

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	4.40	14.44	0.088	0.289
T07-T12	Condensate	None	1150.00	140.78	462.46	2.816	9.249
Total				**145.176**	**476.902**	**2.904**	**9.538**

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	41.398
i-Butane	12.680
n-Butane	29.646
i-Pentane	13.104
n-Pentane	13.965
n-Hexane	6.929
Isohexane	8.945
Neohexane	1.094
2,2,4-Trimethylpentane	0.038
Benzene	0.205
n-Heptane	7.539
Toluene	0.371
Octane	3.971
Ethylbenzene	0.026
o-Xylene	0.032
Nonane	0.777
C11	0.001
Decane	0.005
C10+	0.055
VOCs	**140.78**
HAPs	**7.60**

Water Tanks Vented Emissions

Pollutant	lb/hr
Propane	3.682
i-Butane	0.120
n-Butane	0.417
i-Pentane	0.053
n-Pentane	0.046
n-Hexane	0.004
Isohexane	0.007
Neohexane	0.001
2,2,4-Trimethylpentane	0.000
Benzene	0.027
n-Heptane	0.005
Toluene	0.029
Octane	0.001
Ethylbenzene	0.001
o-Xylene	0.002
Nonane	0.000
C11	0.000
Decane	0.000
C10+	0.000
VOCs	**4.40**
HAPs	**0.06**

Emission Unit	Tank Contents	Control Devices	Tank Throughput (bbls/day)	HAPs	Uncontrolled VOC Emissions (ton/yr)	98 %VOC Control (lb/hr)	98 %VOC Control (ton/yr) *(b)*
T07-T12	Condensate	None	1150.00	n-Hexane	22.763	0.139	0.455
				HAPs	24.968	0.152	0.499
T01-T06	Produced Water	None	2760.00	n-Hexane	0.013	0.000	0.000
				HAPs	0.206	0.001	0.004
				Total n-Hexane	**22.775**	**0.139**	**0.456**
Total				**Total HAPs**	**25.175**	**0.153**	**0.503**

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

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

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 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. Waukesha F3524GSI 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	1.94E-02 lb/MMBtu	(2)	0.141	0.62
SO_2	5.88E-04 lb/MMBtu	(2)	0.004	0.02
NOx	0.20 g/hp-hr	(1)	0.376	1.64
CO	0.30 g/hp-hr	(1)	0.556	2.43
VOC	0.19 g/hp-hr	(1)	0.352	1.54
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	2.53E-05 lb/MMBtu	(2)	1.84E-04	8.08E-04
1,1,2-Trichloroethane	1.53E-05 lb/MMBtu	(2)	1.12E-04	4.88E-04
1,3-Butadiene	6.63E-04 lb/MMBtu	(2)	4.83E-03	2.12E-02
1,3-Dichloropropene	1.27E-05 lb/MMBtu	(2)	9.26E-05	4.05E-04
2-Methylnaphthalene	1.30E-05 lb/MMBtu	(2)	9.47E-05	4.15E-04
2,2,4-Trimethylpentane	6.63E-04 lb/MMBtu	(2)	4.83E-03	2.12E-02
Acetaldehyde	2.79E-03 lb/MMBtu	(2)	2.03E-02	8.91E-02
Acrolein	2.63E-03 lb/MMBtu	(2)	1.92E-02	8.40E-02
Benzene	1.58E-03 lb/MMBtu	(2)	1.15E-02	5.04E-02
Carbon Tetrachloride	1.77E-05 lb/MMBtu	(2)	1.29E-04	5.65E-04
Chlorobenzene	1.29E-05 lb/MMBtu	(2)	9.40E-05	4.12E-04
Chloroform	1.37E-05 lb/MMBtu	(2)	9.98E-05	4.37E-04
Ethylbenzene	2.48E-05 lb/MMBtu	(2)	1.81E-04	7.92E-04
Ethylene Dibromide	2.13E-05 lb/MMBtu	(2)	1.55E-04	6.80E-04
Formaldehyde	5.00E-02 g/hp-hr	(1)	0.093	0.41
Methanol	3.06E-03 lb/MMBtu	(2)	2.23E-02	9.77E-02
Methylene Chloride	4.12E-05 lb/MMBtu	(2)	3.00E-04	1.32E-03
Naphthalene	9.71E-05 lb/MMBtu	(2)	7.08E-04	3.10E-03
PAH (POM)	1.41E-04 lb/MMBtu	(2)	1.03E-03	4.50E-03
Styrene	1.19E-05 lb/MMBtu	(2)	8.67E-05	3.80E-04
Toluene	5.58E-04 lb/MMBtu	(2)	4.07E-03	1.78E-02
Vinyl Chloride	7.18E-06 lb/MMBtu	(2)	5.23E-05	2.29E-04
Xylenes	1.95E-04 lb/MMBtu	(2)	1.42E-03	6.22E-03
Total HAP	**6.2E-02 lb/MMBtu**		**0.184**	**0.81**
Greenhouse Gas Emissions				
CO_2	474.00 g/hp-hr	(1)	877.8	3844.7
CH_4	0.14 g/hp-hr	(1)	0.3	1.1
N_2O	2.2E-04 lb/MMBtu	(3)	1.61E-03	7.04E-03
CO_2e[b]	-	-	878.0	3875.2

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) =	626	
Engine Power Output (hp) =	840	
Number of engines Operating at a Time =	1	
Fuel throughput=	6,224	
BSFC (Btu/hp-hr) =	8,676	(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 Waukesha F3524GSI Specification Sheet Unit 1721

(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.

(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	**6.80**	**29.79**
NOx	**1.25**	**5.48**
VOC	**2.90**	**9.54**
SO_2	**0.34**	**1.50**
n-Hexane	0.14	0.46
HAPs	0.15	0.50

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

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)	176.17	66.07
CO2	116.89	125,000	2,000	(1/1,000,000)	29222.50	14611.25
n-hexane					7.93	2.98

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 uncontrolled 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:

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

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

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:

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

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

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	176.18	66.08
SO_2	5.11	2.56
n-Hexane	7.93	2.98
HAPs	8.71	3.27

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

Promax LPS Stream to Compressor			
Components	lb/hr	lb/hr VOC	lb/hr HAPs
Methane	3534.73		
Ethane	3529.30		
Propane	3068.19	3068.19	
i-Butane	779.101	779.10	
n-Butane	1751.69	1751.69	
i-Pentane	734.079	734.08	
n-Pentane	777.577	777.58	
Nitrogen	17.9304		
Carbon Dioxide	45.6300		
Oxygen	0.379229		
n-Hexane	396.690	396.690	396.690
Isohexane	494.780	494.780	
Neohexane	60.3536	60.354	
2,2,4-Trimethylpentane	2.15766	2.158	2.158
Benzene	11.6810	11.681	11.681
n-Heptane	427.126	427.126	
Toluene	21.4266	21.427	21.427
Octane	230.375	230.375	
Ethylbenzene	1.50974	1.510	1.510
o-Xylene	1.90430	1.904	1.904
Nonane	46.1145	46.114	
C11	0.0483044	0.048	
Decane	0.309367	0.309	
Water	2.11789		
C10+	3.56536	3.56536	
Uncontrolled	lb/hr	8806.68	435.37
Controlled	lb/hr	176.17	8.71
	ton/yr	66.07	3.27

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	5.444	10.956	35.989	3.287	10.797
Total			11.391	37.421	3.722	12.228

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	8.56	Note [2]
Molecular Weight (lb/lb-mol)	19.00	44.66	Note [2]
Bulk Liquid Tempurature (F)	65.00	65.00	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

n-Hexane was evaluted within ProMax and found to be less than 0.02 lb/hr. Therefore was determined to be negligible

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 1721 Waukesha F3524GSI Engine Emissions

Date of Manufacture	November 27, 2006	Engine Serial Number	C16267/1	Date Modified/Reconstructed	N/A
Driver Rated HP	840	Rated Speed in RPM	1200	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	6	Compression Ratio	8:1	Combustion Setting	Rich Burn
Total Displacement (in^3)	3520	Fuel Delivery Method	Carburetor	Combustion Air Treatment	T.C./Intercooled

Raw Engine Emissions with Customer Supplied Fuel Gas Analysis

Fuel Consumption 8525 *LHV BTU/bhp-hr or* 8676 *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)	15.6		28.89	126.53
Carbon Monoxide (CO)	12.5		23.15	101.39
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.19		0.35	1.54
Formaldehyde (CH2O)	0.05		0.09	0.41
Particulate Matter (PM) Filterable+Condensable		1.94E-02	1.41E-01	6.20E-01
Sulfur Dioxide (SO2)		5.88E-04	4.29E-03	1.88E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	474	878	3487
Methane (CH4)	0.14	0.26	1.03

[1] g/bhp-hr are based on Waukesha Specifications assuming 934 LHV BTU/SCF fuel gas, 1000 ft elevation, and 77 F Max Air Inlet Temperature. Note that g/bhp-hr values are based on 100% Load Operation. For Air Permitting, it is recommended to add a safety margin to CO, VOC, and Formaldehyde to account for variations in fuel gas composition and load.
[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 3.2-3).

Catalytic Converter Emissions

Catalytic Converter Make and Model: *Miratech, RCS-3024-EC2*
Element Type: *RE-24-EC*
Number of Elements in Housing: *2*
Air/Fuel Ratio Control *Emit Advanced AFRC*

	% Reduction	lb/hr	TPY
Nitrogen Oxides (NOx)	98.7	**0.38**	**1.64**
Carbon Monoxide (CO)	97.6	**0.56**	**2.43**
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0	**0.35**	**1.54**
Formaldehyde (CH2O)	0	**0.09**	**0.41**
Particulate Matter (PM)	0	**1.41E-01**	**6.20E-01**
Sulfur Dioxide (SO2)	0	**4.29E-03**	**1.88E-02**

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	**878**	**3487**
Methane (CH4)	0	**0.26**	**1.03**

MIRATECH

Proposal Number: MH-15-0628

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Waukesha
Model Number:	F 3524 GSI
Power Output:	840 bhp
Power Output:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	4609 acfm (cfm)
Exhaust Temperature:	1249 F

System Details

Housing Model Number:	RCS2-3024-10-HSG
Element Model Number:	IQ-RE-24EC
Number of Catalyst Layers:	2
Number of Spare Catalyst Layers:	0
System Pressure Loss:	3.0 inches of WC (Clean)
Sound Attenuation:	25-30 dBA insertion loss
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	RCS2-3024-10-EC2
Material:	Carbon Steel
Inlet Pipe Size & Connection:	10 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	10 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	96 inches
Weight Without Catalyst:	558 lbs
Weight Including Catalyst:	646 lbs
Instrumentation Ports:	1 inlet/1 outlet/2 catalyst (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
CO	12.5	97.6	0.3	0.3 g/bhp-hr
NMHC*	0.28			
NMNEHC**	0.19	0	0.2	0.2 g/bhp-hr
NO_x***	15.6	98.7	0.2	0.20 g/bhp-hr
O2	0.3%			
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

DRESSER Waukesha

VHP - F3524GSI

Gas Compression

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ENGINE SPEED (rpm):	1200	COOLING SYSTEM:	JW, IC + OC
DISPLACEMENT (in3):	3520	INTERCOOLER WATER INLET (°F):	130
COMPRESSION RATIO:	8:1	JACKET WATER OUTLET (°F):	180
IGNITION SYSTEM:	ESM	JACKET WATER CAPACITY (gal):	49
EXHAUST MANIFOLD:	Water Cooled	AUXILIARY WATER CAPACITY (gal):	8
COMBUSTION:	Rich Burn, Turbocharged	LUBE OIL CAPACITY (gal):	72
ENGINE DRY WEIGHT (lbs):	15000	MAX. EXHAUST BACKPRESSURE (in. H2O):	20
AIR/FUEL RATIO SETTING:	0.38% CO	MAX. AIR INLET RESTRICTION (in. H2O):	15

SITE CONDITIONS:

FUEL:	Oxford Inlet Customer Supplied 1/2	ALTITUDE (ft):	1200
FUEL PRESSURE RANGE (psig):	30 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	90
FUEL SLHV (BTU/ft3):	1,151.3	FUEL WKI:	58.4
FUEL LHV (BTU/ft3):	1,171.7		

SITE SPECIFIC TECHNICAL DATA

POWER RATING	UNITS	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 90 °F		
			100%	75%	55%
CONTINUOUS ENGINE POWER	BHP	840	840	630	464
OVERLOAD	% 2/24 hr	10	10	-	-
MECHANICAL EFFICIENCY (LHV)	%	29.6	29.5	28.7	27.7
CONTINUOUS POWER AT FLYWHEEL *based on no auxiliary engine driven equipment*	BHP	840	840	630	464
FUEL CONSUMPTION					
FUEL CONSUMPTION (LHV)	BTU/BHP-hr	8618	8619	8875	9201
FUEL CONSUMPTION (SLHV)	BTU/BHP-hr	8468	8469	8721	9040
FUEL FLOW *based on fuel analysis LHV*	SCFM	108	108	84	64
HEAT REJECTION					
JACKET WATER (JW)	BTU/hr x 1000	2317	2298	1821	1416
LUBE OIL (OC)	BTU/hr x 1000	359	350	326	300
INTERCOOLER (IC)	BTU/hr x 1000	144	131	87	40
EXHAUST	BTU/hr x 1000	2054	2075	1513	1097
RADIATION	BTU/hr x 1000	369	387	349	318
EMISSIONS					
NOx (NO + NO2)	g/bhp-hr	15.6	15.7	16.1	16.8
CO	g/bhp-hr	12.5	12.4	12.4	12.5
THC	g/bhp-hr	0.4	0.4	0.5	0.7
NMHC	g/bhp-hr	0.27	0.27	0.31	0.40
NM, NEHC	g/bhp-hr	0.18	0.18	0.21	0.25
CO2	g/bhp-hr	471	471	485	503
AIR INTAKE / EXHAUST GAS					
INDUCTION AIR FLOW	SCFM	1310	1310	1012	772
EXHAUST GAS MASS FLOW	lb/hr	6099	6099	4710	3597
EXHAUST GAS FLOW *at exhaust temp, 14.5 psia*	ACFM	4568	4574	3399	2508
EXHAUST TEMPERATURE	°F	1244	1246	1182	1126

HEAT EXHANGER SIZING		
TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	2627
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	570

COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS		
JACKET WATER PUMP MIN. DESIGN FLOW	GPM	225
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	15
AUX WATER PUMP MIN. DESIGN FLOW	GPM	48
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	22

All data provided per the conditions listed in the notes section on page three.

Data Generated by EngCalc Program Version 3.0. Dresser Inc., Dresser Waukesha
5/29/2015 12:14 PM

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FUEL COMPOSITION

HYDROCARBONS:		Mole or Volume %
Methane	CH4	76.098
Ethane	C2H6	14.915
Propane	C3H8	4.8556
Iso-Butane	I-C4H10	0.6609
Normal Butane	N-C4H10	1.3067
Iso-Pentane	I-C5H12	0.3557
Normal Pentane	N-C5H12	0.3555
Hexane	C6H14	0.8148
Heptane	C7H16	0
Ethene	C2H4	0
Propene	C3H6	0
	SUM HYDROCARBONS	99.362
NON-HYDROCARBONS:		
Nitrogen	N2	0.4433
Oxygen	O2	0.0055
Helium	He	0
Carbon Dioxide	CO2	0.1889
Carbon Monoxide	CO	0
Hydrogen	H2	0
Hydrogen Sulfide	H2S	0
Water Vapor	H2O	0
	TOTAL FUEL	100

FUEL:	Oxford Inlet Customer Supplied 1/2015
FUEL PRESSURE RANGE (psig):	30 - 60
FUEL WKI:	58.4
FUEL SLHV (BTU/ft3):	1151.34
FUEL SLHV (MJ/Nm3):	45.27
FUEL LHV (BUT/ft3):	1171.73
FUEL LHV (MJ/Nm3):	46.08
FUEL DENSITY (SG):	0.74

Standard Conditions per ASTM D3588-91 [60°F and 14.696psia] and ISO 6976:1996-02-01[25, V(0;101.325)].
Based on the fuel composition, supply pressure and temperature, liquid hydrocarbons may be present in the fuel. These liquid hydrocarbons must be less than 2% by gaseous volume of the total fuel. The fuel must not contain any liquid water. WED recommends both of the following:
1) Dew point of the fuel gas to be at least 20°F (11°C) below the measured temperature of the gas at the inlet of the engine fuel regulator.
2) A fuel filter separator to be used on all fuels except commercial quality natural gas.
Refer to the 'Fuel and Lubrication' section of the 'GENERAL TECH DATA MANUAL' or contact the WED Engineering Department for additional information on fuels, or LHV and WKI ™ calculations.

Iso-butane and heavier hydrocarbons greater than 2%. Requires coalescing filter/seperator.

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NOTES

1. All data is based on engines with standard configurations unless noted otherwise.

2. Power rating is adjusted for fuel, site altitude, and site air inlet temperature, in accordance with ISO 3046/1 with tolerance of ± 3%.

3. Fuel consumption is presented in accordance with ISO 3046/1 with a tolerance of -0 / +5% at maximum rating. Fuel flow calculation based on fuel LHV and fuel consumption with added 5% tolerance.

4. Heat rejection tolerances are ± 30% for radiation, and ± 8% for jacket water, lube oil, intercooler, and exhaust energy.

5. Emission levels are given at engine exhaust outlet flange prior to any after treatment. Values are based on a new engine operating at indicated site conditions, and adjusted to the specified timing and air/fuel ratio at rated load. Emissions are at an absolute humidity of 75 grains H2O/lb (10.71 g H2O/kg) of dry air. Emission levels may vary subject to instrumentation, measurement, ambient conditions, fuel quality, and engine variation. Engine may require adjustment on-site to meet emission values, which may affect engine performance and heat output. NOx, CO, THC, and NMHC emission levels are listed as a not to exceed limit, all other emission levels are estimated.

6. Air flow is based on undried air with a tolerance of ± 7%.

7. Exhaust temperature given at engine exhaust outlet flange with a tolerance of ± 75°F (42°C).

8. Exhaust gas mass flow value is based on a "wet basis" with a tolerance of ± 7%.

9. Inlet and Exhaust Restrictions based on full rated engine load Refer to the engine specification section of Dresser Waukesha's standard technical data for more information.

10. Heat exchanger sizing values given as the maximum heat rejection of the circuit, with applied tolerances and an additional 5% reserve factor.

11. Cooling circuit capacity, lube oil capacity, and engine dry weight values are typical.

12. Fuel must conform to Dresser Waukesha "Gaseous Fuel Specification" S7884-7 or most current version. Fuel may require treatment to meet current fuel specification.

13. Cooling system design flow is based on minimum allowable cooling system flow. Cooling system maximum external restriction is defined as the allowable restriction at the minimum cooling system flow. Refer to technical data sheets S-5136-33 and S-6543-19 (or latest version) for more information.

REQUIRED OPTION CODES

ENVIRONMENTAL 9

FORMALDEHYDE EMISSION LEVELS

The following table provides formaldehyde (CH_2O) levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft³ (35.38 MJ/m³ [25, V(0, 101.325)]) SLHV, Waukesha Knock Index® of 91 or higher, 95% methane content by volume, and at ISO standard conditions. Values are based on standard engine timing at 91 WKI® with an absolute humidity of 42 grains/lb. Refer to engine specific WKI® Power & Timing curves for standard timing. Unless otherwise noted, these emission levels can be achieved across the continuous duty speed range at the load levels tabulated. *Contact the local Waukesha representative or Waukesha's Application Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.*

MODEL	CARB. SETTING	CH_2O GRAMS/ BHP-HR PERCENT LOAD		% OBSERVED DRY CO	% OBSERVED DRY O_2	MASS AFR[2]	VOLUME AFR[2]	EXCESS AIR RATIO
		100%	75%					
AT25GL	Lean Burn	0.18	0.20	0.06	9.8	28.0:1	16.8:1	1.74
275GL/AT27GL	Lean Burn	0.18	0.20	0.06	9.8	28.0:1	16.8:1	1.74
	Ultra Lean	0.18	0.20	0.05	11.2	32.0:1	19.2:1	2.00
12V220GL/APG2000 16V220GL/APG3000	Ultra Lean	0.29	0.29	0.05 – 0.15	12.3 – 13.4	32.1 – 35.3	19.3 – 21.2	2.03 – 2.20
16V150LTD/APG4000	Lean Burn	0.14	0.15	0.07	9.5 – 9.8	26.9 – 27.2	16.2 – 16.4	1.69 – 1.7
VHP G, GSI	Rich Burn	0.05	0.05	0.02 – 1.15	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06
VHP Series 4 GSI	Rich Burn	0.05	0.05	0.02 – 0.45	0.30 – 1.35	15.85:1 – 17.0:1	9.5:1 – 10.2:1	0.99 – 1.06
L5774LT L5794LT	Lean Burn	0.22	0.25	0.04	7.6 – 8.0	24.5:1 – 24.7:1	14.7:1 – 14.8:1	1.52 – 1.54
VHP GL	Lean Burn	0.29	0.34	0.06	9.6	28.0:1	16.8:1	1.74
VGF G, GSID	Rich Burn	0.05	0.05	0.20 – 1.1	0.16 – 2.4	15.5:1 – 18.0:1	9.3:1 – 10.8:1	0.97 – 1.12
VGF GL, GLD, GLDC	Lean Burn	0.18	0.22	0.03 – 0.04	7.8 – 8.0	21.5:1 – 25.4:1	12.9:1 – 15.2:1	1.33 – 1.55
VSG G, GSI, GSID	Rich Burn	0.05	0.05	0.02 – 1.15	0.29 – 2.10	15.5:1 – 17.7:1	9.3:1 – 10.6:1	0.97 – 1.10
F11G/TG	Rich Burn	0.05	0.05	0.04 – 1.35	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06
F817G	Rich Burn	0.05	0.05	0.04 – 1.30	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06

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

COMPONENTS	MOLE PERCENT	GPM
METHANE	76.0977	
ETHANE	14.9153	3.98
PROPANE	4.8556	1.33
I-BUTANE	0.6609	0.22
N-BUTANE	1.3067	0.41
I-PENTANE	0.3557	0.13
N-PENTANE	0.3555	0.13
NITROGEN	0.4433	
CARBON DIOXIDE	0.1889	
OXYGEN	0.0055	
HEXANES (PLUS)	0.3148	0.35
TOTAL	100.0000	

ANALYTICAL RESULTS AT BASE CONDITIONS (CALCULATED VALUES)

BTU/SCF (DRY):	1294.07
BTU/SCF (SATURATED):	1272.03
PRESSURE (PSIA):	14.696
TEMPERATURE (°F)	60.00
Z FACTOR (DRY):	0.9962
Z FACTOR (SATURATED):	0.9958
ETHANE + GPM	6.5778

SPECIFIC GRAVITIES (CALCULATED VALUES)

IDEAL GRAVITY	0.7409
REAL GRAVITY	0.7435

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

USA COMPRESSION

Emissions Report

04/21/2015

USA Compression Unit 1025 VRG330/LeRoi 4A219-1

Engine Serial Number :	P653	Engine Manufactured Date :	
Max HP :	68	Max RPM :	1800
Number of Engine Cylinders :		Total Displacement (in3) :	
Combustion Type & Setting :		Fuel Delivery Method:	
Compression Ratio :		Combustion Air Treatment :	
Engine Modified/Reconstructed? :			
Compressor Frame Serial # :	5252X382	Unit Packaged Date :	06/01/1998
Compressor Frame Max RPM :	1800	# of Compressor Throws :	

AIR ENVIRONMENTAL REGULATIONS

County and State Selected for Quote: Marion 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) :		2.27		
Carbon Monoxide (CO) :		3.72		
Volatile Organic Compounds (NMNEHC excluding CH2O) :		0.03		
Formaldehyde (CH2O) :		0.02		
Particulate Matter (PM) Filterable+Condensable :		0.0483		
Sulfur Dioxide (SO2) :		0.0006		

	g/bhp-hr	lb/MMBTU	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2) :		110		
Methane (CH4) :		0.23		

CONTROLLED EMISSIONS

Catalytic Converter Make and Model:

Catalyst Element Type:

Number of Catalyst Elements currently in Housing:

Air/Fuel Ratio Control : No

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).

Estimated Exhaust Emissions Based on Pipeline Quality Natural Gas

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	11.3	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
^ = 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

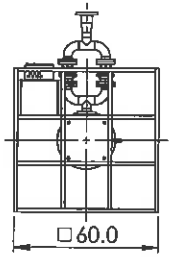
Available upon request.

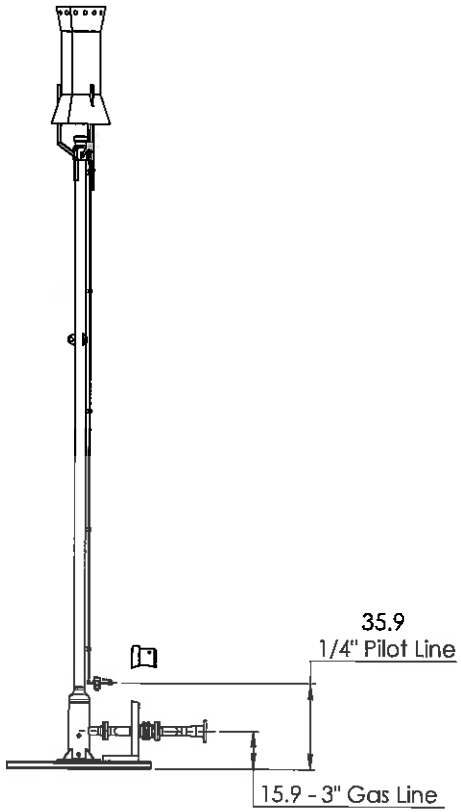
2 ATTACHMENTS

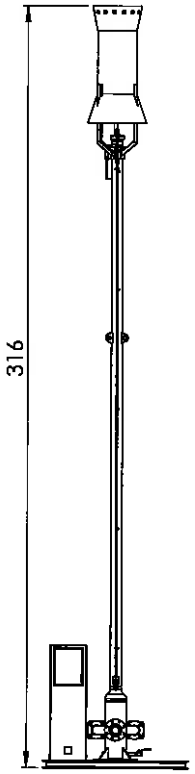
2.1 NOV Documents

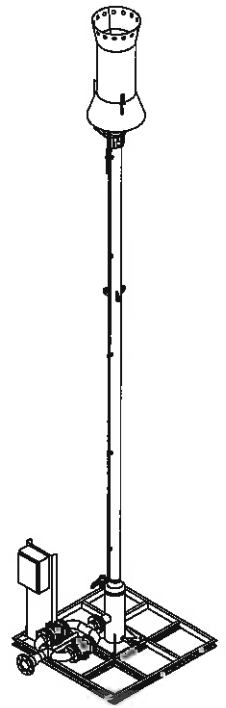
- NOV Terms and Conditions

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







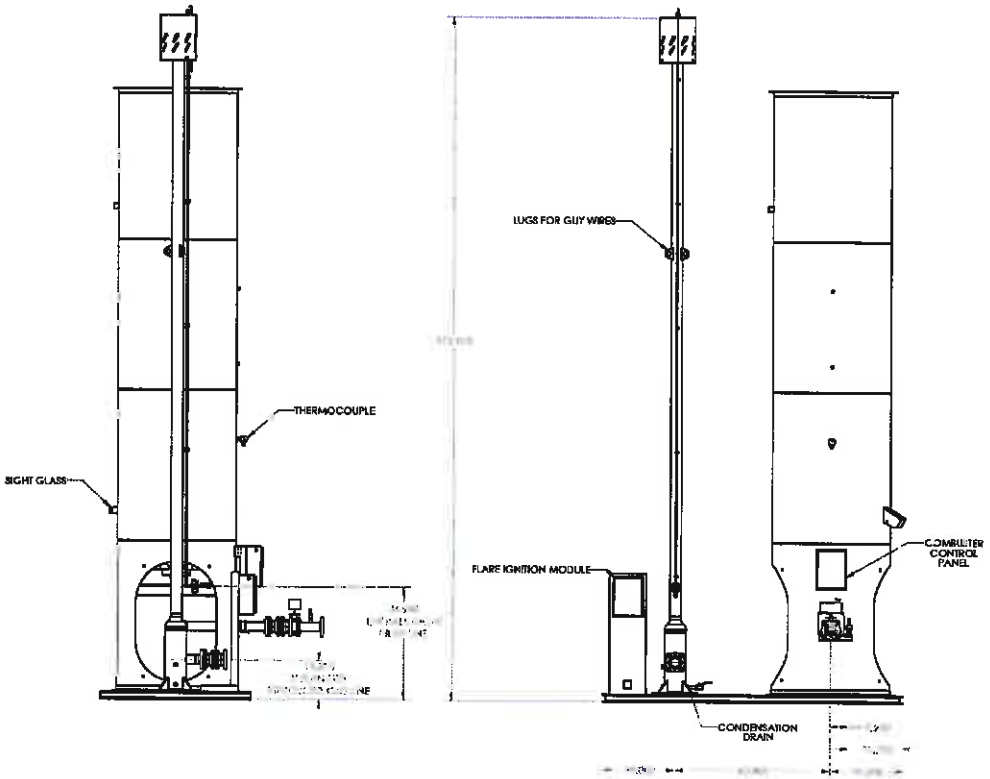


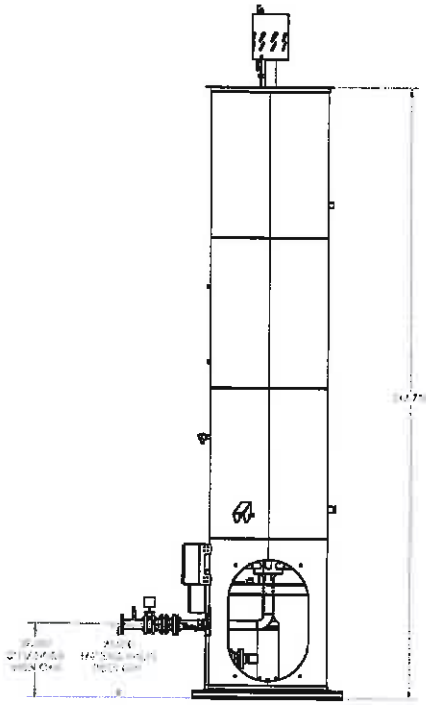
				UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL±	SCALE: 1:50 B
PROPRIETARY AND CONFIDENTIAL	DRAWN: J.Savor	DATE: 1/13/2015		Dwg Title:	HP3000 GAD
	APP'D.:	WEIGHT (lbs): 936.69		07/20/2016 PART #:	HP3000
	DWG #: 1 OF 1	MAT'L:			

JS	01/13/2015	For Review

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.





NATIONAL OILWELL VARCO

MEVC 200-DT

A5F-200.GAD

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

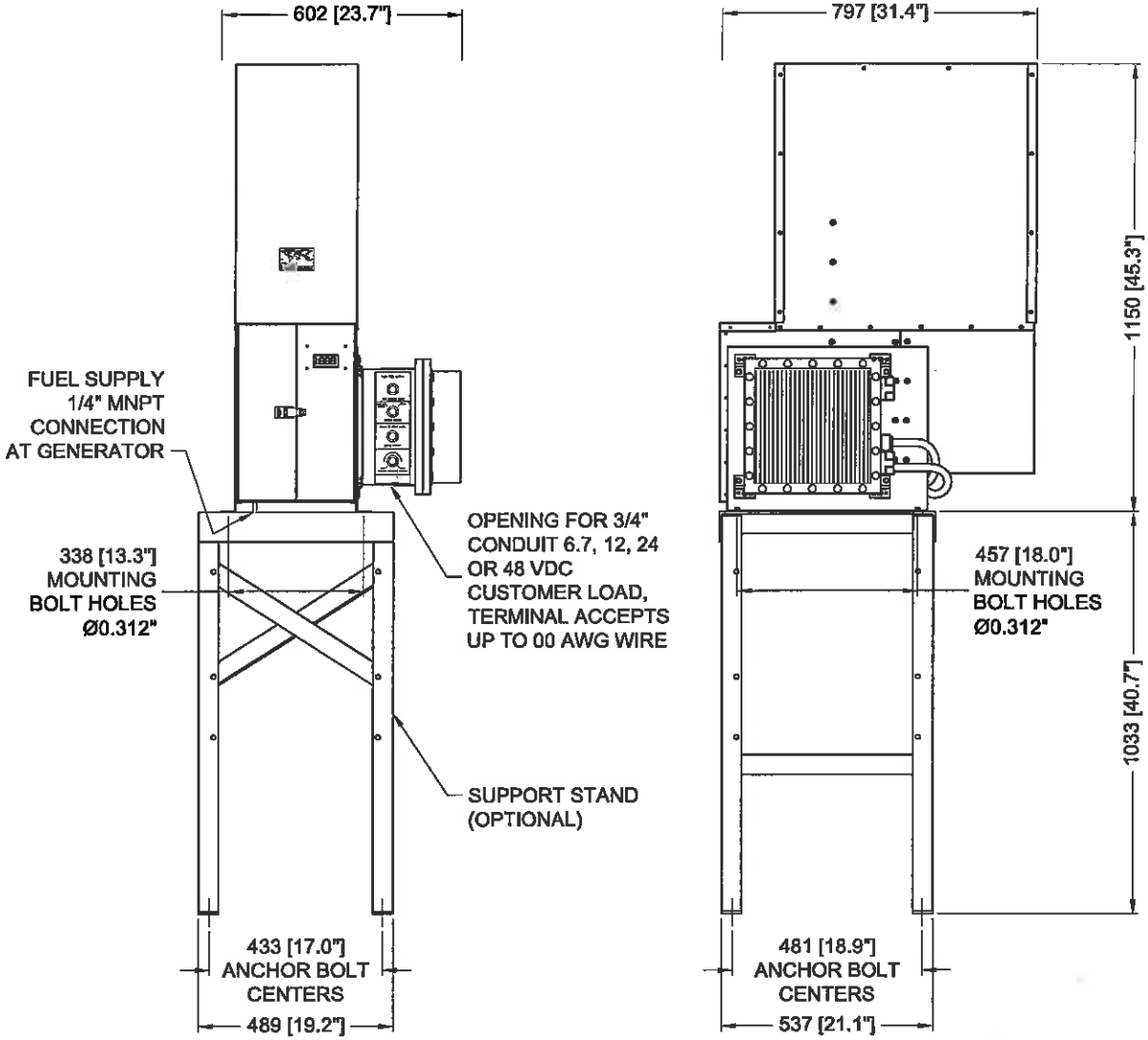
Ambient Operation Temperature: Max. +45°C (115°F) Min. -40°C (-40°F).
Operating Conditions: Unsheltered operation certified for use in hazardous areas.
Please contact Global for operating conditions below -40°C or above +45°C.

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.®

Corporate Office
9, 3700 - 78 Avenue SE
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	= 0.28316m³
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/m³	
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/m³	multiply by 22.88277
mg/m³ to ppm	multiply by 0.69778
grains/100SCF to ppm	multiply by 15.967

Specification for Sulfur Levels

Tariff Limits - H_2S	
TCPL	23mg/m³ OR 1 grain/100 SCF/100 SCF OR 16 ppm
NOVA	23mg/m³ OR 1 grain/100 SCF/100 SCF OR 16 ppm
TRANS GAS	6mg/m³ OR .26grain/100 SCF OR 4.2 ppm

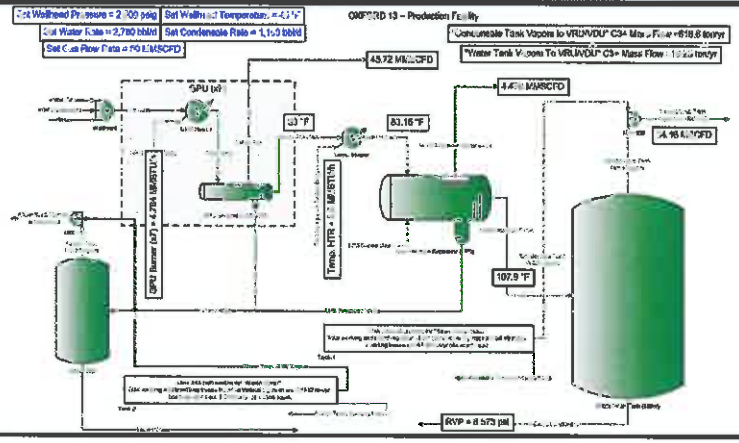
Tariff Limits - Total Sulfur	
TCPL	460 mg/m³ OR 20.1 grains or 321 ppm
NOVA	115 mg/m³ OR 5.03 grains OR 80 ppm
TRANS GAS	23mg/m³ OR 1.00 grains OR 16 ppm

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 (6GPUs)
Plant Schematic

Client Name	CONSOL ENERGY	Job: Condensate Tank and Produced Water Tank Emissions Estimate (600 psig GPU)
Location	OXFORD 13	
Flowsheet	TOTAL PAD (6GPUs)	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name	CONSOL ENERGY	Job	Condensate Tank and Produced Water Tank Emissions Estimate (600 psig GPU)
Location	OXFORD 13		
Flowsheet	TOTAL PAD (6GPUs)		

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	12.3623	11.9865	4.29724 *	0.532491	4.29724 *
Ethane	24.247	24.8318	36.7946 *	1.51401	36.7946 *
Propane	24.8821	25.0302	28.0605 *	2.94811	28.0605 *
i-Butane	5.82203	5.81621	5.69705 *	1.34457	5.69705 *
n-Butane	13.6454	13.599	12.6511 *	4.16454	12.6511 *
i-Pentane	4.88221	4.8422	4.02365 *	3.35117	4.02365 *
n-Pentane	5.21035	5.16052	4.14123 *	4.62002	4.14123 *
Nitrogen	0.0135219	0.0129479	0.00120359 *	0.000544506	0.00120359 *
Carbon Dioxide	0.147553	0.149803	0.19583 *	0.00773102	0.19583 *
Oxygen	0.000423087	0.000407934	9.79329E-05 *	1.75093E-05	9.79329E-05 *
n-Hexane	2.24332	2.14379	0.107489 *	5.9589	0.107489 *
Isohexane	2.80268	2.7673	2.04355 *	5.54582	2.04355 *
Neohexane	0.342057	0.338476	0.265223 *	0.472005	0.265223 *
2,2,4-Trimethylpentane	0.00910603	0.00893223	0.00537669 *	0.0645108	0.00537669 *
Benzene	0.0730992	0.0698287	0.00292 *	0.199759	0.00292 *
n-Heptane	2.04695	2.00602	1.16858 *	15.4143	1.16858 *
Toluene	0.112076	0.107256	0.00864364 *	1.00593	0.00864364 *
Octane	0.949434	0.926819	0.464155 *	20.6639	0.464155 *
Ethylbenzene	0.00672117	0.00644961	0.000894069 *	0.166879	0.000894069 *
o-Xylene	0.00843834	0.00810173	0.00121528 *	0.271895	0.00121528 *
Nonane	0.166172	0.161554	0.0670927 *	10.0766	0.0670927 *
C11	0.000136112	0.000131671	4.08157E-05 *	0.0703317	4.08157E-05 *
Decane	0.000979972	0.000949697	0.000330321 *	0.166124	0.000330321 *
Water	0.0176143	0.0167939	9.58454E-06 *	0.000940182	9.58454E-06 *
C10+	0.00839266	0.008089	0.00187667 *	21.4388	0.00187667 *

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	4.20976	4.09168	1.54361 *	0.075084	1.54361 *
Ethane	15.4762	15.8879	24.7732 *	0.400139	24.7732 *
Propane	23.2899	23.4855	27.7057 *	1.14262	27.7057 *
i-Butane	7.18295	7.1932	7.41429 *	0.686896	7.41429 *
n-Butane	16.835	16.8186	16.4645 *	2.12752	16.4645 *
i-Pentane	7.47708	7.43382	6.5002 *	2.12515	6.5002 *
n-Pentane	7.97962	7.92251	6.69014 *	2.92979	6.69014 *
Nitrogen	0.00804066	0.007718	0.000754957 *	0.00013407	0.000754957 *
Carbon Dioxide	0.137842	0.140284	0.192976 *	0.00299052	0.192976 *
Oxygen	0.000287376	0.000277756	7.01681E-05 *	4.92453E-06	7.01681E-05 *
n-Hexane	4.10356	3.93101	0.207407 *	4.51349	0.207407 *
Isohexane	5.12676	5.07434	3.94317 *	4.20061	3.94317 *
Neohexane	0.625702	0.620656	0.511767 *	0.357515	0.511767 *
2,2,4-Trimethylpentane	0.0220795	0.0217107	0.013752 *	0.0647695	0.013752 *

Mass Fraction	Condensate Tank Flash Vapors %	Condensate Tank Vapors to VRU/VDU %	Condensate Tank W&B Vapors %	Condensate to Tanks %	Condensate Truck Loading Vapors %
Benzene	0.121204	0.116062	0.00510713 *	0.137147	0.00510713 *
n-Heptane	4.35381	4.27711	2.62188 *	13.5758	2.62188 *
Toluene	0.219199	0.210281	0.0178326 *	0.814651	0.0178326 *
Octane	2.30211	2.25273	1.18718 *	20.7468	1.18718 *
Ethylbenzene	0.0151465	0.0145698	0.00212535 *	0.155721	0.00212535 *
o-Xylene	0.0190163	0.018302	0.00288891 *	0.253715	0.00288891 *
Nonane	0.452395	0.440893	0.192676 *	11.3593	0.192676 *
C11	0.000451611	0.000437937	0.000142852 *	0.0966266	0.000142852 *
Decane	0.00295971	0.00287524	0.00105236 *	0.207752	0.00105236 *
Water	0.00673585	0.00643771	3.86625E-06 *	0.000148873	3.86625E-06 *
C10+	0.0321682	0.0310796	0.00758764 *	34.0256	0.00758764 *

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	7.09199	7.21249	0.120503 *	7.87676	0.169089 *
Ethane	26.072	28.0059	1.93393 *	41.977	2.71369 *
Propane	39.2355	41.3983	2.16286 *	119.868	3.03492 *
i-Butane	12.1008	12.6796	0.5788 *	72.0595	0.812173 *
n-Butane	28.3612	29.6465	1.28531 *	223.189	1.80355 *
i-Pentane	12.5963	13.1037	0.507441 *	222.941	0.712042 *
n-Pentane	13.4429	13.9652	0.522269 *	307.353	0.732849 *
Nitrogen	0.0135457	0.0136047	5.8936E-05 *	0.0140648	8.26991E-05 *
Carbon Dioxide	0.232216	0.247281	0.0150648 *	0.313724	0.0211389 *
Oxygen	0.000484129	0.000489606	5.4777E-06 *	0.000516614	7.68632E-06 *
n-Hexane	6.91308	6.92927	0.0161913 *	473.493	0.0227197 *
Isohexane	8.63682	8.94464	0.307825 *	440.67	0.431941 *
Neohexane	1.05409	1.09404	0.0399513 *	37.5054	0.0560597 *
2,2,4-Trimethylpentane	0.0371964	0.0382699	0.00107356 *	6.79472	0.00150642 *
Benzene	0.204186	0.204585	0.00039869 *	14.3876	0.000559443 *
n-Heptane	7.33467	7.53935	0.204678 *	1424.18	0.287205 *
Toluene	0.369275	0.370667	0.00139211 *	85.4619	0.00195341 *
Octane	3.87826	3.97093	0.0926774 *	2176.47	0.130045 *
Ethylbenzene	0.0255166	0.0256825	0.000165916 *	16.336	0.000232814 *
o-Xylene	0.0320358	0.0322613	0.000225524 *	26.6162	0.000316456 *
Nonane	0.762129	0.777171	0.0150413 *	1191.66	0.021106 *
C11	0.000760808	0.00077196	1.11518E-05 *	10.1367	1.56482E-05 *
Decane	0.00498609	0.00506824	8.21527E-05 *	21.7945	0.000115277 *
Water	0.0113476	0.0113479	3.0182E-07 *	0.0156177	4.23515E-07 *
C10+	0.0541923	0.0547846	0.000592332 *	3569.49	0.000831162 *

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	103.311	102.132	75.9425 *	107.852	75.9425 *
Pressure	psig	0 *	0	0.196572	25	0.196572
Mole Fraction Vapor	%	100	99.9988	100 *	0	100 *
Mole Fraction Light Liquid	%	0	0.00124436	0	100	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	47.1101	46.9959	44.6604	113.772	44.6604
Mass Density	lb/ft^3	0.116466	0.116433	0.11773	43.3898	0.11773
Mass Flow	lb/h	168.465	176.272	7.80654 *	10490.6	10.9542 *

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**
Std Vapor Volumetric Flow	MMSCFD	0.0325688	0.0341608	0.00159199	0.839788	0.00223389
Std Liquid Volumetric Flow	sgpm	0.658118	0.690081	0.0319627	29.4852	0.0448502
Specific Gravity		1.62658		1.542	0.695695	1.542
API Gravity					65.4309	
Net Ideal Gas Heating Value	Btu/ft^3	2456.98	2451.37	2336.69	5742.54	2336.69
Gross Ideal Gas Heating Value	Btu/ft^3	2668.24	2662.24	2539.4	6174.53	2539.4
Remarks						

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	37.8169	37.8169	6.058 *	76.282 *	
Ethane	20.3394	20.3394	6.04 *	14.9514 *	
Propane	12.3813	12.3813	6.616 *	4.86736 *	
i-Butane	2.50786	2.50786	2.147 *	0.662501 *	
n-Butane	5.8188	5.8188	5.927 *	1.30986 *	
i-Pentane	2.27157	2.27157	3.831 *	0.356561 *	
n-Pentane	2.57517	2.57517	4.687 *	0.356361 *	
Nitrogen	0.109698	0.109698	0 *	0.444374 *	
Carbon Dioxide	0.178778	0.178778	0.061 *	0.189357 *	
Oxygen	0.00203232	0.00203232	0 *	0.00551332 *	
n-Hexane	1.72926	1.72926	4.365 *	0.148158 *	
Isohexane	1.85897	1.85897	4.844 *	0.16951 *	
Neohexane	0.19447	0.19447	0 *	0.0307743 *	
2,2,4-Trimethylpentane	0.0134214	0.0134214	0.028 *	0.00110266 *	
Benzene	0.0571524	0.0571524	0.369 *	1.00242E-05 *	
n-Heptane	3.164	3.164	12.966 *	0.118887 *	
Toluene	0.198666	0.198666	1.1 *	0.000601453 *	
Octane	3.60834	3.60834	15.2 *	0.0953303 *	
Ethylbenzene	0.0287865	0.0287865	0.154 *	1.00242E-05 *	
o-Xylene	0.0460056	0.0460056	0.235 *	0.00019046 *	
Nonane	1.65273	1.65273	8.354 *	0.00601453 *	
C11	0.0111587	0.0111587	0 *	0.00120291 *	
Decane	0.0266043	0.0266043	0 *	0.00290702 *	
Water	0.0202809	0.0202809	0 *	0 *	
C10+	3.3887	3.3887	17.018 *	0 *	

Mass Fraction	Condi Post-Heat %	Condi Pre-Heat %	Inlet Condensate %	Inlet Gas %	LPS Produced Water %
Methane	13.4041	13.4041	0.991163 *	57.4694 *	
Ethane	13.5125	13.5125	1.85226 *	21.1128 *	
Propane	12.0626	12.0626	2.97534 *	10.0794 *	
i-Butane	3.22051	3.22051	1.27268 *	1.80831 *	
n-Butane	7.4723	7.4723	3.51335 *	3.5753 *	
i-Pentane	3.62105	3.62105	2.81894 *	1.20811 *	
n-Pentane	4.10501	4.10501	3.44881 *	1.20743 *	
Nitrogen	0.0678959	0.0678959	0 *	0.584599 *	
Carbon Dioxide	0.173836	0.173836	0.0273792 *	0.391357 *	
Oxygen	0.00143683	0.00143683	0 *	0.00828497 *	
n-Hexane	3.29248	3.29248	3.8363 *	0.599587 *	
Isohexane	3.53943	3.53943	4.25728 *	0.685995 *	
Neohexane	0.370266	0.370266	0 *	0.124542 *	
2,2,4-Trimethylpentane	0.0338728	0.0338728	0.0326195 *	0.0059151 *	
Benzene	0.0986348	0.0986348	0.29396 *	3.67715E-05 *	
n-Heptane	7.00474	7.00474	13.2503 *	0.559442 *	
Toluene	0.404431	0.404431	1.03366 *	0.00260247 *	
Octane	9.10669	9.10669	17.7077 *	0.511387 *	

Mass Fraction	Condi Post-Heat %	Condi Pre-Heat %	Inlet Condensate %	Inlet Gas %	LPS Produced Water %
Ethylbenzene	0.0675225	0.0675225	0.166743 *	4.99777E-05 *	
o-Xylene	0.107912	0.107912	0.254445 *	0.000949575 *	
Nonane	4.68334	4.68334	10.9273 *	0.036226 *	
C11	0.0385367	0.0385367	0 *	0.00882994 *	
Decane	0.0836336	0.0836336	0 *	0.0194241 *	
Water	0.00807248	0.00807248	0 *	0 *	
C10+	13.5193	13.5193	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	3542.61	3542.61	113.583 *	67182.7 *	0
Ethane	3571.28	3571.28	212.26 *	24681.2 *	0
Propane	3188.06	3188.06	340.959 *	11782.9 *	0
i-Butane	851.16	851.16	145.843 *	2113.94 *	0
n-Butane	1974.88	1974.88	402.614 *	4179.58 *	0
i-Pentane	957.02	957.02	323.037 *	1412.3 *	0
n-Pentane	1084.93	1084.93	395.217 *	1411.51 *	0
Nitrogen	17.9445	17.9445	0 *	683.406 *	0
Carbon Dioxide	45.9437	45.9437	3.13753 *	457.503 *	0
Oxygen	0.379745	0.379745	0 *	9.68527 *	0
n-Hexane	870.182	870.182	439.621 *	700.927 *	0
Isohexane	935.449	935.449	487.864 *	801.94 *	0
Neohexane	97.8591	97.8591	0 *	145.592 *	0
2,2,4-Trimethylpentane	8.95238	8.95238	3.73804 *	6.91484 *	0
Benzene	26.0686	26.0686	33.6864 *	0.0429865 *	0
n-Heptane	1851.31	1851.31	1518.43 *	653.997 *	0
Toluene	106.889	106.889	118.453 *	3.04234 *	0
Octane	2406.84	2406.84	2029.22 *	597.82 *	0
Ethylbenzene	17.8458	17.8458	19.1079 *	0.0584247 *	0
o-Xylene	28.5205	28.5205	29.1582 *	1.11007 *	0
Nonane	1237.78	1237.78	1252.22 *	42.3488 *	0
C11	10.185	10.185	0 *	10.3223 *	0
Decane	22.1038	22.1038	0 *	22.7071 *	0
Water	2.13351	2.13351	0 *	0 *	0
C10+	3573.06	3573.06	3591.38 *	0 *	0

Stream Properties

Property	Units	Condi Post-Heat	Condi Pre-Heat	Inlet Condensate	Inlet Gas	LPS Produced Water
Temperature	°F	83.1603	50	45 *	45 *	107.852
Pressure	psig	25 *	1300	2500 *	2500 *	25
Mole Fraction Vapor	%	81.2869	0	0	100	
Mole Fraction Light Liquid	%	18.7131	100	100	0	
Mole Fraction Heavy Liquid	%	0	0	0	0	
Molecular Weight	lb/lbmol	45.2607	45.2607	98.0517	21.2939	
Mass Density	lb/ft^3	0.386105	33.1542	45.2382	16.2749	
Mass Flow	lb/h	26429.4	26429.4	11459.5	116902	0
Std Vapor Volumetric Flow	MMSCFD	5.31828	5.31828	1.06443	50 *	0
Std Liquid Volumetric Flow	sgpm	103.682	103.682	33.5417 *	675.261	0
Specific Gravity			0.531582	0.725332	0.735222	
API Gravity			138.841	65.4593		
Net Ideal Gas Heating Value	Btu/ft^3	2356.19	2356.19	4964.11	1161.87	
Gross Ideal Gas Heating Value	Btu/ft^3	2557.85	2557.85	5342.59	1280.24	

Warnings

ProMax:ProMax!Project!Flowsheets!TOTAL PAD (6GPUs)!PStreams!Condi Pre-Heat

Warning: The temperature of 50 °F is below hydrate formation.

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	53.4924	53.4924	0.155719	0.0551935	79.0971
Ethane	10.5569	10.5569	0.017406	0.596799	14.1183
Propane	3.50605	3.50605	0.00382422	2.06314	4.03519
i-Butane	0.495789	0.495789	9.28948E-05	1.16392	0.482751
n-Butane	1.00532	1.00532	0.000326078	3.78202	0.893486
i-Pentane	0.30671	0.30671	3.33934E-05	3.28939	0.214885
n-Pentane	0.319327	0.319327	2.86277E-05	4.5962	0.199281
Nitrogen	0.311089	0.311089	0.000672053	2.09053E-05	0.472922
Carbon Dioxide	0.133471	0.133471	0.00622976	0.00208961	0.184934
Oxygen	0.00385966	0.00385966	1.53037E-05	1.14541E-06	0.00578632
n-Hexane	0.168773	0.168773	2.01075E-06	6.10881	0.0624985
Isohexane	0.190859	0.190859	3.75028E-06	5.65649	0.0819131
Neohexane	0.0215439	0.0215439	4.95031E-07	0.477248	0.0110339
2,2,4-Trimethylpentane	0.00118923	0.00118923	6.57812E-10	0.0667462	0.000296559
Benzene	0.00550635	0.00550635	5.88916E-05	0.20487	0.00192748
n-Heptane	0.276465	0.276465	2.25387E-06	15.9537	0.063839
Toluene	0.0168147	0.0168147	4.61026E-05	1.04199	0.00313745
Octane	0.293268	0.293268	3.56109E-07	21.4593	0.0384017
Ethylbenzene	0.00230213	0.00230213	2.05983E-06	0.173341	0.000246875
o-Xylene	0.00363562	0.00363562	3.32134E-06	0.282524	0.000326465
Nonane	0.128713	0.128713	7.80083E-08	10.4765	0.00882078
C11	0.000842109	0.000842109	4.71078E-11	0.0731638	1.75015E-05
Decane	0.0020351	0.0020351	2.40203E-10	0.172787	8.44675E-05
Water	28.5035	28.5035	99.8155	0.000267433	0.0208391
C10+	0.253625	0.253625	1.35534E-09	22.3035	0.00202102

Mass Fraction	Post-Heat %	Pre-Heat %	Produced Water %	Sales Condensate %	Sales Gas %
Methane	39.9077	39.9077	0.138651	0.00760283	62.5261
Ethane	14.7622	14.7622	0.0290489	0.154086	20.9185
Propane	7.18965	7.18965	0.00935943	0.781162	8.76776
i-Butane	1.34009	1.34009	0.000299671	0.580875	1.38259
n-Butane	2.71731	2.71731	0.0010519	1.88748	2.55894
i-Pentane	1.02908	1.02908	0.000133721	2.0378	0.763951
n-Pentane	1.07142	1.07142	0.000114638	2.84737	0.708474
Nitrogen	0.40527	0.40527	0.00104491	5.0285E-06	0.652807
Carbon Dioxide	0.273166	0.273166	0.015217	0.000789638	0.401045
Oxygen	0.00574351	0.00574351	2.71795E-05	3.14709E-07	0.00912359
n-Hexane	0.676362	0.676362	9.61729E-06	4.52018	0.265389
Isohexane	0.764873	0.764873	1.79373E-05	4.1855	0.347829
Neohexane	0.086338	0.086338	2.3677E-06	0.353137	0.0468537
2,2,4-Trimethylpentane	0.00631732	0.00631732	4.17049E-09	0.0654663	0.00166923
Benzene	0.020002	0.020002	0.000255318	0.137408	0.00741885
n-Heptane	1.28828	1.28828	1.25347E-05	13.7263	0.315204
Toluene	0.0720484	0.0720484	0.000235764	0.82437	0.0142445
Octane	1.55788	1.55788	2.25771E-06	21.0478	0.21615
Ethylbenzene	0.0113659	0.0113659	1.21373E-05	0.158015	0.00129148
o-Xylene	0.0179495	0.0179495	1.95707E-05	0.257545	0.00170784

Mass Fraction	Post-Heat %	Pre-Heat %	Produced Water %	Sales Condensate %	Sales Gas %
Nonane	0.767699	0.767699	5.55298E-07	11.5374	0.0557457
C11	0.0061213	0.0061213	4.08682E-10	0.0981962	0.000134799
Decane	0.0134657	0.0134657	1.89687E-09	0.211095	0.0005922
Water	23.8799	23.8799	99.8045	4.13687E-05	0.0184991
C10+	2.12974	2.12974	1.35831E-08	34.5804	0.0179821

Mass Flow	Post-Heat lb/h	Pre-Heat lb/h	Produced Water lb/h	Sales Condensate lb/h	Sales Gas lb/h
Methane	67296.3	67296.3	55.9131	0.784775	63697.8
Ethane	24893.5	24893.5	11.7144	15.905	21310.5
Propane	12123.9	12123.9	3.77433	80.6327	8932.06
i-Butane	2259.78	2259.78	0.120847	59.9588	1408.5
n-Butane	4582.2	4582.2	0.424195	194.828	2606.89
i-Pentane	1735.34	1735.34	0.0539252	210.344	778.267
n-Pentane	1806.73	1806.73	0.0462294	293.91	721.75
Nitrogen	683.406	683.406	0.421377	0.000519049	665.04
Carbon Dioxide	460.64	460.64	6.13649	0.0815076	408.56
Oxygen	9.68527	9.68527	0.0109605	3.24847E-05	9.29456
n-Hexane	1140.55	1140.55	0.00387832	466.58	270.362
Isohexane	1289.8	1289.8	0.0072335	432.033	354.347
Neohexane	145.592	145.592	0.00095481	36.4514	47.7317
2,2,4-Trimethylpentane	10.6529	10.6529	1.68182E-06	6.75752	1.70051
Benzene	33.7294	33.7294	0.102961	14.1834	7.55788
n-Heptane	2172.42	2172.42	0.00505482	1416.85	321.111
Toluene	121.495	121.495	0.0950755	85.0926	14.5115
Octane	2627.04	2627.04	0.000910458	2172.59	220.2
Ethylbenzene	19.1664	19.1664	0.00489457	16.3105	1.31568
o-Xylene	30.2683	30.2683	0.00789218	26.5842	1.73985
Nonane	1294.57	1294.57	0.000223933	1190.9	56.7903
C11	10.3223	10.3223	1.64807E-07	10.136	0.137325
Decane	22.7071	22.7071	7.64944E-07	21.7895	0.603297
Water	40268.7	40268.7	40247.7	0.00427013	18.8457
C10+	3591.38	3591.38	5.4776E-06	3569.44	18.3191

Stream Properties

Property	Units	Post-Heat	Pre-Heat	Produced Water	Sales Condensate	Sales Gas
Temperature	°F	20.8389	47.0618	50	103.311	50 *
Pressure	psig	600 *	2500	1300	0	1300 *
Mole Fraction Vapor	%	64.4013	71.4316	0	0	100
Mole Fraction Light Liquid	%	7.06248	28.5684	100	100	0
Mole Fraction Heavy Liquid	%	28.5362	0	0	0	0
Molecular Weight	lb/lbmol	21.5034	21.5034	18.0173	116.462	20.2941
Mass Density	lb/ft^3	4.7574	21.6794	62.3736	43.7072	7.29383
Mass Flow	lb/h	168630	168630	40326.5	10322.1	101874
Std Vapor Volumetric Flow	MMSCFD	71.4223	71.4223	20.3848	0.807219	45.7192
Std Liquid Volumetric Flow	sgpm	789.302	789.302	80.9302	28.8271	604.69
Specific Gravity				1.00007	0.700784	0.700701
API Gravity				10.1625	64.709	
Net Ideal Gas Heating Value	Btu/ft^3	887.364	887.364	1.80611	5875.1	1111.35
Gross Ideal Gas Heating Value	Btu/ft^3	990.211	990.211	52.2153	6316	1226.08

Warnings

ProMax:ProMax!Project!Flowsheets!TOTAL PAD (6GPUs)!PStreams!Post-Heat
Warning: The temperature of 20.8389 °F is below ice formation.
Warning: The temperature of 20.8389 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!TOTAL PAD (6GPUs)!PStreams!Pre-Heat

Warning: The temperature of 47.0618 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!TOTAL PAD (6GPUs)!PStreams!Produced Water
Warning: The temperature of 50 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!TOTAL PAD (6GPUs)!PStreams!Sales Gas
Warning: The temperature of 50 °F is below hydrate formation.

Remarks

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	44.8083	0.00237743	0 *	84.0364	83.8358
Ethane	23.8694	0.000328709	0 *	9.35903	9.3367
Propane	14.1501	9.36971E-05	0 *	2.04449	2.03945
i-Butane	2.72599	7.6325E-07	0 *	0.0504906	0.0503646
n-Butane	6.129	5.55798E-06	0 *	0.175657	0.175219
i-Pentane	2.06913	4.3167E-07	0 *	0.0180641	0.018019
n-Pentane	2.19173	3.39493E-07	0 *	0.0155029	0.0154641
Nitrogen	0.130166	5.04215E-06	0 *	0.36554	0.364639
Carbon Dioxide	0.210852	0.00161573	0 *	2.5302	2.53346
Oxygen	0.00241013	2.4124E-07	0 *	0.00825475	0.00823517
n-Hexane	0.936141	9.07944E-09	0 *	0.00109697	0.00109422
Isohexane	1.16762	2.08464E-08	0 *	0.00204382	0.00203872
Neohexane	0.142427	2.23173E-09	0 *	0.000270066	0.000269391
2,2,4-Trimethylpentane	0.00384133	3.66803E-13	0 *	3.60293E-07	3.59393E-07
Benzene	0.0304113	4.35132E-05	0 *	0.00847118	0.00845005
n-Heptane	0.866869	1.81888E-08	0 *	0.00122521	0.00122215
Toluene	0.0472919	3.22687E-05	0 *	0.00760257	0.00758359
Octane	0.410143	1.33574E-09	0 *	0.000194424	0.000193938
Ethylbenzene	0.00289197	1.45772E-06	0 *	0.000331426	0.000330599
o-Xylene	0.00364777	2.52887E-06	0 *	0.000436816	0.000435725
Nonane	0.07312	5.02398E-10	0 *	4.24752E-05	4.23691E-05
C11	6.28461E-05	2.71659E-13	0 *	2.56674E-08	2.56033E-08
Decane	0.00044218	9.81953E-13	0 *	1.31099E-07	1.30771E-07
Water	0.0239076	99.9955	100 *	1.37464	1.60097
C10+	0.00401547	3.97436E-12	0 *	7.40577E-07	7.38727E-07

Mass Fraction	To LPS Booster Compressor %	Waste Water %	Water %	Water Tank Flash Vapors %	Water Tank Vapors To VRU/VDU %
Methane	22.1769	0.00211702	0 *	71.5656	71.3933
Ethane	22.1429	0.000548628	0 *	14.9388	14.9029
Propane	19.2498	0.000229334	0 *	4.78572	4.77382
i-Butane	4.88809	2.46239E-06	0 *	0.155783	0.15539
n-Butane	10.9901	1.79311E-05	0 *	0.541967	0.540604
i-Pentane	4.60562	1.72873E-06	0 *	0.0691849	0.0690107
n-Pentane	4.87852	1.35959E-06	0 *	0.0593754	0.0592258
Nitrogen	0.112495	7.84022E-06	0 *	0.543584	0.542232
Carbon Dioxide	0.286283	0.00394695	0 *	5.91108	5.91857
Oxygen	0.00237929	4.2848E-07	0 *	0.0140218	0.0139882
n-Hexane	2.48883	4.343E-08	0 *	0.00501813	0.00500549
Isohexane	3.10425	9.97153E-08	0 *	0.00934958	0.00932603
Neohexane	0.378659	1.06751E-08	0 *	0.00123543	0.00123232
2,2,4-Trimethylpentane	0.0135372	2.3257E-12	0 *	2.18472E-06	2.17922E-06
Benzene	0.0732865	0.000188662	0 *	0.0351258	0.0350375
n-Heptane	2.67979	1.01164E-07	0 *	0.00651709	0.00650067
Toluene	0.134431	0.000165135	0 *	0.037185	0.0370914

Mass Fraction	To LPS Booster Compressor %	Waste Water %	Water %	Water Tank Flash Vapors %	Water Tank Vapors To VRU/VDU %
Octane	1.44538	8.46921E-09	0 *	0.00117894	0.00117597
Ethylbenzene	0.00947211	8.59017E-06	0 *	0.00186782	0.00186311
o-Xylene	0.0119476	1.49024E-05	0 *	0.00246176	0.00245556
Nonane	0.289323	3.57659E-09	0 *	0.000289185	0.000288457
C11	0.000303062	2.35697E-12	0 *	2.12976E-07	2.12439E-07
Decane	0.00194097	7.75509E-12	0 *	9.90179E-07	9.87684E-07
Water	0.0132877	99.9927	100 *	1.31461	1.53102
C10+	0.0223691	3.98341E-11	0 *	7.09867E-06	7.08078E-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	3534.73	0.852093	0 *	55.061	55.0672
Ethane	3529.3	0.220821	0 *	11.4936	11.4949
Propane	3068.19	0.0923061	0 *	3.68203	3.68215
i-Butane	779.101	0.000991101	0 *	0.119856	0.119856
n-Butane	1751.69	0.00721718	0 *	0.416977	0.41698
i-Pentane	734.079	0.000695808	0 *	0.0532294	0.0532295
n-Pentane	777.577	0.000547228	0 *	0.0456822	0.0456822
Nitrogen	17.9304	0.00315566	0 *	0.418222	0.418235
Carbon Dioxide	45.63	1.58863	0 *	4.54786	4.56512
Oxygen	0.379229	0.000172461	0 *	0.0107881	0.0107894
n-Hexane	396.69	1.74804E-05	0 *	0.00386084	0.00386084
Isohexane	494.78	4.0135E-05	0 *	0.00719337	0.00719337
Neohexane	60.3536	4.29669E-06	0 *	0.000950514	0.000950514
2,2,4-Trimethylpentane	2.15766	9.36086E-10	0 *	1.68088E-06	1.68088E-06
Benzene	11.681	0.0759358	0 *	0.0270251	0.0270252
n-Heptane	427.126	4.07183E-05	0 *	0.00501411	0.00501411
Toluene	21.4266	0.0664661	0 *	0.0286093	0.0286094
Octane	230.375	3.40883E-06	0 *	0.000907049	0.000907049
Ethylbenzene	1.50974	0.00345751	0 *	0.00143706	0.00143706
o-Xylene	1.9043	0.00599815	0 *	0.00189403	0.00189403
Nonane	46.1145	1.43956E-06	0 *	0.000222493	0.000222493
C11	0.0483044	9.48671E-10	0 *	1.63859E-07	1.63859E-07
Decane	0.309367	3.12139E-09	0 *	7.61822E-07	7.61822E-07
Water	2.11789	40246.7	40268.7 *	1.01143	1.18091
C10+	3.56536	1.60331E-08	0 *	5.46156E-06	5.46156E-06

Stream Properties

Property	Units	To LPS Booster Compressor	Waste Water	Water	Water Tank Flash Vapors	Water Tank Vapors To VRU/VDU
Temperature	°F	107.852	53.2946	45 *	53.2946	52.17
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	32.4137	18.0158	18.0153	18.838	18.8384
Mass Density	lb/ft^3	0.215652	62.4146	62.6023	0.0504563	0.00165402
Mass Flow	lb/h	15938.8	40249.6	40268.7	76.9378	77.1322
Std Vapor Volumetric Flow	MMSCFD	4.47849	20.3476	20.3578	0.0371973	0.0372905
Std Liquid Volumetric Flow	sgpm	74.1967	80.4676	80.5 *	0.462635	0.463065
Specific Gravity		1.11916	1.00073	1.00374	0.650424	0.650438
API Gravity			10.0154	9.71145		
Net Ideal Gas Heating Value	Btu/ft^3	1721.19	0.0324728	0	972.02	969.696
Gross Ideal Gas Heating Value	Btu/ft^3	1879.67	50.3434	50.31	1076.19	1073.73

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	3.75304 *	3.75304 *			
Ethane	0.423559 *	0.423559 *			
Propane	0.0271135 *	0.0271135 *			
i-Butane	6.02202E-05 *	6.02202E-05 *			
n-Butane	0.000376007 *	0.000376007 *			
i-Pentane	9.73345E-06 *	9.73345E-06 *			
n-Pentane	5.62301E-06 *	5.62301E-06 *			
Nitrogen	0.00481892 *	0.00481892 *			
Carbon Dioxide	3.83476 *	3.83476 *			
Oxygen	0.000417088 *	0.000417088 *			
n-Hexane	2.00473E-09 *	2.00473E-09 *			
Isohexane	1.05548E-07 *	1.05548E-07 *			
Neohexane	1.47768E-08 *	1.47768E-08 *			
2,2,4-Trimethylpentane	0 *	0 *			
Benzene	1.58811E-05 *	1.58811E-05 *			
n-Heptane	1.76744E-08 *	1.76744E-08 *			
Toluene	6.85569E-06 *	6.85569E-06 *			
Octane	3.06979E-10 *	3.06979E-10 *			
Ethylbenzene	1.92398E-07 *	1.92398E-07 *			
o-Xylene	2.78574E-07 *	2.78574E-07 *			
Nonane	4.36987E-11 *	4.36987E-11 *			
C11	1.78777E-15 *	1.78777E-15 *			
Decane	1.93829E-14 *	1.93829E-14 *			
Water	91.9558 *	91.9558 *			
C10+	2.55075E-15 *	2.55075E-15 *			

Mass Fraction	Water Tank W&B Vapors %	Water Truck Loading Vapors %			
Methane	3.16935 *	3.16935 *			
Ethane	0.670424 *	0.670424 *			
Propane	0.0629359 *	0.0629359 *			
i-Butane	0.000184247 *	0.000184247 *			
n-Butane	0.00115042 *	0.00115042 *			
i-Pentane	3.69669E-05 *	3.69669E-05 *			
n-Pentane	2.13558E-05 *	2.13558E-05 *			
Nitrogen	0.00710612 *	0.00710612 *			
Carbon Dioxide	8.88385 *	8.88385 *			
Oxygen	0.000702551 *	0.000702551 *			
n-Hexane	9.09402E-09 *	9.09402E-09 *			
Isohexane	4.78796E-07 *	4.78796E-07 *			
Neohexane	6.70318E-08 *	6.70318E-08 *			
2,2,4-Trimethylpentane	0 *	0 *			
Benzene	6.53E-05 *	6.53E-05 *			
n-Heptane	9.32261E-08 *	9.32261E-08 *			
Toluene	3.32513E-05 *	3.32513E-05 *			
Octane	1.84586E-09 *	1.84586E-09 *			
Ethylbenzene	1.07522E-06 *	1.07522E-06 *			

Mass Fraction	Water Tank W&B Vapors %	Water Truck Loading Vapors %			
o-Xylene	1.55682E-06 *	1.55682E-06 *			
Nonane	2.95026E-10 *	2.95026E-10 *			
C11	1.47099E-14 *	1.47099E-14 *			
Decane	1.45173E-13 *	1.45173E-13 *			
Water	87.2041 *	87.2041 *			
C10+	2.42452E-14 *	2.42452E-14 *			

Mass Flow	Water Tank W&B Vapors lb/h	Water Truck Loading Vapors lb/h			
Methane	0.00615951 *	0.0138128 *			
Ethane	0.00130294 *	0.00292187 *			
Propane	0.000122313 *	0.00027429 *			
i-Butane	3.58077E-07 *	8.02995E-07 *			
n-Butane	2.23579E-06 *	5.0138E-06 *			
i-Pentane	7.18437E-08 *	1.61111E-07 *			
n-Pentane	4.15041E-08 *	9.30736E-08 *			
Nitrogen	1.38105E-05 *	3.09702E-05 *			
Carbon Dioxide	0.0172654 *	0.038718 *			
Oxygen	1.36538E-06 *	3.06189E-06 *			
n-Hexane	1.76739E-11 *	3.9634E-11 *			
Isohexane	9.3052E-10 *	2.08671E-09 *			
Neohexane	1.30274E-10 *	2.92141E-10 *			
2,2,4-Trimethylpentane	0 *	0 *			
Benzene	1.26908E-07 *	2.84593E-07 *			
n-Heptane	1.81181E-10 *	4.06302E-10 *			
Toluene	6.46226E-08 *	1.44917E-07 *			
Octane	3.58736E-12 *	8.04473E-12 *			
Ethylbenzene	2.08965E-09 *	4.68608E-09 *			
o-Xylene	3.02562E-09 *	6.785E-09 *			
Nonane	5.73371E-13 *	1.2858E-12 *			
C11	2.85881E-17 *	6.41094E-17 *			
Decane	2.82138E-16 *	6.32699E-16 *			
Water	0.169478 *	0.380057 *			
C10+	4.71196E-17 *	1.05667E-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	18.9969	18.9969			
Mass Density	lb/ft^3	0.00159445	0.00159445			
Mass Flow	lb/h	0.194346 *	0.435825 *			
Std Vapor Volumetric Flow	MMSCFD	9.31746E-05	0.000208946			
Std Liquid Volumetric Flow	sgpm	0.000429938	0.000964144			
Specific Gravity		0.655912	0.655912			
API Gravity						
Net Ideal Gas Heating Value	Btu/ft^3	41.6298	41.6298			
Gross Ideal Gas Heating Value	Btu/ft^3	92.3623	92.3623			

Remarks

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	20.54
CO	82.11
VOC	89.7
SO_2	4.10
PM_{10}	1.08
$PM_{2.5}$	1.08
Benzene	0.055
Toluene	0.002
Ethylbenzene	0.001
Xylenes	0.007
n-Hexane	3.511
Formaldehyde	0.464
Total HAPs	4.377

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 2_th Day of July, 2015.

By: CNX Gas Company, LLC
Patrick Flynn
Air Quality Manager
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

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

May 2015

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

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

May 2015

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

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

May 2015

ATTACHMENT T

PERMIT APPLICATION FEE

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

June 19, 2015

Joe Kessler
Permit Writer
WVDEP, Division of Air Quality
601 – 57th Street
Charleston, West Virginia 25304

Re: CNX Gas, Application Revision for R13-3248
Oxford 13 Well Pad, Facility ID 017-00153

Dear Mr. Kessler,

CNX Gas would like to provide you with revised application pages for a change to the flash gas compressor proposed at the Oxford 13 site. The attached documents reflect the replacement of the Caterpillar G3508BLE 690 hp flash gas compressor with a Waukesha F3524GSI 840 hp unit. We apologize for this inconvenience, but the change became necessary as a result of our obligations under CNX's Certification for Sustainable Shale Development.

CNX Gas greatly appreciates your time and attention that's necessary to evaluate this change and hopes it comes at a time, which doesn't significantly jeopardize the timeline. Please let us know if there is anything else we can do to help facilitate your review. You can contact me directly at (724) 485-3063 if needed or SLR's Jesse Hanshaw with any questions or comments related to the revised forms at (304) 545-8563 or by email at jhanshaw@slrconsulting.com.

Sincerely,

David Morris, EIT
Air Quality Manager

Attachments: Application Attachments I, J, L, M, and N

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	840 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

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 Rich Burn RICE	2C	Catalytic Converter	NA	NA	PM SO2 NOx CO VOC Formaldehyde CO_2e	0.14 0.01 28.89 23.15 0.35 0.09 878	0.62 0.02 126.53 101.39 1.54 0.41 3,478	0.14 0.01 0.38 0.56 0.35 0.09 878	0.62 0.02 1.64 2.43 1.54 0.41 3,478	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. (°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.

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 (ft²):	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/ft²-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		Waukesha F3524GSI	
Manufacturer's Rated bhp/rpm		68/1800		840/1200	
Source Status[3]		NS		NS	
Date Installed/Modified/Removed[4]		2015		2015	
Engine Manufactured/Reconstruction Date[5]		06/01/1998		11/27/2006	
Is this engine subject to 40CFR60, Subpart JJJJ?		No		No	
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		Yes	
Engine, Fuel and Combustion Data	Engine Type[7]	4SRB		4SRB	
	APCD Type[8]	NSCR		NSCR	
	Fuel Type[9]	RG		RG	
	H_2S (gr/100 scf)	0.25		0.25	
	Operating bhp/rpm	68/1800		840/1200	
	BSFC (Btu/bhp-hr)	8,038		8676	
	Fuel throughput (ft^3/hr)	536		6220	
	Fuel throughput ($MMft^3$/yr)	4.70		54.5	
	Operation (hrs/yr)	8760		8760	
Reference[10]	Potential Emissions[11]	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO_X	1.39	6.09	0.38	1.64
	CO	2.28	9.98	0.56	2.43
	VOC	0.02	0.08	0.35	1.54
	SO_2	<0.01	<0.01	<0.01	0.02
	PM_{10}	0.03	0.13	0.15	0.62
	Formaldehyde	0.02	0.06	0.09	0.41
MRR[12]	Proposed Monitoring:	Hours of operation		Hours of operation	
	Proposed Recordkeeping:	Will keep records for 5 years and 2 years on site.		Wi ll 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 (°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 Sheet
(Non-Selective Catalytic Reduction Control)

Control Device ID No. (C2):

Equipment Information

1. Manufacturer: Miratech. Model No. RCS2-3024-10-EC2	2. Control Device Name: C2 Type: NSCR
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. 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 4609 cfm at 1249 °F	
7. Guaranteed minimum collection efficiency for each pollutant collected: The catalyst manufacturer list 98.7% reduction efficiency for NOx and 97.6% for CO	
8. Attached efficiency curve and/or other efficiency information. NA	
9. Design inlet volume: 1424 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 (%):	18.5 %	

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Particulate (type):	☐ Odor ☒ Other CO & NOx
17. Inlet gas velocity: 43.15 scf/sec	18. Pollutant specific gravity:
19. Gas flow into the collector: 4609 cfm ACF @ 1249°F	20. Gas stream temperature: Inlet: 750-1250 °F Outlet: 1350 °F
21. Gas flow rate: Design Maximum: 4609 ACFM Average Expected: 4148 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 lb/hr	IN Pollutant grains/acf	Emission Capture Efficiency %	OUT Pollutant lb/hr	OUT Pollutant grains/acf	Control Efficiency %
A NOx	28.89		100	0.38		98.7
B CO	23.15		100	0.56		97.6
C						
D						
E						

24. Dimensions of stack: Height 16 ft. Diameter 0.83 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: Upon Request

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. 98.7% for NOx, and 97.6% for CO

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

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)	0.749	0.749	0.749	0.020	7.730	12.405	1.622	4189.048
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)	1.08	1.08	1.08	4.10	26.01	82.11	95.46	33663.56
Total Emissions (lb/hr)	0.25	0.25	0.25	0.94	5.94	18.75	21.79	7685.74

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)	0.055	0.002	0.001	0.007	0.003	0.461	0.528
Total Emissions (ton/yr)	0.055	0.002	0.001	0.007	0.003	0.461	0.608
Total Emissions (lb/hr)	0.012	0.000	0.000	0.002	0.001	0.105	0.139

Table 7. Waukesha F3524GSI 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	1.94E-02 lb/MMBtu	(2)	0.141	0.62
SO_2	5.88E-04 lb/MMBtu	(2)	0.004	0.02
NOx	0.20 g/hp-hr	(1)	0.376	1.64
CO	0.30 g/hp-hr	(1)	0.556	2.43
VOC	0.19 g/hp-hr	(1)	0.352	1.54
Hazardous Air Pollutants				
1,1,2,2-Tetrachloroethane	2.53E-05 lb/MMBtu	(2)	1.84E-04	8.08E-04
1,1,2-Trichloroethane	1.53E-05 lb/MMBtu	(2)	1.12E-04	4.88E-04
1,3-Butadiene	6.63E-04 lb/MMBtu	(2)	4.83E-03	2.12E-02
1,3-Dichloropropene	1.27E-05 lb/MMBtu	(2)	9.26E-05	4.05E-04
2-Methylnaphthalene	1.30E-05 lb/MMBtu	(2)	9.47E-05	4.15E-04
2,2,4-Trimethylpentane	6.63E-04 lb/MMBtu	(2)	4.83E-03	2.12E-02
Acetaldehyde	2.79E-03 lb/MMBtu	(2)	2.03E-02	8.91E-02
Acrolein	2.63E-03 lb/MMBtu	(2)	1.92E-02	8.40E-02
Benzene	1.58E-03 lb/MMBtu	(2)	1.15E-02	5.04E-02
Carbon Tetrachloride	1.77E-05 lb/MMBtu	(2)	1.29E-04	5.65E-04
Chlorobenzene	1.29E-05 lb/MMBtu	(2)	9.40E-05	4.12E-04
Chloroform	1.37E-05 lb/MMBtu	(2)	9.98E-05	4.37E-04
Ethylbenzene	2.48E-05 lb/MMBtu	(2)	1.81E-04	7.92E-04
Ethylene Dibromide	2.13E-05 lb/MMBtu	(2)	1.55E-04	6.80E-04
Formaldehyde	5.00E-02 g/hp-hr	(1)	0.093	0.41
Methanol	3.06E-03 lb/MMBtu	(2)	2.23E-02	9.77E-02
Methylene Chloride	4.12E-05 lb/MMBtu	(2)	3.00E-04	1.32E-03
Naphthalene	9.71E-05 lb/MMBtu	(2)	7.08E-04	3.10E-03
PAH (POM)	1.41E-04 lb/MMBtu	(2)	1.03E-03	4.50E-03
Styrene	1.19E-05 lb/MMBtu	(2)	8.67E-05	3.80E-04
Toluene	5.58E-04 lb/MMBtu	(2)	4.07E-03	1.78E-02
Vinyl Chloride	7.18E-06 lb/MMBtu	(2)	5.23E-05	2.29E-04
Xylenes	1.95E-04 lb/MMBtu	(2)	1.42E-03	6.22E-03
Total HAP	**6.2E-02 lb/MMBtu**		**0.184**	**0.81**
Greenhouse Gas Emissions				
CO_2	474.00 g/hp-hr	(1)	877.8	3844.7
CH_4	0.14 g/hp-hr	(1)	0.3	1.1
N_2O	2.2E-04 lb/MMBtu	(3)	1.61E-03	7.04E-03
CO_2e[b]			878.0	3875.2

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) =	626	
Engine Power Output (hp) =	840	
Number of engines Operating at a Time =	1	
Fuel throughput=	6,224	
BSFC (Btu/hp-hr) =	8,676	(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 Waukesha F3524GSI Specification Sheet Unit 1721

(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.

(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

USA COMPRESSION

USA Compression Unit 1721 Waukesha F3524GSI Engine Emissions

Date of Manufacture	November 27, 2006	Engine Serial Number	C16267/1	Date Modified/Reconstructed	N/A
Driver Rated HP	840	Rated Speed in RPM	1200	Combustion Type	Spark Ignited 4 Stroke
Number of Cylinders	6	Compression Ratio	8:1	Combustion Setting	Rich Burn
Total Displacement (in^3)	3520	Fuel Delivery Method	Carburetor	Combustion Air Treatment	T.C./Intercooled

Raw Engine Emissions with Customer Supplied Fuel Gas Analysis

Fuel Consumption	*8525 LHV BTU/bhp-hr*	*or*	*8676 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)	15.6		28.89	126.53
Carbon Monoxide (CO)	12.5		23.15	101.39
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0.19		0.35	1.54
Formaldehyde (CH2O)	0.05		0.09	0.41
Particulate Matter (PM) Filterable+Condensable		1.94E-02	1.41E-01	6.20E-01
Sulfur Dioxide (SO2)		5.88E-04	4.29E-03	1.88E-02

	g/bhp-hr [1]	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	474	878	3487
Methane (CH4)	0.14	0.26	1.03

[1] g/bhp-hr are based on Waukesha Specifications assuming 934 LHV BTU/SCF fuel gas, 1000 ft elevation, and 77 F Max Air Inlet Temperature. Note that g/bhp-hr values are based on 100% Load Operation. For Air Permitting, it is recommended to add a safety margin to CO, VOC, and Formaldehyde to account for variations in fuel gas composition and load.

[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 3.2-3).

Catalytic Converter Emissions

Catalytic Converter Make and Model:	*Miratech, RCS-3024-EC2*
Element Type:	*RE-24-EC*
Number of Elements in Housing:	*2*
Air/Fuel Ratio Control	*Emit Advanced AFRC*

	% Reduction	lb/hr	TPY
Nitrogen Oxides (NOx)	98.7	0.38	1.64
Carbon Monoxide (CO)	97.6	0.56	2.43
Volatile Organic Compounds (VOC or NMNEHC excluding CH2O)	0	0.35	1.54
Formaldehyde (CH2O)	0	0.09	0.41
Particulate Matter (PM)	0	1.41E-01	6.20E-01
Sulfur Dioxide (SO2)	0	4.29E-03	1.88E-02

	% Reduction	lb/hr	Metric Tonne/yr
Carbon Dioxide (CO2)	0	878	3487
Methane (CH4)	0	0.26	1.03

MIRATECH

Proposal Number: MH-15-0628

Equipment Specification Report

Engine Data

Number of Engines:	1
Application:	Gas Compression
Engine Manufacturer:	Waukesha
Model Number:	F 3524 GSI
Power Output:	840 bhp
Power Output:	0.6 wt% sulfated ash or less
Type of Fuel:	Natural Gas
Exhaust Flow Rate:	4609 acfm (cfm)
Exhaust Temperature:	1249 F

System Details

Housing Model Number:	RCS2-3024-10-HSG
Element Model Number:	IQ-RE-24EC
Number of Catalyst Layers:	2
Number of Spare Catalyst Layers:	0
System Pressure Loss:	3.0 inches of WC (Clean)
Sound Attenuation:	25-30 dBA insertion loss
Exhaust Temperature Limits:	750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number:	RCS2-3024-10-EC2
Material:	Carbon Steel
Inlet Pipe Size & Connection:	10 inch FF Flange, 150# ANSI standard bolt pattern
Outlet Pipe Size & Connection:	10 inch FF Flange, 150# ANSI standard bolt pattern
Overall Length:	96 inches
Weight Without Catalyst:	558 lbs
Weight Including Catalyst:	646 lbs
Instrumentation Ports:	1 inlet/1 outlet/2 catalyst (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
CO	12.5	97.6	0.3	0.3 g/bhp-hr
NMHC*	0.28			
NMNEHC**	0.19	0	0.2	0.2 g/bhp-hr
NO_x***	15.6	98.7	0.2	0.20 g/bhp-hr
O2	0.3%			
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

DRESSER Waukesha

VHP - F3524GSI

Gas Compression

CNX Oxford 11 Re Quote 5/29/15

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ENGINE SPEED (rpm):	1200	COOLING SYSTEM:	JW, IC + OC
DISPLACEMENT (in3):	3520	INTERCOOLER WATER INLET (°F):	130
COMPRESSION RATIO:	8:1	JACKET WATER OUTLET (°F):	180
IGNITION SYSTEM:	ESM	JACKET WATER CAPACITY (gal):	49
EXHAUST MANIFOLD:	Water Cooled	AUXILIARY WATER CAPACITY (gal):	8
COMBUSTION:	Rich Burn, Turbocharged	LUBE OIL CAPACITY (gal):	72
ENGINE DRY WEIGHT (lbs):	15000	MAX. EXHAUST BACKPRESSURE (in. H2O):	20
AIR/FUEL RATIO SETTING:	0.38% CO	MAX. AIR INLET RESTRICTION (in. H2O):	15

SITE CONDITIONS:

FUEL:	Oxford Inlet Customer Supplied 1/2	ALTITUDE (ft):	1200
FUEL PRESSURE RANGE (psig):	30 - 60	MAXIMUM INLET AIR TEMPERATURE (°F):	90
FUEL SLHV (BTU/ft3):	1,151.3	FUEL WKI:	58.4
FUEL LHV (BTU/ft3):	1,171.7		

SITE SPECIFIC TECHNICAL DATA

POWER RATING	UNITS	MAX RATING AT 100 °F AIR TEMP	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE OF 90 °F		
			100%	75%	55%
CONTINUOUS ENGINE POWER	BHP	840	840	630	464
OVERLOAD	% 2/24 hr	10	10	-	-
MECHANICAL EFFICIENCY (LHV)	%	29.6	29.5	28.7	27.7
CONTINUOUS POWER AT FLYWHEEL *based on no auxiliary engine driven equipment*	BHP	840	840	630	464
FUEL CONSUMPTION					
FUEL CONSUMPTION (LHV)	BTU/BHP-hr	8618	8619	8875	9201
FUEL CONSUMPTION (SLHV)	BTU/BHP-hr	8468	8469	8721	9040
FUEL FLOW *based on fuel analysis LHV*	SCFM	108	108	84	64
HEAT REJECTION					
JACKET WATER (JW)	BTU/hr x 1000	2317	2298	1821	1416
LUBE OIL (OC)	BTU/hr x 1000	359	350	326	300
INTERCOOLER (IC)	BTU/hr x 1000	144	131	87	40
EXHAUST	BTU/hr x 1000	2054	2075	1513	1097
RADIATION	BTU/hr x 1000	369	387	349	318
EMISSIONS					
NOx (NO + NO2)	g/bhp-hr	15.6	15.7	16.1	16.8
CO	g/bhp-hr	12.5	12.4	12.4	12.5
THC	g/bhp-hr	0.4	0.4	0.5	0.7
NMHC	g/bhp-hr	0.27	0.27	0.31	0.40
NM, NEHC	g/bhp-hr	0.18	0.18	0.21	0.25
CO2	g/bhp-hr	471	471	485	503
AIR INTAKE / EXHAUST GAS					
INDUCTION AIR FLOW	SCFM	1310	1310	1012	772
EXHAUST GAS MASS FLOW	lb/hr	6099	6099	4710	3597
EXHAUST GAS FLOW *at exhaust temp, 14.5 psia*	ACFM	4568	4574	3399	2508
EXHAUST TEMPERATURE	°F	1244	1246	1182	1126

HEAT EXHANGER SIZING		
TOTAL JACKET WATER CIRCUIT (JW)	BTU/hr x 1000	2627
TOTAL AUXILIARY WATER CIRCUIT (IC + OC)	BTU/hr x 1000	570

COOLING SYSTEM WITH ENGINE MOUNTED WATER PUMPS		
JACKET WATER PUMP MIN. DESIGN FLOW	GPM	225
JACKET WATER PUMP MAX. EXTERNAL RESTRICTION	psig	15
AUX WATER PUMP MIN. DESIGN FLOW	GPM	48
AUX WATER PUMP MAX. EXTERNAL RESTRICTION	psig	22

All data provided per the condtions listed in the notes section on page three.

Data Generated by EngCalc Program Version 3.0. Dresser Inc., Dresser Waukesha
5/29/2015 12:14 PM

CNX Oxford 11 Re Quote 5/29/15

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FUEL COMPOSITION

HYDROCARBONS:		Mole or Volume %
Methane	CH4	76.098
Ethane	C2H6	14.915
Propane	C3H8	4.8556
Iso-Butane	I-C4H10	0.6609
Normal Butane	N-C4H10	1.3067
Iso-Pentane	I-C5H12	0.3557
Normal Pentane	N-C5H12	0.3555
Hexane	C6H14	0.8148
Heptane	C7H16	0
Ethene	C2H4	0
Propene	C3H6	0
	SUM HYDROCARBONS	99.362
NON-HYDROCARBONS:		
Nitrogen	N2	0.4433
Oxygen	O2	0.0055
Helium	He	0
Carbon Dioxide	CO2	0.1889
Carbon Monoxide	CO	0
Hydrogen	H2	0
Hydrogen Sulfide	H2S	0
Water Vapor	H2O	0
	TOTAL FUEL	100

FUEL:	Oxford Inlet Customer Supplied 1/2015
FUEL PRESSURE RANGE (psig):	30 - 60
FUEL WKI:	58.4
FUEL SLHV (BTU/ft3):	1151.34
FUEL SLHV (MJ/Nm3):	45.27
FUEL LHV (BUT/ft3):	1171.73
FUEL LHV (MJ/Nm3):	46.08
FUEL DENSITY (SG):	0.74

Standard Conditions per ASTM D3588-91 [60°F and 14.696psia] and ISO 6976:1996-02-01[25, V(0;101.325)].
Based on the fuel composition, supply pressure and temperature, liquid hydrocarbons may be present in the fuel. These liquid hydrocarbons must be less than 2% by gaseous volume of the total fuel. The fuel must not contain any liquid water. WED recommends both of the following:
1) Dew point of the fuel gas to be at least 20°F (11°C) below the measured temperature of the gas at the inlet of the engine fuel regulator.
2) A fuel filter separator to be used on all fuels except commercial quality natural gas.
Refer to the 'Fuel and Lubrication' section of the 'GENERAL TECH DATA MANUAL' or contact the WED Engineering Department for additional information on fuels, or LHV and WKI ™ calculations.

Iso-butane and heavier hydrocarbons greater than 2%. Requires coalescing filter/seperator.

CNX Oxford 11 Re Quote 5/29/15

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NOTES

1. All data is based on engines with standard configurations unless noted otherwise.

2. Power rating is adjusted for fuel, site altitude, and site air inlet temperature, in accordance with ISO 3046/1 with tolerance of ± 3%.

3. Fuel consumption is presented in accordance with ISO 3046/1 with a tolerance of -0 / +5% at maximum rating. Fuel flow calculation based on fuel LHV and fuel consumption with added 5% tolerance.

4. Heat rejection tolerances are ± 30% for radiation, and ± 8% for jacket water, lube oil, intercooler, and exhaust energy.

5. Emission levels are given at engine exhaust outlet flange prior to any after treatment. Values are based on a new engine operating at indicated site conditions, and adjusted to the specified timing and air/fuel ratio at rated load. Emissions are at an absolute humidity of 75 grains H2O/lb (10.71 g H2O/kg) of dry air. Emission levels may vary subject to instrumentation, measurement, ambient conditions, fuel quality, and engine variation. Engine may require adjustment on-site to meet emission values, which may affect engine performance and heat output. NOx, CO, THC, and NMHC emission levels are listed as a not to exceed limit, all other emission levels are estimated.

6. Air flow is based on undried air with a tolerance of ± 7%.

7. Exhaust temperature given at engine exhaust outlet flange with a tolerance of ± 75°F (42°C).

8. Exhaust gas mass flow value is based on a "wet basis" with a tolerance of ± 7%.

9. Inlet and Exhaust Restrictions based on full rated engine load Refer to the engine specification section of Dresser Waukesha's standard technical data for more information.

10. Heat exchanger sizing values given as the maximum heat rejection of the circuit, with applied tolerances and an additional 5% reserve factor.

11. Cooling circuit capacity, lube oil capacity, and engine dry weight values are typical.

12. Fuel must conform to Dresser Waukesha "Gaseous Fuel Specification" S7884-7 or most current version. Fuel may require treatment to meet current fuel specification.

13. Cooling system design flow is based on minimum allowable cooling system flow. Cooling system maximum external restriction is defined as the allowable restriction at the minimum cooling system flow. Refer to technical data sheets S-5136-33 and S-6543-19 (or latest version) for more information.

REQUIRED OPTION CODES

FORMALDEHYDE EMISSION LEVELS

The following table provides formaldehyde (CH_2O) levels that are valid for new engines for the duration of the standard warranty period and are attainable by an engine in good operating condition running on commercial quality natural gas of 900 BTU/ft^3 (35.38 MJ/m^3 [25, V(0; 101.325)]) SLHV, Waukesha Knock Index® of 91 or higher, 93% methane content by volume, and at ISO standard conditions. Values are based on standard engine timing at 91 WKI® with an absolute humidity of 42 grains/lb. Refer to engine specific WKI® Power & Timing curves for standard timing. Unless otherwise noted, these emission levels can be achieved across the continuous duty speed range at the load levels tabulated. ***Contact the local Waukesha representative or Waukesha's Application Engineering Department for emission values which can be obtained on a case-by-case basis for specific ratings, fuels, and site conditions.***

MODEL	CARB. SETTING	CH_2O GRAMS/ BHP-HR PERCENT LOAD		% OBSERVED DRY		MASS AFR[2]	VOLUME AFR[2]	EXCESS AIR RATIO
		100%	75%	CO	O_2			
AT25GL	Lean Burn	0.18	0.20	0.06	9.8	28.0:1	16.8:1	1.74
275GL/AT27GL	Lean Burn	0.18	0.20	0.06	9.8	28.0:1	16.8:1	1.74
	Ultra Lean	0.18	0.20	0.05	11.2	32.0:1	19.2:1	2.00
12V220GL/APG2000 18V220GL/APG3000	Ultra Lean	0.23	0.29	0.09 – 0.15	12.3 – 13.4	32.1 – 35.3	19.3 – 21.2	2.03 – 2.20
18V160LTD/APG1000	Lean Burn	0.14	0.15	0.07	9.5 – 9.6	26.9 – 27.2	16.2 – 16.4	1.68 – 1.7
VHP G, GSI	Rich Burn	0.05	0.05	0.02 – 1.15	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06
VHP Series 4 GSI	Rich Burn	0.05	0.05	0.02 – 0.45	0.30 – 1.35	15.85:1 – 17.0:1	9.5:1 – 10.2:1	0.99 – 1.06
L5774LT L5794LT	Lean Burn	0.22	0.25	0.04	7.8 – 8.0	24.5:1 – 24.7:1	14.7:1 – 14.8:1	1.52 – 1.54
VHP GL	Lean Burn	0.29	0.34	0.06	9.8	28.0:1	16.8:1	1.74
VGF G, GSID	Rich Burn	0.05	0.05	0.20 – 1.1	0.18 – 2.4	16.6:1 – 18.0:1	9.3:1 – 10.8:1	0.97 – 1.12
VGF GL, GLD, GLD/2	Lean Burn	0.19	0.22	0.03 – 0.04	7.8 – 9.0	21.5:1 – 25.4:1	13.9:1 – 15.2:1	1.53 – 1.65
VSG G, GSI, GSID	Rich Burn	0.05	0.05	0.02 – 1.15	0.29 – 2.10	15.5:1 – 17.7:1	9.3:1 – 10.6:1	0.97 – 1.10
F1197G	Rich Burn	0.05	0.05	0.04 – 1.35	0.30 – 1.35	15.5:1 – 17.0:1	9.3:1 – 10.2:1	0.97 – 1.06
F817G	Rich Burn	0.05	0.05	0.04 – 1.30	0.30 – 1.35	15.5 :1 – 17.0:1	9.2:1 – 10.2:1	0.97 – 1.06

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

Fractional 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#	115
		Client ID #:	N/A

ANALYSIS REPORT

FRACTIONAL ANALYSIS

COMPONENTS	MOLE PERCENT	GPM
METHANE	76.0977	
ETHANE	14.9153	3.98
PROPANE	4.8556	1.33
I-BUTANE	0.6609	0.22
N-BUTANE	1.3067	0.41
I-PENTANE	0.3557	0.13
N-PENTANE	0.3555	0.13
NITROGEN	0.4433	
CARBON DIOXIDE	0.1889	
OXYGEN	0.0055	
HEXANES (PLUS)	0.8148	0.35
TOTAL	100.0000	

ANALYTICAL RESULTS AT BASE CONDITIONS (CALCULATED VALUES)

BTU/SCF (DRY):	1294.07
BTU/SCF (SATURATED):	1272.03
PRESSURE (PSIA):	14.696
TEMPERATURE (°F)	60.00
Z FACTOR (DRY):	0.9962
Z FACTOR (SATURATED):	0.9958
ETHANE + GPM	6.5778

SPECIFIC GRAVITIES (CALCULATED VALUES)

IDEAL GRAVITY	0.7409
REAL GRAVITY	0.7435

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

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

June 4, 2015

Mr. Craig Neal, Vice President Gas Operations
CNX Gas Company, LLC
PO Box 1248
Jane Lew, WV 26378

RE: **Application Completeness**
CNX Gas Company, LLC
Oxford 13 Well Pad
Permit No. R13-3248
Plant ID No. 017-00153

Dear Mr. Neal:

Your application for a construction permit was received by the Division of Air Quality (DAQ) on May 5, 2015 and assigned to the writer for review. Upon an initial review of the application and additional information submitted, the application has been deemed complete as of the date of this letter. The ninety (90) day statutory time frame began on that day.

This determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit determination.

Should you have any questions, please contact me at (304) 926-0499 ext. 1219.

Sincerely,

Joe Kessler, PE
Engineer

c: Mr. Jesse Hanshaw, Principle Engineer
SLR International Corporation

UC Defaulted Accounts Search Results

Sorry, no records matching your criteria were found.

FEIN: 550738862
Business name:
Doing business as/Trading as:

Please use your browsers back button to try again.

WorkforceWV	Unemployment Compensation	Offices of the Insurance Commissioner

UC Defaulted Accounts Search Results

Sorry, no records matching your criteria were found.

FEIN:
Business name: CNX GAS COMPANY, LLC
Doing business as/Trading as:

Please use your browsers back button to try again.

WorkforceWV	Unemployment Compensation	Offices of the Insurance Commissioner

Kessler, Joseph R

From: Adkins, Sandra K
Sent: Monday, May 11, 2015 10:53 AM
To: Kessler, Joseph R
Subject: CNX Gas Co (Oxford 13 Wellpad)/Permit Application Fee

This is the receipt for payment received from:

CNX Gas Company LLC, check number 2780043935, dated April 14, 2015, $4,500.00
Oxford 13 Wellpad R13-3248 id no 017-00153

OASIS Deposit No CR 1500124599 May 11, 2015

May 19, 2015

Joe Kessler
Permit Writer
WVDEP, Division of Air Quality
601 – 57th Street
Charleston, West Virginia 25304

Re: Rule 13 Permit Application
Oxford 13 Well Pad, New Milton, West Virginia

Dear Mr. Kessler,

SLR International Corporation has attached the Class I Legal Advertisement and original affidavit for the Oxford 13 Rule 13 Application on behalf of CNX Gas Company.

The public notice was delivered to *The Herald Record* for publication. The Class I Legal Advertisement and original affidavit from the newspaper are attached. If any additional information is needed, please contact me by telephone at (681) 205-8949 extension 6 or by e-mail at esaturday@slrconsulting.com.

Sincerely,
SLR International Corporation

Ethan Saturday, E.I.
Staff Engineer

I.D. No. 017-00053 Reg. 3248
Company CNX
Facility Oxford 13 Region
Initials

Attachment: Published Legal Advertisement and Affidavit

SLR International Corporation 8 Capitol Street, Suite 300, Terminal Building Charleston, WV 25301
T: (681) 205-8949 F: (681) 205-8969 www.slrconsulting.com
Offices throughout USA, UK, Ireland, Canada, Australia, Namibia, and South Africa

STATE OF WEST VIRGINIA,
COUNTY OF DODDRIDGE, TO WIT

I, Virginia Nicholson, Editor of THE HERALD RECORD, a weekly newspaper published regularly, in Doddridge County, West Virginia, Do Hereby Certify That the Accompanying Legal Notice Entitled:

Air Quality Permit
Oxford - 13 site

was published in said paper for 1

successive weeks beginning with the issue of May 12th 2015 and ending with the issue of

2015 and that said notice contains 357

WORD SPACE at 115 cents a word amounts to the sum of $ 41.06

FOR FIRST PUBLICATION, SECOND PUBLICATION IS 75% OF THE FIRST PUBLICATION

$

and each publication thereafter

$ 41.06 TOTAL

EDITOR

Virginia Nicholson

SWORN TO AND SUBSCRIBED BEFORE ME THIS THE 14th DAY OF May 2015

NOTARY PUBLIC

Robert E Burnside

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
ROBERT E. BURNSIDE
100 SCHOOL ST.
WEST UNION, WV 26456
My commission expires May 16, 2019

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 applicants estimates the potential to discharge of the following Regulated Air Pollutants will be:

Pollutant	Tons/yr
NO_x	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.
5-12-1xb

Kessler, Joseph R

From: Rice, Jennifer L
Sent: Friday, May 08, 2015 4:05 PM
To: craigneal@consolenergy.com; jhanshaw@slrconsulting.com
Cc: Kessler, Joseph R; McKeone, Beverly D
Subject: WV DAQ Permit Application Status for CNX Gas Company LLC; Oxford 13 Wellpad

RE: Application Status
CNX Gas Company LLC
Oxford 13 Wellpad
Plant ID No. 017-00153
Application No. R13-3248

Entire Document
NON-CONFIDENTIAL

Mr. Neal,

Your application for a construction permit for the Oxford 13 Wellpad was received by this Division on May 5, 2015, and was assigned to Joe Kessler. The following item was not included in the initial application submittal:

Original affidavit for Class I legal advertisement not submitted.

This item is necessary for the assigned permit writer to continue the 30-day completeness review.

Within 30 days, you should receive a letter from Joe Kessler stating the status of the permit application and, if complete, given an estimated time frame for the agency's final action on the permit.

Any determination of completeness shall not relieve the permit applicant of the requirement to subsequently submit, in a timely manner, any additional or corrected information deemed necessary for a final permit decision.

Should you have any questions, please contact the assigned engineer, Joe Kessler, at 304-926-0499, extension 1219.

Jennifer Rice
WV Dept. of Environmental Protection
Division of Air Quality
304-926-0499 x1227