



Environmental  
Protection Agency

John R. Kasich, Governor  
Mary Taylor, Lt. Governor  
Scott J. Nally, Director

Certified Mail

8/30/2012

Paul Schubert  
VELOCYS  
7950 Corporate Boulevard  
Plain City, OH 43064

RE: DRAFT AIR POLLUTION PERMIT-TO-INSTALL AND OPERATE

Facility ID: 0180000401  
Permit Number: P0109815  
Permit Type: Administrative Modification  
County: Union

No	TOXIC REVIEW
No	PSD
No	SYNTHETIC MINOR TO AVOID MAJOR NSR
No	CEMS
No	MACT/GACT
No	NSPS
No	NESHAPS
No	NETTING
No	MAJOR NON-ATTAINMENT
No	MODELING SUBMITTED
Yes	SYNTHETIC MINOR TO AVOID TITLE V
Yes	FEDERALLY ENFORCABLE PTIO (FEPTIO)

Dear Permit Holder:

A draft of the Ohio Administrative Code (OAC) Chapter 3745-31 Air Pollution Permit-to-Install and Operate (PTIO) for the referenced facility has been issued for the emissions unit(s) listed in the Authorization section of the enclosed draft permit. This draft action is not an authorization to begin construction or modification of your emissions unit(s). The purpose of this draft is to solicit public comments on the permit. A public notice will appear in the Ohio EPA Weekly Review and the local newspaper, Marysville Tribune. A copy of the public notice and the draft permit are enclosed. This permit can be accessed electronically on the Division of Air Pollution Control (DAPC) Web page, [www.epa.ohio.gov/dapc](http://www.epa.ohio.gov/dapc) by clicking the "Issued Air Pollution Control Permits" link. Comments will be accepted as a marked-up copy of the draft permit or in narrative format. Any comments must be sent to the following:

Andrew Hall  
Permit Review/Development Section  
Ohio EPA, DAPC  
122 South Front Street  
Columbus, Ohio 43215

and Ohio EPA DAPC, Central District Office  
50 West Town Street, 6th Floor  
P.O. Box 1049  
Columbus, OH 43216-1049

Comments and/or a request for a public hearing will be accepted within 30 days of the date the notice is published in the newspaper. You will be notified in writing if a public hearing is scheduled. A decision on issuing a final permit-to-install will be made after consideration of comments received and oral testimony if a public hearing is conducted. Any permit fee that will be due upon issuance of a final Permit-to-Install is indicated in the Authorization section. Please do not submit any payment now. If you have any questions, please contact Ohio EPA DAPC, Central District Office at (614)728-3778.

Sincerely,

Michael W. Ahern, Manager  
Permit Issuance and Data Management Section, DAPC

Cc: U.S. EPA Region 5 Via E-Mail Notification  
Ohio EPA-CDO





## Permit Strategy Write-Up

1. Check all that apply:

Synthetic Minor Determination

Netting Determination

2. Source Description:

Velocys is an R&D company testing devices for converting methane-rich flare gas to synthetic crude oil. Velocys is requesting administrative modifications for two of their testing units: P001 (SMR Layer Test Facility Unit) and P002 (TE 2 Test Facility Unit). Modifications to P001 include the option to divert the outlet stream to a Fischer Tropsch reactor and the addition of a flare to control carbon monoxide emissions. The use of the flare will result in a decrease in the allowable carbon monoxide emissions from P001. Velocys is administratively modifying P002's permit to correct the type of fuels that are permitted for use in the unit.

3. Facility Emissions and Attainment Status:

Velocys is located in Union County which is in full attainment for all criteria pollutants. Velocys is requesting a synthetic minor operational restriction to avoid the Title V permitting program for carbon monoxide. The synthetic minor strategy consists of diverting P001's emissions to a flare to control carbon monoxide. The appropriate operational, monitoring, recordkeeping, reporting and testing requirements have been established for P001 in order to demonstrate the synthetic minor limitation is not exceeded.

4. Facility Emissions and Attainment Status:

Velocys is located in Union County which is in full attainment for all criteria pollutants. Velocys is requesting a synthetic minor operational restriction to avoid the Title V permitting program for carbon monoxide. The synthetic minor strategy consists of venting the emissions from P001 (SMR Layer Test Facility Unit) and P003 (VPP Layer Facility) to a flare. The appropriate operational, monitoring, recordkeeping, reporting and testing requirements have been established in order to demonstrate the synthetic minor limitation is not exceeded.

Table 1: Facility-wide Carbon Monoxide (CO) Emissions

Process	CO Emissions (tons per year)	Notes
SMR Layer (P001)	3.18	vented to flare
TE 2 (P002)	13.44	uncontrolled
VPP Layer Facility (P003)	2.97	vented to flare
other test stands	0.37	from 4/2/12 application
25 hp steam boiler	0.16	from 4/2/12 application
diesel generator	0.55	uncontrolled; based on 500 hr/yr maximum operation (PBR source)
<b>TOTAL</b>	<b>20.67</b>	



5. Source Emissions:

Velocys has requested to limit their CO emissions from P001 to 3.18 tons per rolling, 12-month period. This limitation was established to reflect the worst-case operating condition (P001's emissions by-pass the Fischer-Tropsch reactor and are vented directly to the flare) to provide optimal operational flexibility. The CO emissions limitation was established using the emission unit's maximum hourly CO emission rate to the flare, information provided by the manufacturer of the flare (Flare King, Inc.) and the following equations.

$CO = (CO_p + CO_f) \times 8,760 \text{ hr/yr} / 2,000 \text{ lb/ton}$ , where:  
CO = Total CO emissions per rolling, 12-month period  
CO<sub>p</sub> = CO emissions generated by the process (lb/hr)  
CO<sub>p</sub> = Mol % x Q x density x (1 – DE), where:  
Mol % = Maximum percent of CO in the uncontrolled emissions (11%)  
Q = flow rate into the flare (2,228.2 scfh)  
density = density of CO (0.078 lb/scf)  
DE = destruction efficiency (98%)  
CO<sub>f</sub> = CO emissions generated by the flare (lb/hr)  
CO<sub>f</sub> = EF x LHV x Q x 8,760 hr/yr / 2,000 lb/ton, where:  
EF = manufacturer's emission factor for the flare (0.5496 lb CO/MMBtu)  
LHV = lower heating value of the uncontrolled emissions (0.00028 MMBtu/scf)  
Q = flow rate into the flare (2,228.2 scfh)

Since the flow rate into the flare may increase as the process becomes more efficient, the permit requires Velocys to record the monthly flow rate to the flare and calculate the CO emissions based on this flow rate.

NOx emissions are limited to 0.04 lb/hr and 0.18 ton/yr. The NOx emissions limitations were established to reflect P001's potential to emit using information provided by the manufacturer of the flare (Flare King, Inc.) and the following equation.

$NO_x = EF \times LHV \times Q \times 8,760 \text{ hr/yr} / 2,000 \text{ lb/ton}$ , where:  
EF = manufacturer's emission factor for the flare (0.0641 lbNOx/MMBtu)  
LHV = lower heating value of the uncontrolled emissions (0.00028 MMBtu/scf)  
Q = flow rate into the flare (2,228.2 scfh)

Based on the information provided in the permit application for the emissions vented to the flare, VOC, PE and SO<sub>2</sub> emissions from the flare are expected to be negligible. PE (soot) are dependent upon the carbon-to-hydrogen ratio of the combustion fuel. Multiple-carbon chain organics are not expected to be present in the emissions vented to the flare. SO<sub>2</sub> emissions are dependent upon the amount of sulfur available in the combustion fuel. All sulfur is removed from the feed streams of Velocys's emission units.

6. Conclusion:

The issuance of P0109815 is recommended. The operational limitations contained in this FEPTIO are adequate to provide federally enforceable limitations to ensure that the applicable carbon monoxide threshold will not be exceeded.

7. Please provide additional notes or comments as necessary:

None

8. Total Permit Allowable Emissions Summary (for informational purposes only):

<u>Pollutant</u>	<u>Tons Per Year</u>
CO	16.62
NOx	0.18



PUBLIC NOTICE  
8/30/2012 Issuance of Draft Air Pollution Permit-To-Install and Operate

VELOCYS

7950 CORPORATE BLVD,

Plain City, OH 43064

Union County

FACILITY DESC.: Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)

PERMIT #: P0109815

PERMIT TYPE: Administrative Modification

PERMIT DESC: Administrative modification for two R&D testing units. It includes a synthetic minor operational restriction to avoid the Title V permitting program for carbon monoxide.

The Director of the Ohio Environmental Protection Agency issued the draft permit above. The permit and complete instructions for requesting information or submitting comments may be obtained at: <http://epa.ohio.gov/dapc/permitsonline.aspx> by entering the permit # or: Pamela McCoy, Ohio EPA DAPC, Central District Office, 50 West Town Street, 6th Floor P.O. Box 1049, Columbus, OH 43216-1049. Ph: (614)728-3778



**Ohio**

**Environmental  
Protection Agency**

**DRAFT**

**Division of Air Pollution Control  
Permit-to-Install and Operate  
for  
VELOCYS**

Facility ID:	0180000401
Permit Number:	P0109815
Permit Type:	Administrative Modification
Issued:	8/30/2012
Effective:	To be entered upon final issuance
Expiration:	To be entered upon final issuance





Division of Air Pollution Control
Permit-to-Install and Operate
for
VELOCYS

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## Authorization

Facility ID: 0180000401  
 Application Number(s): A0044221, A0045378  
 Permit Number: P0109815  
 Permit Description: Administrative modification for two R&D testing units. It includes a synthetic minor operational restriction to avoid the Title V permitting program for carbon monoxide.  
 Permit Type: Administrative Modification  
 Permit Fee: \$400.00 *DO NOT send payment at this time, subject to change before final issuance*  
 Issue Date: 8/30/2012  
 Effective Date: To be entered upon final issuance  
 Expiration Date: To be entered upon final issuance  
 Permit Evaluation Report (PER) Annual Date: To be entered upon final issuance

This document constitutes issuance to:

VELOCYS  
 7950 CORPORATE BLVD  
 Plain City, OH 43064

of a Permit-to-Install and Operate for the emissions unit(s) identified on the following page.

Ohio EPA District Office or local air agency responsible for processing and administering your permit:

Ohio EPA DAPC, Central District Office  
 50 West Town Street, 6th Floor  
 P.O. Box 1049  
 Columbus, OH 43216-1049  
 (614)728-3778

The above named entity is hereby granted this Permit-to-Install and Operate for the air contaminant source(s) (emissions unit(s)) listed in this section pursuant to Chapter 3745-31 of the Ohio Administrative Code. Issuance of this permit does not constitute expressed or implied approval or agreement that, if constructed or modified in accordance with the plans included in the application, the described emissions unit(s) will operate in compliance with applicable State and Federal laws and regulations.

This permit is granted subject to the conditions attached hereto.

Ohio Environmental Protection Agency

Scott J. Nally  
 Director



## Authorization (continued)

Permit Number: P0109815

Permit Description: Administrative modification for two R&D testing units. It includes a synthetic minor operational restriction to avoid the Title V permitting program for carbon monoxide.

Permits for the following Emissions Unit(s) or groups of Emissions Units are in this document as indicated below:

<b>Emissions Unit ID:</b>	<b>P001</b>
Company Equipment ID:	TMP168337
Superseded Permit Number:	P0108468
General Permit Category and Type:	Not Applicable

<b>Emissions Unit ID:</b>	<b>P002</b>
Company Equipment ID:	P002
Superseded Permit Number:	P0108468
General Permit Category and Type:	Not Applicable



## **A. Standard Terms and Conditions**



**1. What does this permit-to-install and operate ("PTIO") allow me to do?**

This permit allows you to install and operate the emissions unit(s) identified in this PTIO. You must install and operate the unit(s) in accordance with the application you submitted and all the terms and conditions contained in this PTIO, including emission limits and those terms that ensure compliance with the emission limits (for example, operating, recordkeeping and monitoring requirements).

**2. Who is responsible for complying with this permit?**

The person identified on the "Authorization" page, above, is responsible for complying with this permit until the permit is revoked, terminated, or transferred. "Person" means a person, firm, corporation, association, or partnership. The words "you," "your," or "permittee" refer to the "person" identified on the "Authorization" page above.

The permit applies only to the emissions unit(s) identified in the permit. If you install or modify any other equipment that requires an air permit, you must apply for an additional PTIO(s) for these sources.

**3. What records must I keep under this permit?**

You must keep all records required by this permit, including monitoring data, test results, strip-chart recordings, calibration data, maintenance records, and any other record required by this permit for five years from the date the record was created. You can keep these records electronically, provided they can be made available to Ohio EPA during an inspection at the facility. Failure to make requested records available to Ohio EPA upon request is a violation of this permit requirement.

**4. What are my permit fees and when do I pay them?**

There are two fees associated with permitted air contaminant sources in Ohio:

- PTIO fee. This one-time fee is based on a fee schedule in accordance with Ohio Revised Code (ORC) section 3745.11, or based on a time and materials charge for permit application review and permit processing if required by the Director.

You will be sent an invoice for this fee after you receive this PTIO and payment is due within 30 days of the invoice date. You are required to pay the fee for this PTIO even if you do not install or modify your operations as authorized by this permit.

- Annual emissions fee. Ohio EPA will assess a separate fee based on the total annual emissions from your facility. You self-report your emissions in accordance with Ohio Administrative Code (OAC) Chapter 3745-78. This fee assessed is based on a fee schedule in ORC section 3745.11 and funds Ohio EPA's permit compliance oversight activities. Unless otherwise specified, facilities subject to one or more synthetic minor restrictions must use Ohio EPA's "Air Services" to submit annual emissions associated with this permit requirement. Ohio EPA will notify you when it is time to report your emissions and to pay your annual emission fees.

**5. When does my PTIO expire, and when do I need to submit my renewal application?**

This permit expires on the date identified at the beginning of this permit document (see "Authorization" page above) and you must submit a renewal application to renew the permit. Ohio EPA will send a renewal notice to you approximately six months prior to the expiration date of this permit. However, it is very important that you submit a complete renewal permit application (postmarked prior to expiration of this permit) even if you do not receive the renewal notice.



If a complete renewal application is submitted before the expiration date, Ohio EPA considers this a timely application for purposes of ORC section 119.06, and you are authorized to continue operating the emissions unit(s) covered by this permit beyond the expiration date of this permit until final action is taken by Ohio EPA on the renewal application.

**6. What happens to this permit if my project is delayed or I do not install or modify my source?**

This PTIO expires 18 months after the issue date identified on the "Authorization" page above unless otherwise specified if you have not (1) started constructing the new or modified emission sources identified in this permit, or (2) entered into a binding contract to undertake such construction. This deadline can be extended by up to 12 months, provided you apply to Ohio EPA for this extension within a reasonable time before the 18-month period has ended and you can show good cause for any such extension.

**7. What reports must I submit under this permit?**

An annual permit evaluation report (PER) is required in addition to any malfunction reporting required by OAC rule 3745-15-06 or other specific rule-based reporting requirement identified in this permit. Your PER due date is identified in the Authorization section of this permit.

**8. If I am required to obtain a Title V operating permit in the future, what happens to the operating provisions and PER obligations under this permit?**

If you are required to obtain a Title V permit under OAC Chapter 3745-77 in the future, the permit-to-operate portion of this permit will be superseded by the issued Title V permit. From the effective date of the Title V permit forward, this PTIO will effectively become a PTI (permit-to-install) in accordance with OAC rule 3745-31-02(B). The following terms and conditions will no longer be applicable after issuance of the Title V permit: Section B, Term 1.b) and Section C, for each emissions unit, Term a)(2).

The PER requirements in this permit remain effective until the date the Title V permit is issued and is effective, and cease to apply after the effective date of the Title V permit. The final PER obligation will cover operations up to the effective date of the Title V permit and must be submitted on or before the submission deadline identified in this permit on the last day prior to the effective date of the Title V permit.

**9. What are my obligations when I perform scheduled maintenance on air pollution control equipment?**

You must perform scheduled maintenance of air pollution control equipment in accordance with OAC rule 3745-15-06(A). If scheduled maintenance requires shutting down or bypassing any air pollution control equipment, you must also shut down the emissions unit(s) served by the air pollution control equipment during maintenance, unless the conditions of OAC rule 3745-15-06(A)(3) are met. Any emissions that exceed permitted amount(s) under this permit (unless specifically exempted by rule) must be reported as deviations in the annual permit evaluation report (PER), including nonexempt excess emissions that occur during approved scheduled maintenance.

**10. Do I have to report malfunctions of emissions units or air pollution control equipment? If so, how must I report?**

If you have a reportable malfunction of any emissions unit(s) or any associated air pollution control system, you must report this to the Ohio EPA DAPC, Central District Office in accordance with OAC rule 3745-15-06(B). Malfunctions that must be reported are those that result in emissions that exceed

permitted emission levels. It is your responsibility to evaluate control equipment breakdowns and operational upsets to determine if a reportable malfunction has occurred.

If you have a malfunction, but determine that it is not a reportable malfunction under OAC rule 3745-15-06(B), it is recommended that you maintain records associated with control equipment breakdown or process upsets. Although it is not a requirement of this permit, Ohio EPA recommends that you maintain records for non-reportable malfunctions.

**11. Can Ohio EPA or my local air agency inspect the facility where the emission unit(s) is/are located?**

Yes. Under Ohio law, the Director or his authorized representative may inspect the facility, conduct tests, examine records or reports to determine compliance with air pollution laws and regulations and the terms and conditions of this permit. You must provide, within a reasonable time, any information Ohio EPA requests either verbally or in writing.

**12. What happens if one or more emissions units operated under this permit is/are shut down permanently?**

Ohio EPA can terminate the permit terms associated with any permanently shut down emissions unit. "Shut down" means the emissions unit has been physically removed from service or has been altered in such a way that it can no longer operate without a subsequent "modification" or "installation" as defined in OAC Chapter 3745-31.

You should notify Ohio EPA of any emissions unit that is permanently shut down by submitting<sup>1</sup> a certification that identifies the date on which the emissions unit was permanently shut down. The certification must be submitted by an authorized official from the facility. You cannot continue to operate an emissions unit once the certification has been submitted to Ohio EPA by the authorized official.

You must comply with all recordkeeping and reporting for any permanently shut down emissions unit in accordance with the provisions of the permit, regulations or laws that were enforceable during the period of operation, such as the requirement to submit a PER, air fee emission report, or malfunction report. You must also keep all records relating to any permanently shutdown emissions unit, generated while the emissions unit was in operation, for at least five years from the date the record was generated.

Again, you cannot resume operation of any emissions unit certified by the authorized official as being permanently shut down without first applying for and obtaining a permit pursuant to OAC Chapter 3745-31.

**13. Can I transfer this permit to a new owner or operator?**

You can transfer this permit to a new owner or operator. If you transfer the permit, you must follow the procedures in OAC Chapter 3745-31, including notifying Ohio EPA or the local air agency of the change in ownership or operator. Any transferee of this permit must assume the responsibilities of the transferor permit holder.

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<sup>1</sup>Permittees that use Ohio EPA's "Air Services" can mark the affected emissions unit(s) as "permanently shutdown" in the facility profile along with the date the emissions unit(s) was permanently removed and/or disabled. Submitting the facility profile update will constitute notifying of the permanent shutdown of the affected emissions unit(s).

**14. Does compliance with this permit constitute compliance with OAC rule 3745-15-07, "air pollution nuisance"?**

This permit and OAC rule 3745-15-07 prohibit operation of the air contaminant source(s) regulated under this permit in a manner that causes a nuisance. Ohio EPA can require additional controls or modification of the requirements of this permit through enforcement orders or judicial enforcement action if, upon investigation, Ohio EPA determines existing operations are causing a nuisance.

**15. What happens if a portion of this permit is determined to be invalid?**

If a portion of this permit is determined to be invalid, the remainder of the terms and conditions remain valid and enforceable. The exception is where the enforceability of terms and conditions are dependent on the term or condition that was declared invalid.

## **B. Facility-Wide Terms and Conditions**

1. This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).
  - a) For the purpose of a permit-to-install document, the facility-wide terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.
    - (1) None.
  - b) For the purpose of a permit-to-operate document, the facility-wide terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.
    - (1) None.

## **C. Emissions Unit Terms and Conditions**



1. P001, SMR Layer Test Facility Unit

Operations, Property and/or Equipment Description:

SMR Layer Test Facility Unit

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

a. b)(1)a.,c)(3), d)(6)d. and e)(1)c..

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	OAC rule 3745-31-05(D) (Synthetic minor to avoid Title V)	Carbon monoxide (CO) emissions shall not exceed 3.18 tons per rolling, 12-month period.  See c)(3) below.
b.	OAC rule 3745-31-05(A)(3), as effective 11/30/01	Carbon monoxide (CO) emissions shall not exceed 0.72lb/hr and 3.18 ton/yr.  Nitrogen oxide (NOx) emissions shall not exceed 0.04 lb/hr and 0.18 ton/yr.  See b)(2)a. and b)(2)d. below.
c.	OAC rule 3745-31-05(A)(3)(a)(ii), as effective 12/01/06	See b)(2)b. below.

(2) Additional Terms and Conditions

a. The permittee has satisfied the Best Available Technology (BAT) requirements pursuant to Ohio Administrative Code (OAC) paragraph 3745-31-05(A)(3), as

effective November 30, 2001, in this permit. On December 1, 2006, paragraph (A)(3) of OAC rule 3745-31-05 was revised to conform to the Ohio Revised Code (ORC) changes effective August 3, 2006 (Senate Bill 265 changes), such that BAT is no longer required by State regulations for National Ambient Air Quality Standards (NAAQS) pollutant(s) less than ten tons per year. However, that rule revision has not yet been approved by U.S. EPA as a revision to Ohio's State Implementation Plan (SIP). Therefore, until the SIP revision occurs and the U.S. EPA approves the revisions to OAC rule 3745-31-05, the requirement to satisfy BAT still exists as part of the federally-approved SIP for Ohio. Once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05, then these emission limitations/control measures no longer apply.

- b. The following rule paragraphs will apply once U.S. EPA approves the December 1, 2006 version of OAC rule 3745-31-05 as part of the State Implementation Plan:
  - i. The Best Available Technology (BAT) requirements under OAC rule 3745-31-05(A)(3) do not apply to the CO and NO<sub>x</sub> emissions from this air contaminant source since the potentials to emit are less than 10 tons per year.
- c. There shall be no visible emissions from the stack serving this emissions unit, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.
- d. The hourly and annual NO<sub>x</sub> emission limitations were established to reflect the potential to emit for this emissions unit in accordance with the information provided in the application. It is not necessary to develop monitoring, recordkeeping, or reporting requirements to ensure compliance with these limitations.

c) Operational Restrictions

- (1) The permittee shall burn only hydrogen and/or natural gas in this emissions unit.
- (2) All of the emissions from this emissions unit shall be vented to the flare at all times the emissions unit is in operation. The flare shall be designed and operated as follows:
  - a. The flare shall be operated with a flame present at all times when gases are vented to it. The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.
- (2) The emissions of CO from this emissions unit shall not exceed 3.18 tons per year, based upon a rolling, 12-month summation of the CO emissions. To ensure enforceability during the first 12 calendar months following the issuance of this permit, the permittee shall not exceed the emission levels specified in the following table:



Month(s)	Maximum Allowable Cumulative Emissions of CO (Tons)
1	0.26
1-2	0.53
1-3	0.79
1-4	1.06
1-5	1.32
1-6	1.59
1-7	1.85
1-8	2.12
1-9	2.38
1-10	2.65
1-11	2.91
1-12	3.18

After the first 12 calendar months following the issuance of this permit, compliance with the annual emission limitation for CO shall be based upon a rolling, 12-month summation of the CO emissions.

d) Monitoring and/or Recordkeeping Requirements

- (1) For each day during which the permittee burns a fuel other than hydrogen or natural gas, the permittee shall maintain a record of the type and quantity of fuel burned in this emissions unit.
- (2) The permittee shall monitor the flare to ensure that it is operated and maintained in conformance with its design and the requirements contained in this permit.
- (3) The permittee shall properly install, operate, and maintain a device to continuously monitor the pilot flame when the emissions unit is in operation. The monitoring device and any recorder shall be installed, calibrated, operated, and maintained in accordance with the manufacturer's recommendations, instructions, and operating manuals.
- (4) The permittee shall record all periods of time during which there was no pilot flame or the flare was inoperable.
- (5) The permittee shall record all periods of time when the emissions unit was in operation and the process emissions were not vented to the flare.
- (6) The permittee shall collect and record the following information on a monthly basis:
  - a. The standard cubic feet of gases vented from the emissions unit to the flare.
  - b. The CO emissions (calculated using the equation in f)(1)a. and the actual flow rate into the flare recorded for the month), in pounds or tons.
  - c. During the first 12 calendar months following the issuance of this permit, the permittee shall record the cumulative CO emissions for each calendar month.

- d. Beginning after the first 12 calendar months following the issuance of this permit, the rolling 12-month summation of CO emissions (i.e., the total CO emissions from the current month added to the summation of the CO emissions from the previous 11 months), in pounds or tons.
- (7) The permittee shall perform daily checks, when the emissions unit is in operation and when the weather conditions allow, for any visible particulate emissions from the stack serving this emissions unit. The presence or absence of any visible emissions shall be noted in an operations log. If visible emissions are observed, the permittee shall also note the following in the operations log:
- a. the color of the emissions;
  - b. whether the emissions are representative of normal operations;
  - c. if the emissions are not representative of normal operations, the cause of the abnormal emissions;
  - d. the total duration of any visible emissions incident; and
  - e. any corrective actions taken to eliminate the visible emissions.
- e) Reporting Requirements
- (1) The permittee shall submit quarterly deviation (excursion) reports that identify:
- a. all periods of time when the emissions unit was in operation and the process emissions were not vented to the flare. The reports shall include the date, time, and duration of each such period.
  - b. all periods of time during which the pilot flame was not functioning properly or the flare was not maintained as required in this permit. The reports shall include the date, time, and duration of each such period.
  - c. all exceedances of the rolling, 12-month emission limitation for CO and, for the first 12 calendar months of operation or the first 12 calendar months following the issuance of this permit, all exceedances of the maximum allowable cumulative emission levels.
  - d. the probable cause of each deviation (excursion);
  - e. any corrective actions that were taken to remedy the deviations (excursions) or prevent future deviations (excursions); and
  - f. the magnitude and duration of each deviation (excursion).

If no deviations (excursions) occurred during a calendar quarter, the permittee shall submit a report that states that no deviations (excursions) occurred during the quarter.

The quarterly reports shall be submitted, electronically through Ohio EPA Air Services, each year by January 31 (covering October to December), April 30 (covering January to March), July 31 (covering April to June), and October 31 (covering July to September),

unless an alternative schedule has been established and approved by the Director (the Ohio EPA, Central District Office).

- (2) The permittee shall submit an annual Permit Evaluation Report (PER) to the Ohio EPA. The PER must be completed electronically and submitted via the Ohio EPA eBusiness Center: Air Services by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.
  - (3) The permittee shall identify the following information in the annual PER in accordance with the monitoring requirements for visible emissions in term number d)(7) above:
    - a. all days during which any visible particulate emissions were observed from the stack serving this emissions unit; and
    - b. any corrective actions taken to eliminate the visible particulate emissions.
  - (4) Unless other arrangements have been approved by the director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.
- f) Testing Requirements

- (1) Compliance with the Emissions Limitations and/or Control Requirements specified in section b) of these terms and conditions shall be determined in accordance with the following methods:

- a. Emission Limitations

Carbon monoxide (CO) emissions shall not exceed 0.72lb/hr(as applicable prior to U.S. EPA approving the December 1, 2006, version of OAC rule 3745-31-05 as part of the SIP) and 3.18 tons per rolling, 12-month period.

Applicable Compliance Method

The hourly CO emissions limitations was established using the emission unit's maximum hourly CO emission rate to the flare, information provided by the manufacturer of the flare (Flare King, Inc.) and the following equations.

$CO = CO_P + CO_F$ , where:

CO = Total CO emissions in pounds per hour

$CO_P$  = CO emissions generated by the process (lb/hr)

$CO_P = Mol \% \times Q \times density \times (1 - DE)$ , where:

Mol % = Maximum percent of CO in the uncontrolled emissions (11%)

Q = flow rate into the flare (2,228.2scfh)

density = density of CO (0.078 lb/scf)

DE = destruction efficiency (98%)

$CO_F$  = CO emissions generated by the flare (lb/hr)

$CO_F = EF \times LHV \times Q$ , where:

EF = manufacturer's emission factor for the flare (0.5496 lb CO/MMBtu)

LHV = lower heating value of the uncontrolled emissions (0.00028 MMBtu/scf)

Q = flow rate into the flare (2,228.2scfh)

The annual limitation was calculated by multiplying the hourly limitation by 8,760 hr/yr and then dividing by 2,000 lb/ton.

Compliance shall be demonstrated in accordance with the monitoring and/or recordkeeping required in d)(2), d)(3), d)(4), d)(5) and d)(6).

b. Emission Limitation

There shall be no visible emissions from the stack serving this emissions unit, except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

Applicable Compliance Method

If required, compliance with the stack visible emissions limitation shall be determined through visible emissions observations performed in accordance with 40 CFR Part 60, Appendix A, Method 22. The observation period is 2 hours and shall be used according to Method 22.

c. Emission Limitation

Nitrogen oxide (NO<sub>x</sub>) emissions shall not exceed 0.04lb/hr and 0.18 ton/yr(as applicable prior to U.S. EPA approving the December 1, 2006, version of OAC rule 3745-31-05 as part of the SIP).

Applicable Compliance Method

The hourly NO<sub>x</sub> emissions limitation was established using information provided by the manufacturer of the flare (Flare King, Inc.) and the following equation.

$NO_x = EF \times LHV \times Q$ , where:

EF = manufacturer's emission factor for the flare (0.0641 lbNO<sub>x</sub>/MMBtu)

LHV = lower heating value of the uncontrolled emissions (.00028 MMBtu/scf)

Q = flow rate into the flare (2,228.2scfh)

The annual limitation was calculated by multiplying the hourly limitation by 8,760 hr/yr and then dividing by 2,000 lb/ton.

g) Miscellaneous Requirements

(1) None.



2. P002, TE 2 Test Facility Unit

Operations, Property and/or Equipment Description:

TE 2 Test Facility Unit

a) This permit document constitutes a permit-to-install issued in accordance with ORC 3704.03(F) and a permit-to-operate issued in accordance with ORC 3704.03(G).

(1) For the purpose of a permit-to-install document, the emissions unit terms and conditions identified below are federally enforceable with the exception of those listed below which are enforceable under state law only.

a. None.

(2) For the purpose of a permit-to-operate document, the emissions unit terms and conditions identified below are enforceable under state law only with the exception of those listed below which are federally enforceable.

a. None.

b) Applicable Emissions Limitations and/or Control Requirements

(1) The specific operation(s), property, and/or equipment that constitute each emissions unit along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures are identified below. Emissions from each unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

	Applicable Rules/Requirements	Applicable Emissions Limitations/Control Measures
a.	ORC 3704.03(T) [Best Available Technology]	Carbon monoxide (CO) emissions shall not exceed 4.5 pounds per pound of hydrogen produced.  See b)(2)a. below.

(2) Additional Terms and Conditions

a. The emissions limitation established under ORC 3704.03(T) reflects the emission unit's potential-to-emit in accordance with the information provided in the permit application. It is not necessary to establish monitoring and recordkeeping or reporting requirements to ensure compliance with this limitation.

c) Operational Restrictions

(1) The permittee shall burn only hydrogen, nitrogen, natural gas, carbon monoxide and/or carbon dioxide in this emissions unit.



d) Monitoring and/or Recordkeeping Requirements

- (1) For each day during which the permittee burns a fuel other than hydrogen, nitrogen, natural gas, carbon monoxide and/or carbon dioxide, the permittee shall maintain a record of the type and quantity of fuel burned in this emissions unit.

e) Reporting Requirements

- (1) The permittee shall submit an annual Permit Evaluation Report (PER) to the Ohio EPA. The PER must be completed electronically and submitted via the Ohio EPA eBusiness Center: Air Services by the due date identified in the Authorization section of this permit. The permit evaluation report shall cover a reporting period of no more than twelve-months for each air contaminant source identified in this permit.
- (2) Unless other arrangements have been approved by the director, all notifications and reports shall be submitted through the Ohio EPA's eBusiness Center: Air Services online web portal.

f) Testing Requirements

- (1) Compliance with the Emissions Limitations and/or Control Requirements specified in section b) of these terms and conditions shall be determined in accordance with the following methods:

a. Emission Limitation

Carbon monoxide (CO) emissions shall not exceed 4.5 pounds per pound of hydrogen produced.

Applicable Compliance Method

If required, the permittee shall demonstrate compliance with this emission limitation in accordance with 40 CFR Part 60, Appendix A, Methods 1-4 and 10.

g) Miscellaneous Requirements

- (1) None.