



10/01/2026

Elizabeth Moran
PPG - North Plant
4829 Fairland Road
Barberton, OH 44203

RE: DRAFT AIR POLLUTION PERMIT-TO-INSTALL

Facility ID: 1677020163
Permit Number: P0140925
Permit Type: Administrative Modification
County: Summit

No	TOXIC REVIEW
No	PSD
Yes	SYNTHETIC MINOR TO AVOID MAJOR NSR
No	CEMS
Yes	MACT/GACT
No	NSPS
No	NESHAPS
No	NETTING
No	MAJOR NON-ATTAINMENT
No	MODELING SUBMITTED
No	MAJOR GHG
No	SYNTHETIC MINOR TO AVOID MAJOR GHG

Dear Permit Holder:

A draft of the Ohio Administrative Code (OAC) Chapter 3745-31 Air Pollution Permit-to-Install 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 Environmental Protection Agency (Ohio EPA) [Weekly Review and Public Notices](#) website. A copy of the public notice and the draft permit are enclosed. This permit can be accessed electronically on the Ohio EPA document search webpage: [eDocument Search](#). 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:

Andrea Moore
Permitting Section
Ohio EPA, DAPC
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

and Akron Regional Air Quality Management District
1867 West Market St.
Akron, OH 44313

Comments and/or a request for a public hearing will be accepted within 30 days of the date the notice is published on the Ohio EPA [Weekly Review and Public Notices](#) website. 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 Akron Regional Air Quality Management District at (330)375-2480.

Sincerely,

Robert Hodanbosi
Chief, Division of Air Pollution Control

cc: U.S. EPA Region 5 - *Via E-Mail Notification*
ARAQMD; Pennsylvania; West Virginia; Canada

PUBLIC NOTICE

The following matters are the subject of this public notice by the Ohio Environmental Protection Agency. The complete public notice, including any additional instructions for submitting comments, requesting information, a public hearing, or filing an appeal may be obtained at: [Weekly Review and Public Notices | Ohio Environmental Protection Agency](#) or Hearing Clerk, Ohio EPA, 50 W. Town St., Columbus, Ohio 43215. Ph: 614-644-3037 email: HClerk@epa.ohio.gov

Draft Air Pollution Permit-to-Install Administrative

Modification PPG - North Plant

4829 Fairland Rd

Barberton, OH 44203-3913

ID#: P0140925

Date of Action: 10/01/2026

Permit Desc: Facility-initiated administrative modification to incorporate RACT standards. Pursuant to Part D of Title I of the Clean Air Act (CAA), Ohio EPA is required to establish a State Implementation Plan (SIP) for the attainment and maintenance of the NAAQS. The above-mentioned permit is a part of Ohio's SIP for attainment and maintenance of the 2015 ozone NAAQS and will be submitted to United States Environmental Protection Agency (U.S. EPA) as a modification of the SIP.

The permit can be accessed electronically and comments may be submitted at: <https://ohioepa.commentinput.com> - Search by entering the permit P0140925 in the "Search Projects" search box.

The public comment period will run until 11/02/2026 at 11:59 PM.

Permit Strategy Write-Up

1. Check all that apply:

☐ Synthetic Minor Determination **N/A**

☐ Netting Determination **N/A**

2. Source Description:

Emission units P070, P071 and P123 (OLED Process plant) and P080 (Multipurpose plant) - chemical and plastic sheet manufacturing. As required by the reclassification to serious nonattainment for ozone under the 2015 ozone National Ambient Air Quality Standards (NAAQS) promulgated by U.S. EPA, this facility has submitted a VOC Reasonably Available Control Technology (RACT) study on April 1, 2026 (subsequently revised on May 22, 2026, June 19, 2026, August 27, 2026 and September 16, 2026) to address the feasibility of controlling VOC emissions from their chemical and plastic sheet manufacturing operations. This facility does not have any prior source-specific VOC RACT established under OAC rule 3745-21-09. This permit modification includes the implementation of the proposed RACT limits in the September 16, 2026 revision of the RACT study. Section B of this permit cites the RACT limits under OAC rule 3745-21-11(B). The RACT limits are implemented under an OAC rule 3745-31-05(D) synthetic minor restriction for the affected emissions units in section C of this permit.

Pursuant to Part D of Title I of the Clean Air Act (CAA), Ohio EPA is required to establish a State Implementation Plan (SIP) for the attainment and maintenance of the NAAQS. This permit is part of Ohio's SIP for attainment and maintenance of the 2015 ozone NAAQS and will be submitted to U.S. EPA as a modification of the SIP.

3. Facility Emissions and Attainment Status:

PPG -North Plant is a Title V facility. Summit County was designated as serious nonattainment for the 2015 ozone NAAQS but is now a maintenance county. The county is currently designated attainment for all NAAQS (criteria) pollutants which include ozone, PM_{2.5}, PM₁₀, CO, NO₂, lead, and SO₂.

4. Source Emissions:

Emission units P070, P071, P123 and P080 have VOC emissions that are subject to the VOC RACT requirements. The VOC RACT determination for P070, P071, and P123 is venting VOC to a process condenser to recover solvents, complying with existing Synthetic Minor requirements, not exceed 39.9 tons per year based upon a rolling, 12-month summation. P070, P071 and P123 shall also comply with a leak detection and repair (LDAR) program in accordance with the requirements of 40 CFR Part 63, Subpart UU. The VOC RACT determination for P080 is operating of carbon adsorption, packed tower, scrubbers, and/or flare depending on product and/or activity to ensure OC emissions do not exceed 40 pounds per day. P080 shall also comply with a leak detection and repair (LDAR) program in accordance with the requirements of 40 CFR Part 63, Subpart UU. Monitoring, record keeping, reporting, and testing requirements have been included to ensure compliance.

5. Conclusion:

This permit modification establishes VOC RACT limits as proposed by PPG in their VOC RACT study as part of the requirements for the 2015 ozone NAAQs nonattainment and maintenance areas under the reclassification to serious nonattainment for the Cleveland area. The VOC RACT limits established in this permit will be implemented upon final issuance of this permit.



**Environmental
Protection
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Draft Permit-to-Install

PPG - North Plant

Permit Number: P0140925

Facility ID: 1677020163

Effective Date: To be entered upon final issuance

6. Please provide additional notes or comments as necessary:

None

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

Pollutant

Tons Per Year

VOC

39.9



DRAFT

Division of Air Pollution Control

Permit-to-Install

for

PPG - North Plant

Facility ID:	1677020163
Permit Number:	P0140925
Permit Type:	Administrative Modification
Issued:	10/01/2026
Effective:	To be entered upon final issuance



**Environmental
Protection
Agency**

Division of Air Pollution Control

Permit-to-Install

for

PPG - North Plant

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Authorization

Facility ID: 1677020163
Facility Description: Chemical and Plastic Sheet Production
Application Number(s): M0008830, M0008828, M0008829
Permit Number: P0140925
Permit Type: Permit-To-Install
Permit Fee: \$0.00 *DO NOT send payment at this time, subject to change before final issuance*
Issue Date: 10/01/2026
Effective Date: To be entered upon final issuance

This document constitutes issuance of a Permit-to-Install for the emissions unit(s) identified on the following page to:

PPG - North Plant
4829 Fairland Rd
Barberton, OH 44203-3913

Ohio Environmental Protection Agency (EPA) District Office or local air agency responsible for processing and administering your permit:

Akron Regional Air Quality Management District
1867 West Market St.
Akron, OH 44313
(330)375-2480

The above-named entity is hereby granted this Permit-to-Install 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 and does not constitute expressed or implied assurance that if constructed or modified in accordance with those plans and specifications, the above described emissions unit(s) of pollutants will be granted the necessary permits to operate (air) or NPDES permits as applicable.

This permit is granted subject to the conditions attached hereto.

Ohio Environmental Protection Agency

John Logue
Director

Authorization (continued)

Permit Number:P0140925

Permit Description:Facility-initiated administrative modification to incorporate RACT standards. Pursuant to Part D of Title I of the Clean Air Act (CAA), Ohio EPA is required to establish a State Implementation Plan (SIP) for the attainment and maintenance of the NAAQS. The above-mentioned permit is a part of Ohio's SIP for attainment and maintenance of the 2015 ozone NAAQS and will be submitted to United States Environmental Protection Agency (U.S. EPA) as a modification of the SIP.

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

Emissions Unit ID:	P080
Company Equipment ID:	Multipurpose Plant
Superseded Permit Number:	16-1102
General Permit Category and Type:	Not Applicable
Emissions Unit ID:	P123
Company Equipment ID:	OLED Cell #3
Superseded Permit Number:	P0129444
General Permit Category and Type:	Not Applicable

Group Name:OLED Process Units

Emissions Unit ID:	P070
Company Equipment ID:	P070
Superseded Permit Number:	P0130935
General Permit Category and Type:	Not Applicable P0130935
Emissions Unit ID:	P071
Company Equipment ID:	P071
Superseded Permit Number:	P0130935
General Permit Category and Type:	Not Applicable P0130935

List of Commonly Used Abbreviations

AP-42 = U.S. EPA's Compilation of Air Pollution Emissions Factors	HVLP = high volume, low pressure	PER = Permit Evaluation Report
ASTM = American Society for Testing and Materials	LAER = lowest achievable emission rate	PM = particulate matter
BACT = Best Available Control Technology	lb(s)/hr = pound(s) per hour	PM ₁₀ = particulate matter with an aerodynamic diameter less than or equal to 10 microns
BAT = Best Available Technology	LDAR = leak detection and repair	PM _{2.5} = particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
CAA = Clean Air Act	LPG = liquefied petroleum gas/propane	ppb = parts per billion
CAM = compliance assurance monitoring	MACT = maximum achievable control technology	ppm = parts per million
CEMS = continuous emissions monitoring system	MAGLC = maximum acceptable ground level concentration	PSD = Prevention of Significant Deterioration
CFC = chlorofluorocarbon	mg/m ³ = milligrams per cubic meter	psi = pounds per square inch
CFR = Code of Federal Regulations	MM = million	psia = pounds per square inch absolute
CH ₄ = methane	MMBtu = million British Thermal Units	PTE = potential-to-emit
CI = compression ignition	MSDS = material safety data sheet	PTI = Permit-to-Install
CO = carbon monoxide	MSW = municipal solid waste	PTIO = Permit-to-Install and Operate
CO ₂ = carbon dioxide	NAAQS = National Ambient Air Quality Standard	PTO = Permit-to-Operate
COM = continuous opacity monitor	NESHAP = National Emission Standard for Hazardous Air Pollutants	PWR = process weight rate
DAPC = Division of Air Pollution Control	NG = natural gas	RACM = reasonably available control measures
DO/LAA = District Office/Local Air Agency	ng/m ³ = nanograms per cubic meter	RACT = reasonably available control technology
dscf = dry standard cubic foot	NH ₃ = ammonia	RATA = relative accuracy test audit
EAC = emissions activity category	NMHC = non-methane hydrocarbons	RTO = regenerative thermal oxidizer
eDocs = electronic documents database	NMOC = non-methane organic compound	SB265 = Senate Bill 265
ERAC = Environmental Review Appeals Commission	NO = nitrogen oxide	scfm = standard cubic feet per minute
ESP = electrostatic precipitator	NO ₂ = nitrogen dioxide	SI = spark ignition
EU = emissions unit	NO _x = nitrogen oxides	SIP = State Implementation Plan
FEPTIO = Federally Enforceable Permit-to-Install and Operate	NSPS = New Source Performance Standard	SO ₂ = sulfur dioxide
FER = Fee Emissions Report	NSR = New Source Review	SSMP = startup, shutdown, and malfunction plan
FR = Federal Register	NTV = Non-Title V	TDS = total dissolved solids
GACT = generally achievable control technology	O&M = operation and maintenance	TLV = threshold limit value
GHG = greenhouse gases	OAC = Ohio Administrative Code	TO = thermal oxidizer
gr/dscf = grains per dry standard cubic foot	OC = organic compound	TPH = ton(s) per hour
H ₂ S = hydrogen sulfide	Ohio EPA = Ohio Environmental Protection Agency	TPY = ton(s) per year
H ₂ SO ₄ = sulfuric acid	ORC = Ohio Revised Code	TSP = total suspended particulates
HAP = hazardous air pollutant	Pb = lead	VE = visible particulate emissions
HCl = hydrogen chloride	PBR = Permit-By-Rule	VMT = vehicle miles traveled
HF = hydrogen fluoride	PCB = polychlorinated biphenyl	VOC = volatile organic compound
Hg = mercury	PE = particulate emissions	WPP = work practice plan
hp = horsepower	PEMS = predictive emissions monitoring system	µg/m ³ = micrograms per cubic meter

A. Standard Terms and Conditions

1. Federally Enforceable Standard Terms and Conditions

- a) All Standard Terms and Conditions are federally enforceable, with the exception of those listed below which are enforceable under state law only:
 - (1) Standard Term and Condition A.2.a), Severability Clause
 - (2) Standard Term and Condition A.3.c) through A. 3.e), General Requirements
 - (3) Standard Term and Condition A.6.c), Compliance Requirements
 - (4) Standard Term and Condition A.9., Reporting Requirements
 - (5) Standard Term and Condition A.10., Applicability
 - (6) Standard Term and Condition A.11.b) through A.11.e), Construction of New Source(s) and Authorization to Install
 - (7) Standard Term and Condition A.14., Public Disclosure
 - (8) Standard Term and Condition A.15., Additional Reporting Requirements When There Are No Deviations of Federally Enforceable Emission Limitations, Operational Restrictions, or Control Device Operating Parameter Limitations
 - (9) Standard Term and Condition A.16., Fees
 - (10) Standard Term and Condition A.17., Permit Transfers

2. Severability Clause

- a) A determination that any term or condition of this permit is invalid shall not invalidate the force or effect of any other term or condition thereof, except to the extent that any other term or condition depends in whole or in part for its operation or implementation upon the term or condition declared invalid.
- b) All terms and conditions designated in parts B. and C. of this permit are federally enforceable as a practical matter, if they are required under the Act, or any of its applicable requirements, including relevant provisions designed to limit the potential to emit of a source, are enforceable by the Administrator of the U.S. EPA and the state and by citizens (to the extent allowed by section 304 of the Act) under the Act. Terms and conditions in parts B and C of this permit shall not be federally enforceable and shall be enforceable under state law only, only if specifically identified in this permit as such.

3. General Requirements

- a) Any noncompliance with the federally enforceable terms and conditions of this permit constitutes a violation of the Act and is grounds for enforcement action or for permit revocation, revocation and re-issuance, or modification.
- b) It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the federally enforceable terms and conditions of this permit.
- c) This permit may be modified, revoked, or revoked and reissued, for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or revocation, or of a notification of planned changes or anticipated noncompliance does not stay any term and condition of this permit.

- d) This permit does not convey any property rights of any sort, or any exclusive privilege.
- e) The permittee shall furnish to the Director of the Ohio EPA, or an authorized representative of the Director, upon receipt of a written request and within a reasonable time, any information that may be requested to determine whether cause exists for modifying or revoking this permit or to determine compliance with this permit. Upon request, the permittee shall also furnish to the Director or an authorized representative of the Director, copies of records required to be kept by this permit. For information claimed to be confidential in the submittal to the Director, if the Administrator of the U.S. EPA requests such information, the permittee may furnish such records directly to the Administrator along with a claim of confidentiality.

4. Monitoring and Related Record Keeping and Reporting Requirements

- a) Except as may otherwise be provided in the terms and conditions for a specific emissions unit, the permittee shall maintain records that include the following, where applicable, for any required monitoring under this permit:
 - (1) The date, place (as defined in the permit), and time of sampling or measurements.
 - (2) The date(s) analyses were performed.
 - (3) The company or entity that performed the analyses.
 - (4) The analytical techniques or methods used.
 - (5) The results of such analyses.
 - (6) The operating conditions existing at the time of sampling or measurement.
- b) Each record of any monitoring data, testing data, and support information required pursuant to this permit shall be retained for a period of five years from the date the record was created. Support information shall include, but not be limited to all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. Such records may be maintained in computerized form.
- c) Except as may otherwise be provided in the terms and conditions for a specific emissions unit, the permittee shall submit required reports in the following manner:
 - (1) Reports of any required monitoring and/or recordkeeping of federally enforceable information shall be submitted to the Akron Regional Air Quality Management District.
 - (2) Quarterly written reports of (i) any deviations from federally enforceable emission limitations, operational restrictions, and control device operating parameter limitations, excluding deviations resulting from malfunctions reported in accordance with OAC rule 3745-15-06, that have been detected by the testing, monitoring and recordkeeping requirements specified in this permit, (ii) the probable cause of such deviations, and (iii) any corrective actions or preventive measures taken, shall be made to the Akron Regional Air Quality Management District. The written reports shall be submitted quarterly, by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters. See A.15. below if no deviations occurred during the quarter.



- (3) Written reports, which identify any deviations from the federally enforceable monitoring, recordkeeping, and reporting requirements contained in this permit shall be submitted to the Akron Regional Air Quality Management District every six months, by January 31 and July 31 of each year for the previous six calendar months. If no deviations occurred during a six-month period, the permittee shall submit a semiannual report, which states that no deviations occurred during that period.
 - (4) This permit is for an emissions unit located at a Title V facility. Each written report shall be signed by a responsible official certifying that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.
- d) The permittee shall report actual emissions pursuant to OAC Chapter 3745-78 for the purpose of collecting Air Pollution Control Fees.

5. Scheduled Maintenance/Malfunction Reporting

Any scheduled maintenance of air pollution control equipment shall be performed in accordance with paragraph (A) of OAC rule 3745-15-06. The malfunction, i.e., upset, of any emissions units or any associated air pollution control system(s) shall be reported to the Akron Regional Air Quality Management District in accordance with paragraph (B) of OAC rule 3745-15-06. (The definition of an upset condition shall be the same as that used in OAC rule 3745-15-06(B)(1) for a malfunction.) The verbal and written reports shall be submitted pursuant to OAC rule 3745-15-06.

Except as provided in that rule, any scheduled maintenance or malfunction necessitating the shutdown or bypassing of any air pollution control system(s) shall be accompanied by the shutdown of the emission unit(s) that is (are) served by such control system(s).

6. Compliance Requirements

- a) All applications, notifications or reports required by terms and conditions in this permit to be submitted or "reported in writing" are to be submitted to Ohio EPA through the Ohio EPA's eBusiness Center: Air Services web service ("Air Services"). Ohio EPA will accept hard copy submittals on an as-needed basis if the permittee cannot submit the required documents through the Ohio EPA eBusiness Center. In the event of an alternative hard copy submission in lieu of the eBusiness Center, the post-marked date or the date the document is delivered in person will be recognized as the date submitted. Electronic submission of applications, notifications or reports required to be submitted to Ohio EPA fulfills the requirement to submit the required information to the Director, the appropriate Ohio EPA District Office or contracted local air agency, and/or any other individual or organization specifically identified as an additional recipient identified in this permit unless otherwise specified. Consistent with OAC rule 3745-15-03, the electronic signature date shall constitute the date that the required application, notification or report is considered to be "submitted". Any document requiring signature may be represented by entry of the personal identification number (PIN) by responsible official as part of the electronic submission process or by the scanned attestation document signed by the Authorized Representative that is attached to the electronically submitted written report.

Any document (including reports) required to be submitted and required by a federally applicable requirement in this permit shall include a certification by a Responsible Official that, based on



information and belief formed after reasonable inquiry, the statements in the document are true, accurate, and complete

- b) Upon presentation of credentials and other documents as may be required by law, the permittee shall allow the Director of the Ohio EPA or an authorized representative of the Director to:
 - (1) At reasonable times, enter upon the permittee's premises where a source is located, or the emissions-related activity is conducted, or where records must be kept under the conditions of this permit.
 - (2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit, subject to the protection from disclosure to the public of confidential information consistent with ORC section 3704.08.
 - (3) Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit.
 - (4) As authorized by the Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit and applicable requirements.
- c) The permittee shall submit progress reports to the Akron Regional Air Quality Management District concerning any schedule of compliance for meeting an applicable requirement. Progress reports shall be submitted semiannually or more frequently if specified in the applicable requirement or by the Director of the Ohio EPA. Progress reports shall contain the following:
 - (1) Dates for achieving the activities, milestones, or compliance required in any schedule of compliance, and dates when such activities, milestones, or compliance were achieved.
 - (2) An explanation of why any dates in any schedule of compliance were not or will not be met, and any preventive or corrective measures adopted.

7. Best Available Technology

As specified in OAC Rule 3745-31-05, new sources that must employ Best Available Technology (BAT) shall comply with the Applicable Emission Limitations/Control Measures identified as BAT for each subject emissions unit.

8. Air Pollution Nuisance

The air contaminants emitted by the emissions units covered by this permit shall not cause a public nuisance, in violation of OAC rule 3745-15-07.

9. Reporting Requirements

The permittee shall submit required reports in the following manner:

- a) Reports of any required monitoring and/or recordkeeping of state-only enforceable information shall be submitted to the Akron Regional Air Quality Management District.
- b) Except as otherwise may be provided in the terms and conditions for a specific emissions unit, quarterly written reports of (a) any deviations (excursions) from state-only required emission limitations, operational restrictions, and control device operating parameter limitations that have been detected by the testing, monitoring, and recordkeeping requirements specified in this permit, (b) the probable cause of such deviations, and (c) any corrective actions or preventive measures which have been or will



be taken, shall be submitted to the Akron Regional Air Quality Management District. If no deviations occurred during a calendar quarter, the permittee shall submit a quarterly report, which states that no deviations occurred during that quarter. The reports shall be submitted quarterly, by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters. (These quarterly reports shall exclude deviations resulting from malfunctions reported in accordance with OAC rule 3745-15-06.)

10. Applicability

This permit-to-install is applicable only to the emissions unit(s) identified in the permit-to-install. Separate application must be made to the Director for the installation or modification of any other emissions unit(s) not exempt from the requirement to obtain a permit-to-install.

11. Construction of New Sources(s) and Authorization to Install

- a) This permit does not constitute an assurance that the proposed source will operate in compliance with all Ohio laws and regulations. This permit does not constitute expressed or implied assurance that the proposed facility has been constructed in accordance with the application and terms and conditions of this permit. The action of beginning and/or completing construction prior to obtaining the Director's approval constitutes a violation of OAC rule 3745-31-02. Furthermore, issuance of this permit does not constitute an assurance that the proposed source will operate in compliance with all Ohio laws and regulations. Issuance of this permit is not to be construed as a waiver of any rights that the Ohio Environmental Protection Agency (or other persons) may have against the applicant for starting construction prior to the effective date of the permit. Additional facilities shall be installed upon orders of the Ohio Environmental Protection Agency if the proposed facilities cannot meet the requirements of this permit or cannot meet applicable standards.
- b) If applicable, authorization to install any new emissions unit included in this permit shall terminate within eighteen months of the effective date of the permit if the owner or operator has not undertaken a continuing program of installation or has not entered into a binding contractual obligation to undertake and complete within a reasonable time a continuing program of installation. This deadline may be extended once by twelve months if application is made to the Director within a reasonable time before the termination date and the permittee shows good cause for any such extension.
- c) The permittee may notify Ohio EPA of any emissions unit that is permanently shut down (i.e., 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) by submitting a certification from the authorized official that identifies the date on which the emissions unit was permanently shut down. Authorization to operate the affected emissions unit shall cease upon the date certified by the authorized official that the emissions unit was permanently shut down. At a minimum, notification of permanent shut down shall be made or confirmed by marking the affected emissions unit(s) as "permanently shut down" in "Air Services" along with the date the emissions unit(s) was permanently removed and/or disabled. Submitting the facility profile update electronically will constitute notifying the Director of the permanent shutdown of the affected emissions unit(s).
- d) The provisions of this permit shall cease to be enforceable for each affected emissions unit after the date on which an emissions unit is permanently shut down (i.e., 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). All records relating to any permanently shut down emissions unit, generated while the emissions unit was in operation, must be maintained in accordance with law. All reports required by this permit must be submitted for any period an affected emissions unit operated prior to permanent shut down. At a minimum, the permit requirements must be evaluated as part of the reporting requirements identified in this permit covering the last period the emissions unit operated.

Unless otherwise exempted, no emissions unit certified by the responsible official as being permanently shut down may resume operation without first applying for and obtaining a permit pursuant to OAC Chapter 3745-31 and OAC Chapter 3745-77 if the restarted operation is subject to one or more applicable requirements.

- e) The permittee shall comply with any residual requirements related to this permit, such as the requirement to submit a deviation report, air fee emission report, or any other reporting required by this permit for the period the operating provisions of this permit were enforceable, or as required by regulation or law. All reports shall be submitted in a form and manner prescribed by the Director. All records relating to this permit must be maintained in accordance with law.

12. Permit-To-Operate Application

The permittee is required to apply for a Title V permit pursuant to OAC Chapter 3745-77. The permittee shall submit a complete Title V permit application or a complete Title V permit modification application within twelve months after commencing operation of the emissions units covered by this permit. However, if operation of the proposed new or modified source(s) as authorized by this permit would be prohibited by the terms and conditions of an existing Title V permit, a Title V permit modification of such new or modified source(s) pursuant to OAC rule 3745-77-04(D) and OAC rule 3745-77-08(C)(3)(d) must be obtained before operating the source in a manner that would violate the existing Title V permit requirements.

13. Construction Compliance Certification

The applicant shall identify the following dates in the "Air Services" facility profile for each new emissions unit identified in this permit.

- a) Completion of initial installation date shall be entered upon completion of construction and prior to start-up.
- b) Commence operation after installation or latest modification date shall be entered within 90 days after commencing operation of the applicable emissions unit.

14. Public Disclosure

The facility is hereby notified that this permit, and all agency records concerning the operation of this permitted source, are subject to public disclosure in accordance with OAC rule 3745-49-03.

15. Additional Reporting Requirements When There Are No Deviations of Federally Enforceable Emission Limitations, Operational Restrictions, or Control Device Operating Parameter Limitations

If no deviations occurred during a calendar quarter, the permittee shall submit a quarterly report, which states that no deviations occurred during that quarter. The reports shall be submitted quarterly by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters.

16. Fees

The permittee shall pay fees to the Director of the Ohio EPA in accordance with ORC section 3745.11 and OAC Chapter 3745-78. The permittee shall pay all applicable permit-to-install fees within 30 days after the issuance of any permit-to-install. The permittee shall pay all applicable permit-to-operate fees within thirty days of the issuance of the invoice.

17. Permit Transfers

Any transferee of this permit shall assume the responsibilities of the prior permit holder. The new owner must update and submit the ownership information via the "Owner/Contact Change" functionality in "Air Services" once the transfer is legally completed. The change must be submitted through "Air Services" within thirty days of the ownership transfer date.

18. Risk Management Plans

If the permittee is required to develop and register a risk management plan pursuant to section 112(r) of the Clean Air Act, as amended, 42 U.S.C. 7401 et seq. ("Act"), the permittee shall comply with the requirement to register such a plan.

19. Title IV Provisions

If the permittee is subject to the requirements of 40 CFR Part 72 concerning acid rain, the permittee shall ensure that any affected emissions unit complies with those requirements. Emissions exceeding any allowances that are lawfully held under Title IV of the Act, or any regulations adopted thereunder, are prohibited.

B. Facility Wide Terms and Conditions

1. All the following facility-wide terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.
 - a) None.
2. The following emissions units contained in this permit are subject to 40 CFR Part 63, Subpart FFFF - National Emission Standards for Hazardous Air Pollutants (NESHAP) for Miscellaneous Organic Chemical Manufacturing: P070, P071, P080, and P123. The promulgated version of this NESHAP and the 40 CFR Part 63, General Provisions may be accessed via the internet from the Electronic Code of Federal Regulations (e-CFR) website <http://ecfr.gov> or by contacting the appropriate Ohio EPA District office or local air agency.
3. **OAC rule 3745-21-11(B) VOC RACT Requirements**
 As required by the reclassification to serious nonattainment for ozone under the 2015 ozone National Ambient Air Quality Standards (NAAQS) promulgated by U.S. EPA, and pursuant to OAC rule 3745-21-11(B) and the VOC Reasonable Available Control Technology (RACT) Study submitted by PPG – North Plant on April 1, 2026 (subsequently revised on May 22, 2026, June 19, 2026, August 27, 2026 and September 16, 2026):
 “PPG – North Plant” (Facility ID: 1677020163) or any subsequent owner or operator of “PPG – North Plant” facility located at 4289 Fairland Road, Barberton, Ohio shall comply with the following requirements* for the emission units P070, P071, P123, and P080:
 - a) The permittee must comply with the requirements of 40 CFR Part 63, Subpart UU and the requirements referenced therein, except as specified in §63.2480(b) and (d) of 40 CFR Part 63, Subpart FFFF for equipment Leak Detection and Repair (LDAR).
 - b) The emissions of volatile organic compounds (VOC) from emissions units P070, P071 and P123, combined, shall not exceed 39.9 tons per year based upon a rolling, 12-month summation of the monthly emissions.
 The emission limitation for VOC includes emissions from the process vents and fugitive emissions from equipment leaks and storage tanks.
 - c) VOC emissions from emissions units P070, P071 and P123 reactor vessels shall be vented to the process condenser to recover solvents.
 - d) Organic compound (OC) emissions from emissions unit P080 are limited to less than 40 pounds per day and are controlled by a flare or other control device when necessary.
4. **Additional terms and conditions**
 See Emission Unit Terms and Conditions C.1.b)(2), C.2.b)(2), and C.3.b)(2)
5. **Monitoring and/or Recordkeeping Requirements**
 - a) See 40 CFR Part 63, Subpart UU (40 CFR 63.1019 – 63.1039).
 - b) The permittee shall maintain monthly records of the following for emission units P070, P071, and P123:
 - (1) the VOC emissions from each individual EU, in tons;
 - (2) the VOC emissions from each EU, combined, in tons; and



(3) the rolling, 12-month summation of the VOC emissions from P070, P071, and P123, combined, for the previous 12 -month period, in tons.

See Emission Unit Terms and Conditions C.1.d)(2) through C.1.d)(4) and C.2.d)(5) through C.2.d)(7).

c) The permittee shall maintain daily records of the following for emission units P080:

(1) the daily flare information and process operations

See Emission Unit Terms and Conditions C.3.d)(9) through C.3.d)(10).

(2) the total uncontrolled OC emission rate, in pounds per day, for all products processed that day

See Emission Unit Terms and Conditions C.3.d)(11)a. through C.3.d)(11)e.

6. Reporting Requirements

a) See 40 CFR Part 63, Subpart UU (40 CFR 63.1019 – 63.1039).

b) The permittee shall submit quarterly deviation (excursion) reports for EUs P070, P071, and P123 that identify:

(1) all exceedances of the rolling, 12-month VOC emission limitation for EU P070, P071, and P123, combined.

See Emission Unit Terms and Conditions C.1.e)(3) through C.1.e)(4) and C.2.e)(8) through C.2.e)(9).

c) The permittee shall submit quarterly deviation (excursion) reports for P080 that identify:

(1) all exceedances of the total uncontrolled daily OC emission limitation for EU P080.

(2) 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.

See Emission Unit Terms and Conditions C.3.e)(8) through C.3.e)(10).

d) The reports contained in this permit shall be submitted in accordance with the reporting requirements specified in Section A, Standard Terms and Conditions.

Unless other arrangements have been approved by the director, all notifications and reports shall be submitted through Ohio EPA's eBusiness Center: Air Services online web portal.

7. Testing Requirements

a) Emission Limitation:

The emissions of VOC* from emissions units P070, P071, and P123 combined, shall not exceed 39.9 tons per year based upon a rolling, 12-month summation of the monthly emissions.

*The emission limitation for VOC includes emissions from the process vents and fugitive emissions from equipment leaks and storage tanks.

Applicable Compliance Method:

Compliance with the allowable annual VOC emission limitation above shall be demonstrated by record keeping requirements specified in B. 5.b).



b) Emission Limitation:

OC emissions are limited to less than 40 pounds per day.

Applicable Compliance Method:

Compliance with the allowable annual VOC emission limitation above shall be demonstrated by record keeping requirements specified in B. 5.c).

See Emission Unit Terms and Conditions C.3.f)(1)

C. Emissions Unit Terms and Conditions

1. Emissions Unit Group - OLED Process Units: P070, P071

EU ID	Operations, Property and/or Equipment Description
P070	OLED Process Unit Cell #1
P071	OLED Process Unit Cell #2

- a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

(1) 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.	OAC rule 3745-31-05(A)(3)	For emissions units P070 and P071, the emission limitation(s) specified by this rule is/are equivalent to the emission limitation(s) established pursuant to 40 CFR Part 63, Subpart FFFF.
b.	OAC rule 3745-31-05(D) (Synthetic Minor to avoid Non-Attainment New Source Review and Federally enforceable requirements to comply with OAC rule 3745-21-11(B))	The emissions of volatile organic compounds (VOC)* from emissions units P070, P071 and P123, combined, shall not exceed 39.9 tons per year based upon a rolling, 12-month summation of the monthly emissions. *The emission limitation for VOC includes emissions from the process vents and fugitive emissions from equipment leaks and storage tanks. See b)(2)a. through b)(2)c. below. For OAC rule 3745-21-11(B): See Facility-Wide Terms and Conditions B.3.a), B.3.b), B.4, B.5.a), B.5.b), B.6.a), B.6.b), B.7.a) above.



c.	OAC rule 3745-21-14(C)(3)(b)	The emissions units listed above are exempt from control requirements since the uncontrolled total annual mass emissions, as determined in accordance with paragraph (E)(1) of OAC rule 3745-21-14, is less than thirty thousand (30,000) pounds per year of VOC for all products manufactured for each emissions unit.
d.	40 CFR Part 63, Subpart FFFF	For equipment leaks, you must comply with the requirements of 40 CFR Part 63, Subpart UU and the requirements referenced therein, except as specified in §63.2480(b) and (d) of 40 CFR Part 63, Subpart FFFF.
e.	40 CFR Part 63, Subpart A (40 CFR 63.2540)	Table 12 to Subpart FFFF of 40 CFR Part 63 – Applicability of General Provisions to Subpart FFFF shows which parts of the General Provisions in 40 CFR 63.1 – 15 apply.

(2) Additional Terms and Conditions

- a. The permittee is authorized to make revisions to the emission tracking protocol to reflect any physical or operational changes in the production process, so long as:
- i. the physical and/or operational change(s) do not result in an increase in the allowable emission limitations for emissions units P070, P071 and P123;
 - ii. the physical and/or operational change(s) do not result in a change in the applicable requirements detailed within this permit; and
 - iii. the physical and/or operational change(s) do not meet the definition of modify or modification under OAC rule 3745-31-01.

Potential physical or operational changes may include the addition/removal of fugitive components, use of different vessels or reactors directly related to the OLED production process and use of different materials in the OLED production process.

Any physical and/or operational change(s) that do not meet the requirements in b)(2)c.i through b)(2)c.iii above will require a modification to the existing Permit to Install (PTI) prior to commencing production under the new operating scenario. If this change includes the installation of additional equipment, the PTI must be obtained prior to the installation of the additional equipment.

- b. A “Production Batch” is defined as the individual batch process steps (e.g. reaction, purification, cleaning, etc.) and cleaning operations that result in the development of an OLED product or intermediate product.



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- c. Compliance with the VOC emissions limitation of 39.9 tons per year from emissions units P070, P071, and P123, combined, shall be achieved by restricting the OLED production batches based upon a rolling 12-month summation and the following equation:

$$\frac{[\text{Storage Tanks} + \text{Fugitives} + \sum (\text{Batch Step Emissions}_i \times \text{Number of Batch Steps}_i)]}{2000 \frac{\text{lbs}}{\text{ton}}} \leq 39.9 \text{ tons}$$

Where,

Storage Tanks = VOC emissions from OLED storage tanks associated with P070, P071 and P123 during the rolling, 12-month period, in pounds.

Fugitives = VOC emissions from OLED fugitive components (e.g., valves, connectors, pump seals, etc.) associated with P070, P071 and P123 during the rolling, 12-month period, in pounds.

Batch Step Emissions = VOC emissions of the individual OLED batch production process steps associated with P070, P071 and P123 (e.g., reaction, purification, cleaning, etc.) during the rolling, 12-month period, in pounds.

Number of Batch Steps = Quantity of each individual OLED batch production process steps associated with P070, P071, and P123 (e.g., reaction, purification, cleaning, etc.) performed during the rolling, 12-month period.

c) Operational Restrictions

- (1) None.

d) Monitoring and/or Recordkeeping Requirements

- (1) See 40 CFR Part 63, Subpart FFFF (40 CFR 63.2430 – 63.2550).
- (2) As dictated by the emission tracking protocol, the permittee shall record and maintain the following information:
- a. the company identification for each emission model for each process step (i.e., thermal equilibriums, reactions, etc.); and
 - b. the resultant VOC emissions, in pounds of VOC per process step calculated in accordance with the methodology outlined in the emission tracking protocol*.

*Unless models have been developed for lower-emitting scenarios, the emission tracking protocol must use the worst-case emission rate for each process step, as calculated using

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Emission Masters® and defined by the most recent approved emission tracking protocol. The information tracked in d)(2)b. above is then used to calculate the resulting VOC emissions.

- (3) The permittee shall collect and record the following information for each month for each emissions unit listed above:
- a. the company identification for each production batch processed;
 - b. the process step type;
 - c. the emissions model;
 - d. the number of times the process step was completed;
 - e. the total VOC emissions from all production batches produced during the month, in pound(s) or ton(s) per month;
 - f. the total VOC emissions from fugitive equipment leaks, as calculated using the Leak Detection and Repair (LDAR) monitoring data, in pound(s) or ton(s) per month;
 - g. the total VOC emissions from the storage tanks using the equations in AP-42 Chapter 7, in pound(s) or ton(s) per month; and
 - h. the total VOC emissions from all production batches produced during the month, fugitive equipment leaks and storage tanks, in pound(s) or ton(s) per month.
- (4) The permittee shall collect and record the following information for each month for emissions units P070, P071 and P123, combined:
- a. the total VOC emissions from all production batches produced during the month, fugitive equipment leaks and storage tanks, in pound(s) or ton(s) per month; and
 - b. the total VOC emissions during the rolling, 12-month period, i.e., the summation of all VOC emissions, as recorded in d)(4)a. above, for the present month plus the previous 11 months of operations, in ton(s).
- (5) Uncontrolled total annual mass emissions for a batch process train shall be determined by the following methods:
- a. Direct process vent emissions measurements taken prior to any release to the atmosphere, following any recovery device, prior to mixing with vents from other process trains or unrelated operations, and prior to any control device, provided such measurements conform with the requirements of measuring the mass flow rate of VOC incoming to the control device as set forth in paragraphs (F)(6)(b), (F)(6)(c)(i)(a) and (F)(6)(c)(i)(b) of OAC rule 3745-21-14.
 - b. Engineering estimates of the uncontrolled VOC emissions from a process vent or process vents, in the aggregate, within a batch process train, using either the potential



or permitted number of batch cycles per year or total production as represented in the permit for the batch process train as follows:

- i. Engineering estimates of the uncontrolled VOC emissions shall be based upon accepted chemical engineering principles, measurable process parameters, or physical or chemical laws and their properties. Examples of methods include, but are not limited to, the following:
 - (a) Use of material balances based on process stoichiometry to estimate maximum VOC concentrations.
 - (b) Estimation of maximum flow rate based on physical equipment design such as pump or blower capacities.
 - (c) Estimation of VOC concentrations based on saturation conditions.
 - ii. All data, assumptions and procedures used in any engineering estimate shall be documented.
- (6) The permittee shall maintain records of the uncontrolled total annual VOC mass emissions for the unit operation or the batch process train, as applicable, and documentation verifying these values or measurements. The documentation shall include the engineering calculations, any measurements made in accordance with OAC rule 3745-21-14(F), and the potential or permitted number of batch cycles per year, or, in the alternative, total production as represented in the permit pertaining to the unit operation or the batch process train.
- (7) See Facility Wide Terms and Conditions B.5.a) and B.5.b).
- e) Reporting Requirements
 - (1) 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.
 - (2) See 40 CFR Part 63, Subpart FFFF (40 CFR 63.2430 – 63.2550).
 - (3) The permittee shall notify the appropriate Ohio EPA district office or local air agency before making any revisions to the previously approved emission tracking protocol whenever there is a physical or operational change in the OLED process that is not covered by the existing emission tracking protocol and which meets the conditions in b)(2)c. above. This notification shall detail the change(s) which will be made to the process unit(s) and the emission tracking protocol.
 - (4) The permittee shall submit quarterly deviation (excursion) reports that identify all exceedances of the 39.9 tons per year rolling, 12-month VOC emission limitation for emissions units P070, P071 and P123, combined.

The quarterly deviation (excursion) reports shall be submitted in accordance with the reporting requirements of the Standard Terms and Conditions of this permit.

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- (5) The permittee shall notify the appropriate Ohio EPA district office or local air agency in writing that the batch process train is subject to OAC rule 3745-21-14. The notification shall provide the information specified in paragraph (K)(5) of OAC rule 3745-21-14.

The applicability notification for OAC rule 3745-21-14 for emissions units P070 and P071 were submitted on October 12, 2015 (Report ID: 107442) and July 22, 2019 (Report ID: 185150), respectively.

- (6) The permittee shall submit an initial compliance status report which includes the results of exemption, process vent determinations, compliance tests, values of monitored parameters established during compliance tests, and any other information used to demonstrate compliance and recorded pursuant to paragraph (H) of OAC rule 3745-21-14.

The initial compliance status report for emissions units P070 and P071 were submitted on October 12, 2015 (Report ID: 107445) and July 22, 2019 (Report ID: 185150), respectively.

- (7) The permittee shall notify the director in writing if the uncontrolled total annual mass emissions from such unit operation or batch process train exceeds the threshold in paragraph (C)(3)(b) of OAC rule 3745-21-14 within sixty days after the event occurs. Such notification shall include a copy of all records of such event.

- (8) See Facility Wide Terms and Conditions B.6.a) and B.6.b)

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. Emissions Limitation

The emissions of VOC* from emissions units P070, P071 and P123 combined, shall not exceed 39.9 tons per year based upon a rolling, 12-month summation of the monthly emissions.

*The emission limitation for VOC includes emissions from the process vents and fugitive emissions from equipment leaks and storage tanks.

Applicable Compliance Method

Compliance with the allowable annual VOC emission limitation above shall be demonstrated based on the requirements in b)(2)e., d)(2), d)(3) and d)(4) above.

g) **Miscellaneous Requirements**

- (1) None.

2. P123, OLED Cell #3

Operations, Property and/or Equipment Description:

OLED Process Unit Cell #3

- a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

(1) 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.	OAC rule 3745-31-05(A)(3)	The emission limitation(s) specified by this rule is/are equivalent to the emission limitation(s) established pursuant to 40 CFR Part 63, Subpart FFFF.
b.	OAC rule 3745-31-05(D) (Synthetic Minor to avoid Non-Attainment New Source Review and Federally enforceable requirements to comply with OAC rule 3745-21-11(B))	The emissions of volatile organic compounds (VOC)* from emissions units P070, P071 and P123, combined, shall not exceed 39.9 tons per year based upon a rolling, 12-month summation of the monthly emissions. *The emission limitation for VOC includes emissions from the process vents and fugitive emissions from equipment leaks and storage tanks. See b)(2)c. through b)(2)e. below. For OAC rule 3745-21-11(B): See Facility-Wide Terms and Conditions B.3.a), B.3.b), B.4, B.5.a), B.5.b), B.6.a), B.6.b), B.7.a) above.
c.	OAC rule 3745-21-14(C)(3)(b)	P123 is exempt from control requirements since the uncontrolled total annual mass rate



		of emissions, as determined in accordance with paragraph (E)(1) of OAC rule 3745-21-14, is less than thirty thousand (30,000) pounds per year of VOC for all products manufactured for the emissions unit.
d.	40 CFR Part 63, Subpart FFFF	For equipment leaks, you must comply with the requirements of 40 CFR Part 63, Subpart UU and the requirements referenced therein, except as specified in §63.2480(b) and (d) of 40 CFR Part 63, Subpart FFFF. See b)(2)a. and b)(2)b. below.
e.	40 CFR Part 63, Subpart A (40 CFR 63.2540)	Table 12 to Subpart FFFF of 40 CFR Part 63 – Applicability of General Provisions to Subpart FFFF shows which parts of the General Provisions in 40 CFR 63.1 – 15 apply.

(2) Additional Terms and Conditions

- a. If any Group 2 emission point becomes a Group 1 emission point after the compliance date for your affected source, you must comply with the Group 1 requirements beginning on the date the switch occurs. An initial compliance demonstration as specified in 40 CFR Part 63, Subpart FFFF must be conducted within 150 days after the switch occurs.
- b. Pursuant to 40 CFR 63.2550, “equipment” means each pump, compressor, agitator, pressure relief device, sampling connection system, open-ended valve or line, valve, connector, and instrument system in organic hazardous air pollutant (HAP) service; and any control devices or systems used to comply with Table 6 of 40 CFR Part 63, Subpart FFFF.
- c. The permittee is authorized to make revisions to the emission tracking protocol to reflect any physical or operational changes in the production process, so long as:
 - i. the physical and/or operational change(s) do not result in an increase in the allowable emission limitations for emissions units P070, P071 and P123.
 - ii. the physical and/or operational change(s) do not result in a change in the applicable requirements detailed within this permit, and
 - iii. the physical and/or operational change(s) do not meet the definition of modify or modification under OAC rule 3745-31-01.

Potential physical or operational changes may include the addition/removal of fugitive components, use of different vessels or reactors directly related to the OLED production process and use of different materials in the OLED production process.



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Any physical and/or operational change(s) that do not meet the requirements in b)(2)c.i through b)(2)c.iii above will require a modification to the existing Permit to Install (PTI) prior to commencing production under the new operating scenario. If this change includes the installation of additional equipment, the PTI must be obtained prior to the installation of the additional equipment.

- d. A "Production Batch" is defined as each individual batch process step (e.g. reaction, purification, cleaning, etc.) and cleaning operations that result in the development of an OLED product or intermediate product.
- e. Compliance with the VOC emissions limitation of 39.9 tons per year from emissions units P070, P071, and P123, combined, shall be achieved by restricting the OLED production batches based upon a rolling 12-month summation and the following equation:

$$\frac{[\text{Storage Tanks} + \text{Fugitives} + \sum(\text{Batch Step Emissions}_i \times \text{Number of Batch Steps}_i)]}{2,000} \leq 39.9 \text{ tons}$$

Where,

- Storage Tanks = VOC emissions from OLED storage tanks associated with P070, P071 and P123 during the rolling, 12-month period, in pounds.
- Fugitives = VOC emissions from OLED fugitive components (e.g., valves, connectors, pump seals, etc.) associated with P070, P071 and P123 during the rolling, 12-month period, in pounds.
- Batch Step Emissions = VOC emissions of each individual OLED batch production process step associated with P070, P071 and P123 (e.g., reaction, purification, cleaning, etc.) during the rolling, 12-month period, in pounds.
- Number of Batch Steps = Quantity of each individual OLED batch production process step associated with P070, P071, and P123 (e.g., reaction, purification, cleaning, etc.) performed during the rolling, 12-month period.

c) Operational Restrictions

- (1) None.

d) Monitoring and/or Recordkeeping Requirements

- (1) You must meet each requirement in Table 6 of 40 CFR Part 63, Subpart FFFF that applies to your equipment leaks, except as specified in §63.2480(b) through §63.2480(b) of 40 CFR Part 63, Subpart FFFF.



- (2) Equipment that is organic HAP service must comply with the requirements of 40 CFR Part 63, Subpart UU and the requirements referenced therein, except as specified in §63.2480(b) and (d).
- (3) You must keep each applicable record required by 40 CFR Part 63, Subpart A and in referenced Subpart UU of 40 CFR Part 63.
- (4) For Group 2 batch process vents, you must keep records of the information specified in paragraphs (a) through (d) below:
 - a. a record of the day each batch was completed and/or the operating hours per day for continuous operations with hydrogen halide and halogen emissions.
 - b. a record of whether each batch operated was considered a standard batch;
 - c. the estimated uncontrolled and controlled emissions for each batch that is considered to be a nonstandard batch; and
 - d. records of the daily 365-day rolling summations of emissions, or alternative records that correlate to the emissions (e.g., number of batches), calculated no less frequently than monthly.
- (5) As dictated by the emission tracking protocol, the permittee shall record and maintain the following information:
 - a. the company identification for each emission model for each process step (i.e., thermal equilibriums, reactions, etc.); and
 - b. the resultant VOC emissions, in pounds of VOC per process step calculated in accordance with the methodology outlined in the emission tracking protocol*.

*Unless models have been developed for lower-emitting scenarios, the emission tracking protocol must use the worst-case emission rate for each process step, as calculated using Emission Masters® and defined by the most recent approved emission tracking protocol. The information tracked in d)(5)b. above is then used to calculate the resulting VOC emissions.
- (6) The permittee shall collect and record the following information for each month for each emissions unit listed above:
 - a. the company identification for each production batch processed;
 - b. the process step type;
 - c. the emissions model;
 - d. the number of times the process step was completed;
 - e. the total VOC emissions from all production batches produced during the month, in pound(s) or ton(s) per month;



- f. the total VOC emissions from fugitive equipment leaks, as calculated using the Leak Detection and Repair (LDAR) monitoring data, in pound(s) or ton(s) per month;
 - g. the total VOC emissions from the storage tanks using the equations in AP-42 Chapter 7, in pound(s) or ton(s) per month; and
 - h. the total VOC emissions from all production batches produced during the month, fugitive equipment leaks and storage tanks, in pound(s) or ton(s) per month.
- (7) The permittee shall collect and record the following information for each month for emissions units P070, P071 and P123, combined:
 - a. the total VOC emissions from all production batches produced during the month, fugitive equipment leaks and storage tanks, in pound(s) or ton(s) per month and
 - b. the total VOC emissions during the rolling, 12-month period, i.e., the summation of all VOC emissions, as recorded in d)(7)a. above, for the present month plus the previous 11 months of operations, in ton(s).
- (8) Uncontrolled total annual mass emissions for a batch process train shall be determined by one of the following methods:
 - a. Direct process vent emissions measurements taken prior to any release to the atmosphere, following any recovery device, prior to mixing with vents from other process trains or unrelated operations, and prior to any control device, provided such measurements conform with the requirements of measuring the mass flow rate of VOC incoming to the control device as set forth in paragraphs (F)(6)(b), (F)(6)(c)(i)(a) and (F)(6)(c)(i)(b) of OAC rule 3745-21-14.
 - b. Engineering estimates of the uncontrolled VOC emissions from a process vent or process vents, in the aggregate, within a batch process train, using either the potential or permitted number of batch cycles per year or total production as represented in the permit for the batch process train as follows:
 - i. Engineering estimates of the uncontrolled VOC emissions shall be based upon accepted chemical engineering principles, measurable process parameters, or physical or chemical laws and their properties. Examples of methods include, but are not limited to, the following:
 - (a) Use of material balances based on process stoichiometry to estimate maximum VOC concentrations.
 - (b) Estimation of maximum flow rate based on physical equipment design such as pump or blower capacities.
 - (c) Estimation of VOC concentrations based on saturation conditions.

- ii. All data, assumptions and procedures used in any engineering estimate shall be documented.
- (9) The permittee shall maintain records of the uncontrolled total annual VOC mass emissions for the unit operation or the batch process train, as applicable, and documentation verifying these values or measurements. The documentation shall include the engineering calculations, any measurements made in accordance with OAC rule 3745-21-14(F), and the potential or permitted number of batch cycles per year, or, in the alternative, total production as represented in the permit pertaining to the unit operation or the batch process train.

See Facility Wide Terms and Conditions B.5.a) and B.5.b)

e) Reporting Requirements

- (1) 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.
- (2) You must submit all notifications in §§63.6(h)(4) and (5), 63.7(b) and (c), 63.8(e), (f)(4) and (6), and 63.9(b) through (h) that apply to you by the dates specified.
- (3) As specified in §63.9(b)(3), you must submit an initial notification not later than 120 calendar days after you become subject to 40 CFR Part 63, Subpart FFFF.

The initial notification for emissions unit P123 was submitted on June 9, 2019 in PTI application A0064117.

- (4) You must submit each report in Table 11 of 40 CFR Part 63, Subpart FFFF that applies to you.
- (5) You must submit a notification of compliance status report according to the schedule in §63.2520(d)(1) of 40 CFR Part 63, Subpart FFFF, and the notification of compliance status report must contain the information specified in §63.2520(d)(2) of 40 CFR Part 63, Subpart FFFF.

The notification of compliance status report was submitted on July 22, 2019 (Report ID: 185150).

- (6) The compliance report must contain the information specified below:
 - a. Company name and address.
 - b. Statement by a responsible official with that official's name, title, and signature, certifying the accuracy of the content of the report.
 - c. Date of report and beginning and ending dates of the reporting period.
 - d. The compliance report must contain the information on deviations, as defined in §63.2550, according to paragraphs (i) and (ii) below:
 - i. If there are no deviations from any emission limit, operating limit or work practice standard specified in 40 CFR Part 63, Subpart FFFF, include a statement



that there were no deviations from the emission limits, operating limits, or work practice standards during the reporting period.

- ii. If you documented in your notification of compliance status report that an MCPU has Group 2 batch process vents because the non-reactive HAP is the only HAP and usage is less than 10,000 lb/yr, the total uncontrolled organic HAP emissions from the batch process vents in an MCPU will be less than 1,000 lb/yr for the anticipated number of standard batches, or total uncontrolled hydrogen halide and halogen HAP emissions from all batch process vents and continuous process vents in a process are less than 1,000 lb/yr, include the records associated with each calculation required by §63.2525(e) that exceeds an applicable HAP usage or emissions threshold.
- e. Applicable records and information for periodic reports as specified in referenced Subpart UU of 40 CFR Part 63.

The compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31. The compliance report must be postmarked or delivered no later than August 31 or February 28, whichever date is the first date following the end of the semiannual reporting period.

(7) Notification of process change

- a. Except as specified in paragraph e)(7)b. below, whenever you make a process change, or change any of the information submitted in the notification of compliance status report or a previous compliance report, that is not within the scope of an existing operating scenario, you must document the change in your compliance report. A process change does not include moving within a range of conditions identified in the standard batch, and a nonstandard batch does not constitute a process change. The notification must include all of the information in (i) through (iii) below:
 - i. A description of the process change.
 - ii. Revisions to any of the information reported in the original notification of compliance status report under §63.2520(d) of 40 CFR Part 63, Subpart FFFF.
 - iii. Information required by the notification of compliance status report under §63.2520(d) of 40 CFR Part 63, Subpart FFFF for changes involving the addition of processes or equipment at the affected source.
- b. You must submit a report 60 days before the scheduled implementation date of any of the changes identified in (i), (ii), or (iii) below:
 - i. Any change to the information contained in the precompliance report.
 - ii. A change in the status of a control device from small to large.

- iii. A change from Group 2 to Group 1 for any emission point except for batch process vents that meet the conditions specified in §63.2460(b)(6)(i).
- (8) The permittee shall notify the appropriate Ohio EPA district office or local air agency before making any revisions to the previously approved emission tracking protocol whenever there is a physical or operational change in the OLED process that is not covered by the existing emission tracking protocol and which meets the conditions in b)(2)c. above. This notification shall detail the change(s) which will be made to the process unit(s) and the emission tracking protocol.
 - (9) The permittee shall submit quarterly deviation (excursion) reports that identify all exceedances of the 39.9 tons per year rolling, 12-month VOC emission limitation for emissions units P070, P071 and P123, combined.

The quarterly deviation (excursion) reports shall be submitted in accordance with the reporting requirements of the Standard Terms and Conditions of this permit.
 - (10) The permittee shall notify the appropriate Ohio EPA district office or local air agency in writing that the batch process train is subject to OAC rule 3745-21-14. The notification shall provide the information specified in paragraph (K)(5) of OAC rule 3745-21-14.
 - (11) The permittee shall submit an initial compliance status report which includes the results of exemption, process vent determinations, compliance tests, values of monitored parameters established during compliance tests, and any other information used to demonstrate compliance and recorded pursuant to paragraph (H) of OAC rule 3745-21-14.
 - (12) The permittee shall notify the director in writing if the uncontrolled total annual mass emissions from such unit operation or batch process train exceeds the threshold in paragraph (C)(3)(b) of OAC rule 3745-21-14 within sixty days after the event occurs. Such notification shall include a copy of all records of such event.
 - (13) See Facility Wide Terms and Conditions B.6.a) and B.6.b).
- 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. Emissions Limitation

The emissions of VOC* from emissions units P070, P071 and P123 combined, shall not exceed 39.9 tons per year based upon a rolling, 12-month summation of the monthly emissions.

*The emission limitation for VOC includes emissions from the process vents and fugitive emissions from equipment leaks and storage tanks.

Applicable Compliance Method

Compliance with the allowable annual VOC emission limitation above shall be demonstrated based on the requirements in b)(2)e., d)(5), d)(6) and d)(7) above.

g) Miscellaneous Requirements

(1) None.

3. P080, Multipurpose Plant

Operations, Property and/or Equipment Description: Multipurpose Plant

a) The following emissions unit terms and conditions are federally enforceable with the exception of those listed below which are enforceable under state law only.

(1) 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.	OAC rule 3745-31-05	Carbon Adsorption, packed tower, scrubbers, flare to be employed depending on product and/or activity. See b)(2)a. below.
b.	OAC rule 3745-31-05(D) (Federally enforceable requirements to comply with OAC rule 3745-21-11(B))	See Facility-Wide Terms and Conditions B.3.a), B.3.c), B.4, B.5.a), B.5.c), B.6.a), B.6.c), B.7.b) above.
c.	OAC rule 3745-21-07(M)(3)(d)(ix)	Exempt, provided that organic compound (OC) emissions are limited to less than 40 pounds per day and are controlled by a flare or other control device when necessary. See b)(2)b. below.
d.	40 CFR Part 63, Subpart FFFF	For equipment leaks - Leak detection and repair (LDAR) program that complies with the requirements of 40 CFR Part 63, Subpart UU. For MON heat exchanger systems – Cooling tower monitoring/leak detection plan that complies with the requirements of 40 CFR 60.104
d.	40 CFR part 63, Subpart A (40 CFR 63.2540)	Table 12 to Subpart FFFF of 40 CFR Part 63 – Applicability of General Provisions to

		Subpart FFFF shows which parts of the General Provisions in 40 CFR 63.1 – 15 apply.
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(2) Additional Terms and Conditions

- a. The permittee shall employ Best Available Technology to control air contaminants from this emissions unit.
- b. The permittee shall properly install, operate and maintain a device to continuously monitor the pilot flame when the emissions unit is in operation and employing organic compounds and the operation of the flare is required to maintain compliance with applicable rules. The monitoring device and any recorder shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.
- c. If any Group 2 emission point becomes a Group 1 emission point after the compliance date for your affected source, you must comply with the Group 1 requirements beginning on the date the switch occurs. An initial compliance demonstration as specified in this subpart must be conducted within 150 days after the switch occurs.
- d. If, after the compliance date for your affected source, hydrogen halide and halogen HAP emissions from process vents in a process increase to more than 1,000 lb/yr, you must comply with the applicable emission limits specified in Table 3 to this subpart and the associated compliance requirements beginning on the date the emissions exceed the applicable threshold. An initial compliance demonstration as specified in this subpart must be conducted within 150 days after the switch occurs.

c) Operational Restrictions

- (1) A pilot flame shall be maintained at all times in the flare's pilot light burner when the emissions unit is in operation and employing organic compounds and the operation of the flare is required to maintain compliance with applicable rules.

d) Monitoring and/or Recordkeeping Requirements

- (1) You must meet each requirement in Table 6 of 40 CFR Part 63, Subpart FFFF that applies to your equipment leaks, except as specified in §63.2480(b) through §63.2480(d) of 40 CFR Part 63, Subpart FFFF.
- (2) Equipment that is in organic HAP service must comply with the requirements of 40 CFR Part 63, Subpart UU and the requirements referenced therein, except as specified in §63.2480(b) and (d).
- (3) You must meet each requirement in Table 7 of 40 CFR Part 63, Subpart FFFF that applies to your wastewater streams and liquid streams in open systems within a miscellaneous organic chemical manufacturing process unit (MCPU), except as specified in §63.2485(b) through (o) of 40 CFR Part 63, Subpart FFFF.

Effective Date: To be entered upon final issuance

- (4) For each process wastewater stream*, you must comply with the requirements in §§63.132 through 63.148 and the requirements referenced therein, except as specified in §63.2485. For each maintenance wastewater stream, you must comply with the requirements in §63.105 and the requirements referenced therein, except as specified in §63.2485. *The process waste stream(s) is/are considered Group 2.
- (5) You must comply with each requirement in Table 10 of 40 CFR Part 63, Subpart FFFF that applies to your heat exchange systems, except as specified in §63.2490(b) and §63.2490(c) of 40 CFR Part 63, Subpart FFFF.
- (6) You must comply with the requirements of §63.104 and the requirements referenced therein, except as specified in §63.2490.
- (7) You must keep each applicable record required by 40 CFR Part 63, Subpart A and in referenced Subparts F, G and UU of 40 CFR Part 63.
- (8) You must keep each applicable record required by 40 CFR Part 63, Subpart A and in referenced Subparts F, G and UU of 40 CFR Part 63.
- (9) 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.
- (10) The permittee shall record the following information each day for the flare and process operations:
 - a. all periods during which the emissions unit was in operation and employing organic compounds and the operation of the flare is required to maintain compliance with applicable rules and there was no pilot flame; and
 - b. the operating times for the flare, monitoring equipment and the associated emissions unit.
- (11) The permittee shall record the following information each day for the emissions unit:
 - a. the company identification for each product processed;
 - b. the number of batches processed or indicate with the number 1 for each day that a batch is being processed over multiple days;
 - c. the total uncontrolled OC emission rate, in pounds per day, for all products processed that day (i.e., the summation of products of (b) times the emission factor*, in either pound(s) of OC per day or pound(s) of OC per batch, for all products processed);
 - d. an indication of whether or not a control device (i.e., flare) was utilized; and
 - e. if a control device was employed, the total controlled OC emission rates, in pounds per day, for all products processed.

*Emission factors were developed by PPG using results from emission testing.
- (12) See Facility Wide Terms and Conditions B.5.a) and B.5.c)

e) Reporting Requirements

- (1) 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.
- (2) You must submit all notifications in §§63.6(h)(4) and (5), 63.7(b) and (c), 63.8(e), (f)(4) and (6), and 63.9(b) through (h) that apply to you by the dates specified.
- (3) As specified in §63.9(b)(3), you must submit an initial notification not later than March 9, 2004. The initial notification was submitted on March 9, 2004.
- (4) You must submit each report in Table 11 of 40 CFR Part 63, Subpart FFFF that applies to you.
- (5) You must submit a notification of compliance status report according to the schedule in §63.2520(d)(1) of 40 CFR Part 63, Subpart FFFF, and the notification of compliance status report must contain the information specified in §63.2520(d)(2) of 40 CFR Part 63, Subpart FFFF. The notification of compliance status reports were submitted on October 8, 2008.
- (6) The compliance report must cover the semiannual reporting period from January 1 through June 30 or the semiannual reporting period from July 1 through December 31. The compliance report must be postmarked or delivered no later than August 31 or February 28, whichever date is the first date following the end of the semiannual reporting period.

The compliance report must contain the information specified below:

- a. Company name and address.
- b. Statement by a responsible official with that official's name, title, and signature, certifying the accuracy of the content of the report.
- c. Date of report and beginning and ending dates of the reporting period.
- d. The compliance report must contain the information on deviations, as defined in §63.2550, according to paragraphs (i) and (ii) below:
 - i. If there are no deviations from any emission limit, operating limit or work practice standard specified in this subpart, include a statement that there were no deviations from the emission limits, operating limits, or work practice standards during the reporting period.
 - ii. If you documented in your notification of compliance status report that an MCPU has Group 2 batch process vents because the non-reactive HAP is the only HAP and usage is less than 10,000 lb/yr, the total uncontrolled organic HAP emissions from the batch process vents in an MCPU will be less than 1,000 lb/yr for the anticipated number of standard batches, or total uncontrolled hydrogen halide and halogen HAP emissions from all batch process vents and continuous process vents in a process are less than 1,000 lb/yr, include the records associated with each calculation Final Title V Permit PPG - North Plant Permit Number: P0130936 Facility ID: 1677020163 Effective Date: 03/29/2022 Page 38 of 54 required by §63.2525(e) that exceeds an applicable HAP usage or emissions threshold.



- e. Applicable records and information for periodic reports as specified in referenced Subparts F, G and UU of 40 CFR Part 63.
- (7) Notification of process change
 - a. Except as specified in paragraph e)(7)b. below, whenever you make a process change, or change any of the information submitted in the notification of compliance status report or a previous compliance report, that is not within the scope of an existing operating scenario, you must document the change in your compliance report. A process change does not include moving within a range of conditions identified in the standard batch, and a nonstandard batch does not constitute a process change. The notification must include all of the information in (i) through (iii) below:
 - i. A description of the process change.
 - ii. Revisions to any of the information reported in the original notification of compliance status report under §63.2520(d) of 40 CFR Part 63, Subpart FFFF.
 - iii. Information required by the notification of compliance status report under §63.2520(d) of 40 CFR Part 63, Subpart FFFF for changes involving the addition of processes or equipment at the affected source.
 - b. You must submit a report 60 days before the scheduled implementation date of any of the changes identified in (i), (ii), or (iii) below:
 - i. Any change to the information contained in the precompliance report.
 - ii. A change in the status of a control device from small to large.
 - iii. A change from Group 2 to Group 1 for any emission point except for batch process vents that meet the conditions specified in §63.2460(b)(6)(i).
- (8) The permittee shall notify Akron Regional Air Quality Management District in writing of any product or formulation change in this emissions unit. Notification shall contain information normally contained in a Permit to Install application and be submitted at least four (4) weeks prior to the proposed change.
- (9) The permittee shall submit quarterly deviation reports that identify 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.
- (10) The permittee shall submit quarterly deviation (excursion) reports that include an identification of each day during which the OC emissions from all batches processed exceeded 40 pounds per day and the actual OC emissions for each such day. The quarterly deviation (excursion) reports shall be submitted in accordance with the reporting requirements of the Standard Terms and Conditions of this permit.
- (11) See Facility Wide Terms and Conditions B.6.a) and B.6.c)
- 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. Emissions Limitation

OC emissions are limited to less than 40 pounds per day

Applicable Compliance Method

Compliance with the allowable emission limitations above shall be based upon the record keeping requirements established in d)(11) above and the use of a flare, as needed to control OC emissions.

If required, compliance with the allowable OC emission limitation above shall be demonstrated based on the results of emission testing conducted in accordance with Methods 1 - 4 and 18 or 25*, as applicable, of 40 CFR Part 60, Appendix A.

*If Method 25 is employed, the reported OC mass emission value shall be converted from "as carbon" to the actual OC emission rate. The determination of the weight fraction of carbon may be based on standard analytical techniques or material formulation data.

g) Miscellaneous Requirements

(1) None.

VOC AND NO_x RACT STUDY



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1. BACKGROUND

On April 1, 2025, Ohio EPA promulgated revisions to the existing volatile organic compound (VOC) regulation under Chapter 3745-21 of the Ohio Administrative Code (OAC) and the existing Nitrogen Oxides (NO_x) regulations under OAC 3745-110 due to the reclassification to serious nonattainment status for the Cleveland area with respect to the 2015 Ozone National Ambient Air Quality Standard (NAAQS).

Changes included in the revised standards include but are not limited to:

- ▶ Extension of existing VOC RACT rules in OAC 3745-21 to facilities that emit 50 tons per year (tpy) or more of VOC and are in the Cleveland ozone nonattainment area
- ▶ Extension of existing NO_x RACT rules in OAC 3745-110 to facilities that emit 50 tpy of NO_x in the Cleveland ozone nonattainment area

Chapter 3745-21-11 requires facilities located in Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, or Summit county that have the potential to emit greater than 50 tons per year (tpy) but less than 100 tons of VOC per year from non-CTG (Control Technique Guidelines) sources to conduct a detailed engineering study to determine the technical and economic feasibility of reducing VOC emissions and define RACT for the affected sources. Chapter 3745-110 requires facilities in the same counties that have the potential to emit between 50-100 tons per year of NO_x to conduct the same engineering study for reducing NO_x emissions. The engineering study must be submitted to Ohio EPA within one (1) year of the effective date of the rule (i.e., by April 1, 2026 for VOC and NO_x). Accordingly, PPG's chemical manufacturing facility located in Barberton, Ohio, is required to submit an updated VOC and NO_x RACT study by April 1, 2026. PPG submitted a RACT study on April 1, 2026 and is submitting a revised RACT study to address comments provided by Ohio EPA on May 1, 2026 and July 29, 2026.

2. FACILITY OVERVIEW

2.1 General Facility Information

PPG owns and operates a chemical and plastic sheet manufacturing facility located in Summit County. The facility is located at 4829 Fairland Road, Barberton, Ohio 44203-3913. The Barberton facility manufactures chemicals and plastic products for a variety of applications. For permitting purposes, the Barberton Plant is subdivided into three plants: the North Plant, South Plant, and Teslin Plant, which are all a part of one, single stationary source. Emission Units from all three plants will be included in this study.

Figure 2-1 is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

Figure 2-1. Area Map for PPG



Facility information required by sections (1) through (4) of OAC 3745-21-11(B) is provided as follows:

- a) The complete facility name, Ohio EPA air program facility identification number, and address:

PPG – Barberton

Facility IDs: 1677020164 (Teslin), 1677020163 (North Plant), 1677020162 (South Plant)

4829 Fairland Road

Summit, Ohio 44203

- b) The name, title, address and telephone number of the owner or operator's representative within the company who is the contact person for this facility regarding the engineering study and affected sources:

*Elizabeth Moran
Environmental Engineer
4829 Fairland Road
Barberton, OH 44203
EMoran@ppg.com
(234) 419-9484*

- c) The name, title, address, and telephone number of the official who is responsible for approval of the engineering study:

*Scott Rinehart
Plant Manager
4829 Fairland Road
Barberton, OH 44203
srinehart@ppg.com
(330) 825-3680*

- d) The standard industrial classification and source classification codes which are applicable to the facility's operation:

*SIC Code: 2821
SCC Codes:*

*South Plant: 10300603, 30199998, 20200102, 30181003, 30180001, 39999999, S0100101
North Plant: 20200102, 30101199, 30180001, 30199998, 30107002, S0100101, 30101199,
39999999, 30101198, 30181003
Teslin Plant: 30880001, 31299999, 10200603, 30880001, 30801008, 30899999*

2.2 NO_x RACT Applicability Determination

[Table 2-1](#) summarizes the emission units at the Barberton Facility with the potential to emit NO_x and the facility wide potential emissions in tons per year (tpy). Barberton operates twenty-six (26) emission units that are sources of NO_x emissions.

The April 2025 update to OAC 3745-110 requires that any facility within Summit County perform a RACT study if the facility has the potential to emit between 50-100 tons per year of NO_x. As shown in [Table 2-1](#), below, the Barberton Facility has the potential to emit 44.8 tons per year of NO_x, excluding the facility from this rule. Therefore, a NO_x RACT study was not performed for the Barberton Facility.

Table 2-1 NO_x Emission Units at the Barberton Plants

Emission Unit ID	Emission Unit Location	Emission Unit Description	NO_x PTE (tpy)
B013	South	Natural Gas Fired Cleaver Brooks Boiler - #1 Fine Chemical Boiler	1.87
B014	South	Natural Gas Fired Cleaver Brooks Boiler - #2 Fine Chemical Boiler	1.87
B015	South	Natural Gas Fired Cleaver Brooks Boiler - #3 Fine Chemical Boiler	1.87
B016	South	Natural Gas Fired Cleaver Brooks Boiler - #4 Fine Chemical Boiler	1.87
B017	South	Natural Gas Fired Cleaver Brooks Boiler - #5 Fine Chemical Boiler	1.87
B018	South	Natural Gas Fired Cleaver Brooks Boiler - #6 Fine Chemical Boiler	1.87
B032	South	diesel fired emergency electric generator - South Plant Diesel Fired Emergency Generator	2.08
P098	South	Chloroformate plant	7
P117	South	Fire Pump Diesel Engine (#1); West: 220 HP; South Plant - B034	1.96
P118	South	Fire Pump Diesel Engine (#2); East: 260 HP; South Plant - B035	2.32
P119	South	IM2 emergency generator, 16 kW (<50hp <37.3kW), propane fueled - B033	0.16
B011	North	OLED Generator Kohler 150REOZJF	1.56
P135	North	OLED Generator #2	1.56
B102	North	OLED Boiler B-102	0.08
B103	North	OLED Boiler B-103	0.08
B104	North	OLED Boiler B-104	0.08
B105	North	OLED Boiler B-105	0.08
B106	North	OLED Boiler B-106	0.21
B107	North	OLED Boiler B-107	0.21
B019	Teslin	#1 Teslin Boiler	2.7
B020	Teslin	#2 Teslin Boiler	2.7
B021	Teslin	#3 Teslin Boiler	2.7
B022	Teslin	#4 Teslin Boiler	2.7
B023	Teslin	#5 Teslin Boiler	2.7
B024	Teslin	#6 Teslin Boiler	2.7
Total Site-Wide PTE			44.8

2.3 VOC RACT Applicability Determination

[Table 2-2](#) summarizes the Title V permitted VOC sources at the Barberton Facility. A detailed documentation of the approach for calculating PTE is provided in Appendix A. Though PPG owns and operates Coating manufacturing facilities, the Barberton facility does not create or apply coatings, therefore they are not included in this RACT Study.

The April 2025 update to OAC 3745-21-11 requires that any facility within Summit County perform a RACT study if the facility has the potential to emit between 50-100 tons per year of VOC. As shown in [Table 2-2](#), below, the Barberton Facility has the potential to emit more than 50 tons per year of VOC. Therefore, PPG has proceeded with the development of a RACT study for the VOC emitting operations at the Barberton Facility.

As shown in [Table 2-2](#), Barberton operates multiple emission units that are insignificant sources of VOC emissions. Due to the insignificant nature of these sources and their inherently low levels of VOC emissions, these units are excluded from the RACT study. This leaves nine (9) significant emission units that will be addressed in this RACT study. The remainder of this study provides the proposed VOC RACT determination for these sources.

Table 2-2. Title V Permitted VOC Sources at the Barberton Facility

Emission Unit ID	Emission Unit Location	Emission Unit Description	Current VOC Control	VOC PTE (tpy)	VOC RACT Applicability
P098	South Plant	Chloroformate plant	Thermal Incinerator Tails Scrubber Wet Scrubber	8.76	RACT study
P099	South Plant	CR-39 Process	Process and Air Scrubbers	9	RACT study
P117	South Plant	Fire Pump Diesel Engine (#1); West: 220 HP; South Plant - B034	N/A	0.16	Insignificant
P118	South Plant	Fire Pump Diesel Engine (#2); East: 260 HP; South Plant - B035	N/A	0.19	Insignificant
T015	South Plant	10,000 gallon storage tank containing d-Limonene - T-231	N/A	0.13	Insignificant
T025	South Plant	10,000 gallon storage tank containing Polycaprolactone Diol - T-166	N/A	1.35	Insignificant
T026	South Plant	5,000 gallon storage tank containing Allyl Chloroformate - T-145	N/A	0.56	Insignificant
T027	South Plant	7,600 gallon storage tank containing Allyl Chloroformate - T-144	N/A	0.56	Insignificant
T028	South Plant	5,000 gallon storage tank containing Isopropyl Chloroformate - T-147	N/A	1.91	Insignificant
T029	South Plant	7,500 gallon storage tank containing Isopropyl Chloroformate - T-149	N/A	1.91	Insignificant
T034	South Plant	7,500 gallon storage tank containing Chloroformate (2-EHCF) - T-146	N/A	0.68	Insignificant
T046	South Plant	10,000 gallon storage tank containing Dynalene (heat transfer fluid) - T-230	N/A	0.01	Insignificant

Table 2-2. Title V Permitted VOC Sources at the Barberton Facility

Emission Unit ID	Emission Unit Location	Emission Unit Description	Current VOC Control	VOC PTE (tpy)	VOC RACT Applicability
T055	South Plant	150,000 gallon storage tank containing wastewater - T-339	N/A	0.07	Insignificant
T056	South Plant	150,000 gallon storage tank containing wastewater - T-422	N/A	0.07	Insignificant
T064	South Plant	T-570, PPG ID# 39010 No. 22 Storage Tank MECF - T570, PPG ID# 39010	N/A	--	Insignificant
B011	North	OLED Generator Kohler 150REOZJF	N/A	0.13	Insignificant
P135	North	OLED Generator #2	N/A	0.13	Insignificant
J001	North	32% HCl Loading Rack	N/A	-	Insignificant
P070 ^b	North	Process Unit Cell #1	Condenser ^c	39.9 tpy from P070, P071, P123	RACT Study
P071 ^b	North	OLED Cell 1	Condenser ^c	39.9 tpy from P070, P071, P123	RACT Study
P123 ^b	North	OLED Cell #3	Condenser ^c	39.9 tpy from P070, P071, P123	RACT Study
P080	North	Multipurpose Plant	Carbon Adsorption, Packed Tower Scrubbers, or Flare	7.3	RACT Study
P104	North	#1 LoVel 27 Unit	N/A	-	Insignificant

Table 2-2. Title V Permitted VOC Sources at the Barberton Facility

Emission Unit ID	Emission Unit Location	Emission Unit Description	Current VOC Control	VOC PTE (tpy)	VOC RACT Applicability
P105	North	LoVel Feed System	N/A	-	Insignificant
P125	North	Sublimation Process	N/A	0.12	Insignificant
P914	North	Tote Mixing Operations	N/A	-	Insignificant
T032	North	200,000 Gallons HCl Tank - T-195	N/A	-	Insignificant
T033	North	200,000 Gallons HCl Tank - T-194	N/A	-	Insignificant
P110	Teslin	Teslin Line 2	Carbon Adsorption Unit	37.3	RACT Study
P114	Teslin	Teslin Line 3	Carbon Adsorption Unit	39.4	RACT Study
P115	Teslin	Teslin Line 4	Carbon Adsorption Unit	39.4	RACT study

a. Excludes de-minimis, trivial and permit-exempt sources

b. P070, P071, and P123 are subject to a combined VOC emission limit of 39.90 tons per rolling, 12-month period.

c. P070, P071, and P123 have a condenser that has been deemed inherent to the process.

3. RACT DETERMINATIONS

3.1 South Plant Operations

The South Plant operates a chloroformate plant (i.e., Ohio EPA Emission Unit ID P098). VOC emissions from the chloroformate plant operations are controlled by a Thermal Incinerator and a Tails Scrubber which are required to provide greater than or equal to 98% control of organic Hazardous Air Pollutant (HAP) and equivalently Volatile Organic Compound (VOC) emissions (or achieve less than or equal to 20 ppmv as TOC or total organic HAP/VOC at the control device outlet) in accordance with 40 CFR 63, Subpart FFFF: National Emission Standards for Hazardous Air Pollutants (NESHAP) for Miscellaneous Organic Chemical Manufacturing (MON MACT) and Subpart NNNNN: NESHAP for Hydrochloric Acid Production (HCL MACT). Furthermore, the level of HAP control should be equivalent to VOC control as all HAP/VOC required to be controlled under the MON in the P098 process are organic HAP/VOC. The primary emission control scenario routes process emission unit vents through the incinerator and the tails scrubber, with an emergency caustic scrubber providing backup control, as needed. Further, PPG is required to continuously monitor the average fire box temperature within the thermal incinerator, as well as pH, titrations for scrubber liquid caustic strength, and liquid to gas ratio for the tails scrubber to ensure continuous compliance with emission control requirements.

PPG reviewed Control Technique Guidelines and Alternative Control Techniques Documents found on EPA's website to compare the available control technologies and their respective cost effectiveness. A review of these documents indicates that control technologies for stationary sources that emit VOC achieve a range of 95-98% control. Thus, PPG's controls are required to achieve a level of control that is beyond the level of RACT and any further add-on controls would only result in cost-prohibitive, negligible incremental gains.

For fugitive emissions, PPG has a leak detection and repair (LDAR) program, following the requirements outlined in 40 CFR 63, Subpart UU. As demonstrated in PPG's semiannual MON MACT compliance reports, very few leaks of fugitive components are observed for P098. As such, enhanced LDAR controls such as installation of no detectable emissions (NDE) components would result in a negligible reduction in fugitive emissions.

Given that PPG is already required to implement Maximum Achievable Control Technology (MACT) for P098 in accordance with MON MACT and HCl MACT, no further controls have been deemed necessary for this emission unit through the RACT study. PPG proposes continued compliance with the OAC applicable standards, the 98% control of VOC compounds, and LDAR program as RACT for P098.

The South Plant also operates a CR-39 process (i.e., Ohio EPA Emission Unit ID P099). P099 is also subject to 40 CFR 63 section FFFF NESHAP: Miscellaneous Organic Chemical Manufacturing (Miscellaneous Organic Chemical Manufacturing MACT). VOC emissions from the CR-39 process operations are controlled by a process and an air scrubber, operating in series, which provide greater than 85% control of VOC emissions and the emissions from P099 are required to be vented to the process and air scrubbers at all times. Further, PPG continuously monitors pressure drop across the scrubbers and liquid flow rate to ensure that operation of the control devices is properly maintained to achieve the aforementioned control efficiency.¹

¹ Note that P099 only contains Group 2 process vents that are exempt from MON control requirements. P099 is subject to OAC rule 3745-21-07(M)(2), which requires 85 percent control of VOC emissions.

PPG reviewed U.S EPA's RACT/BACT/LAER Stationary Sources (RBLC) to compare the level of VOC control required by recent RACT determinations for the chemical manufacturing industry. A review of this database indicates that RACT for stationary sources has widely been determined as use of an add-on control device that achieves a range of 95-98% control. PPG also reviewed Control Technique Guidelines and Alternative Control Techniques Documents found on EPA's website to compare the available control technologies. A review of these documents indicates that control technologies for stationary sources that emit VOC achieve a range of 95-98% control.

The following is a summary of potentially available control technology for the units within this plant:

Carbon Adsorption: Adsorption is mass transfer of a molecule from the gas to liquid phase to a solid surface. The molecule (adsorbate) is held on the adsorbent surface by either physical or chemical bonding. Adsorption technology can achieve VOC removal efficiencies of 95-98%, but the material adsorbent will require frequent replacement or regeneration.

Thermal Incineration: Thermal Incineration oxidizes combustible materials by raising their temperature above the auto-ignition point in the presence of oxygen, and maintaining a high temperature for sufficient time to complete combustion to Carbon Dioxide and Water. Specifically, Regenerative Thermal Oxidizers (RTOs) use high density media from a previous cycle to preheat waste streams. The partially oxidized gases then are heated by combustion of auxiliary fuel to a final oxidation temperature between 1400 and 1500 °F. RTOs can achieve VOC removal efficiencies of 95-99%, but removal efficiency is typically determined by site-specific requirements.

Catalytic Incinerator: Catalytic Incineration operates similarly to Thermal Incineration, but after passing through the flame area, the gas passes through a catalyst bed. Catalyst increases the oxidation rate enabling conversion at lower reaction temperatures. For VOC, typically the catalyst used includes metal oxides such as platinum. Catalytic incinerators can achieve VOC removal efficiencies of 95-99%, but removal efficiencies are typically determined by site-specific requirements.

Condenser: Condensation is a technique where volatile components are separated through saturation from the gas phase, followed by a phase change, either through compression or by refrigeration. Typically, condensers can be used as control for upstream control devices, or alone for controlling high VOC concentration streams. The VOC removal efficiency is heavily dependent on the gas speciation, method, stream temperature, pressure, concentration, and coolant type, but typical condensers strive to achieve a 90% control efficiency.

Scrubber: Absorption (Scrubbing) is the selective transfer of one or more components of a gas mixture into a liquid solvent. Absorption depends heavily on the properties of both the gas stream and liquid solvent, such as density, viscosity, and the pollutants in each stream. Scrubber control efficiency can range from 70-98% depending on the properties of the gas and liquid streams. Scrubbers typically need a secondary form of treatment for the removal of pollutants from the scrubber liquid.

In order to achieve a higher level of emissions control beyond the use of the existing scrubber system, PPG has determined that a system comparable to P098 with a combustion control device and scrubber system would be the most reasonably available engineering solution. Both emission control devices would be required to operate in series to allow for control of both the volatile organic compounds as well as the halogenated compounds present in the exhaust. Therefore, PPG has completed an analysis to assess the feasibility of adding a combustion control device (e.g., thermal oxidizer) prior to the existing P099 scrubber

system. As a reference, PPG reviewed the capital cost of three ongoing thermal oxidizer installations at its facilities in the U.S. and presented this information in Table 3-1 below.

Table 3-1. Thermal Oxidizer Capital Cost References

PPG Facility	CAPEX (\$)
Oak Creek, WI	\$3.02MM
Delaware, OH	\$3.00MM
Circleville, OH	\$8.27MM

Using the average of the most recent total capital costs for installation of thermal oxidizers at PPG Plants across the U.S., PPG conducted a cost effectiveness review for the installation of an additional thermal oxidizer to control VOC emissions associated with P099. Please note that PPG assumed that the overall control effectiveness of this system would be 98% and conservatively did not include the annual operating costs of the thermal oxidation system in this evaluation. Based on the calculations provided in Table 3-2 below, the cost effectiveness of an add-on thermal oxidizer system would exceed \$56,000/ton.

Table 3-2. Thermal Oxidizer Cost Evaluation

Cost Parameter	Calculated Value	Notes
Total Capital Investment (TCI)	\$4.76MM	Average capital cost of three recent TOX projects
Capital Recovery Factor (CRF)	0.0926	$i(1+i)^n / (1+i)^n - 1 =$ Where n = Equipment Life (20 years) and i = Interest Rate (6.75%)
Indirect Annual Cost (IDAC)	\$0.44MM	IDAC = TCI x CRF
Direct Annual Cost (DAC)	-	Conservatively not included in this analysis
Total Annual Costs (TAC)	\$0.44MM	TAC = IDAC + DAC
VOC Emission Reduction	7.8 tpy	$= \text{PTE} - [\text{PTE} / (1 - 85\%) * (1 - 98\%)]$
Cost Effectiveness	\$56,510/ton	$= \text{TAC} / \text{VOC Emission Reduction}$

Given that PPG is already subject to federal MACT requirements and state of Ohio VOC emission control requirements for P099, no further controls have been deemed necessary for this emission unit through the RACT study. The cost effectiveness of an add-on thermal oxidizer system far exceeds presumptive RACT established through U.S. EPA guidance.² Therefore, PPG proposes continued compliance with an 85% control efficiency of VOC emissions and Ohio EPA applicable standards as RACT for P099.

Due to the low concentration of organic HAP in the CR-39 process, it is currently not subject to any LDAR monitoring requirements under the MON³. However, PPG has installed twelve (12) area monitors to measure

² EPA-450/4-91-031 – Guideline Series, Control of Volatile Organic Compound Emissions from Reactor Processes and Distillation Operations Processes in the Synthetic Organic Chemical Manufacturing Industry, August 1993.

³ P099 is not subject to any LDAR monitoring requirements under the MON MACT because none of the associated equipment is “in organic HAP service” as defined under 40 CFR 63.2550(a).

the concentration of allyl alcohol (i.e., the primary VOC for CR-39) throughout the process for worker safety. The area monitors are configured to trigger an evacuation alarm at an allyl alcohol concentration of 10 ppm, which is far less than the 500 ppm leak threshold that is prescribed by most LDAR regulations. Based on the low concentration of organic HAP in the CR-39 process and the area monitors that have been installed, PPG disagrees with the Agency's assertion that an LDAR program would meaningfully reduce emissions from the source. However, PPG has decided to implement an LDAR program as RACT for CR-39 following the procedures for existing sources that are outlined under 40 CFR 63, Subpart UU.

Appendix C provides the source specific information required for both emission units by OAC 3745-21-11(b)(1) through (7).

3.2 North Plant Operations

The following is a summary of potentially available control technology for the units within this plant:

Carbon Adsorption: Adsorption is mass transfer of a molecule from the gas to liquid phase to a solid surface. The molecule (adsorbate) is held on the adsorbent surface by either physical or chemical bonding. Adsorption technology can achieve VOC removal efficiencies of 95-98%, but the material adsorbent will require frequent replacement or regeneration.

Thermal Incineration: Thermal Incineration oxidizes combustible materials by raising their temperature above the auto-ignition point in the presence of oxygen, and maintaining at a high temperature for sufficient time to complete combustion to Carbon Dioxide and Water. Specifically, Regenerative Thermal Oxidizers (RTOs) use high density media from a previous cycle to preheat waste streams. The partially oxidized gases then are heated by combustion of auxiliary fuel to a final oxidation temperature between 1400 and 1500 °F. RTOs can achieve VOC removal efficiencies of 95-99%, but removal efficiency is typically determined by site-specific requirements.

Catalytic Incinerator: Catalytic Incineration operates similarly to Thermal Incineration, but after passing through the flame area, the gas passes through a catalyst bed. Catalyst increases the oxidation rate enabling conversion at lower reaction temperatures. For VOC, typically the catalyst used includes metal oxides such as platinum. Catalytic incinerators can achieve VOC removal efficiencies of 95-99%, but removal efficiencies are typically determined by site-specific requirements.

Condenser: Condensation is a technique where volatile components are separated through saturation from the gas phase, followed by a phase change, either through compression or by refrigeration. Typically, condensers can be used as control for upstream control devices, or alone for controlling high VOC concentration streams. The VOC removal efficiency is heavily dependent on the gas speciation, method, stream temperature, pressure, concentration, and coolant type, but typical condensers strive to achieve a 90% control efficiency.

Scrubber: Absorption (Scrubbing) is the selective transfer of one or more components of a gas mixture into a liquid solvent. Absorption depends heavily on the properties of both the gas stream and liquid solvent, such as density, viscosity, and the pollutants in each stream. Scrubber control efficiency can range from 70-98% depending on the properties of the gas and liquid streams. Scrubbers typically need a secondary form of treatment for the removal of pollutants from the scrubber liquid.

The North Plant operates a multipurpose plant (i.e., Ohio EPA Emission Unit ID P080). P080 is subject to 40 CFR 63 section FFFF: NESHA for Miscellaneous Organic Chemical Manufacturing (Organic Chemical

Manufacturing MACT). However, due to the low level of emissions generated by the process, the MPP emission points are classified as Group 2 process vents and do not require control. The Title V permit dictates that PPG should utilize carbon adsorption, packed tower scrubbers, or a flare to control VOC emissions from the plant operations depending on the product or activity being performed. Furthermore, as shown in Table 3-3, actual emissions from the MPP Plant have historically been less than one ton per year.

Table 3-3. Multipurpose Plant Actual VOC Emissions

Emission Unit ID Emission Unit Description	Emission Unit Description	2023 VOC Emissions (tpy)	2024 VOC Emissions (tpy)	2025 VOC Emissions (tpy)
P080	Multipurpose Plant	0.14	0.28	0.19

PPG has the capability of controlling emissions from the MPP operations as needed to comply with Ohio Best Available Technology (BAT) requirements which state the following: The MPP unit must operate carbon adsorption, packed towers, scrubbers and/or a flare depending on product and/or activity. Given that VOC emissions from the P080 process have been less than one ton per year in recent years, this unit is currently operating below de minimis levels on an actuals basis, making any add-on control measures effectively cost prohibitive. Furthermore, P080 has existing emission control requirements established in the Title V Operating Permit. Therefore, PPG believes that RACT has been met for this operation. For fugitive emissions from P080, PPG is subject to LDAR monitoring requirements of 40 CFR 63, Subpart UU while manufacturing products that result in LDAR components that are "in organic HAP service" as defined under 40 CFR 63.2550(a). PPG proposes continued operation of carbon adsorption, packed tower, scrubbers, and/or flare depending on product and/or activity and compliance with the existing LDAR program as RACT for P080.

The North Plant also operates an OLED process which includes Process Unit Cell #1, OLED Process Unit Cell #2, and OLED Cell #3 (i.e., Ohio EPA Emission Unit ID P070, P071, and P123). VOC emissions from the plant operations are controlled by a condenser that is deemed inherent to the process. The process condenser recovers raw material prior to emission release and sends the recovered solvent back to process. P070, P071, and P123 are subject to 40 CFR 63 section FFFF: NESHA For Miscellaneous Organic Chemical Manufacturing (Organic Chemical Manufacturing MACT). However, due to the low level of organic HAP emissions generated by the process, the OLED emission points are classified as Group 2 process vents and do not require control.

The majority of VOC emissions from the OLED processes originate from LDAR emissions. LDAR emissions are subject to MON MACT requirements and PPG has established an LDAR program compliant with 40 CFR 63, Subpart UU to meet the MON standards. The LDAR program under MON MACT requires monthly leak inspections of all equipment in organic HAP/VOC service and repairing leaks within 15 days of detection.

PPG currently utilizes Method 21 instrument-based testing, in accordance with 40 CFR 63, Subpart UU. As demonstrated in PPG's semiannual MON MACT compliance reports, very few leaks of fugitive components are observed for the OLED process. As such, enhanced LDAR controls such as installation of no detectable emissions (NDE) components would result in a negligible reduction in fugitive emissions.

For stack emissions, the possible emissions control enhancements that can be performed are as follows: upgrading the condenser or installation of a RTO, carbon adsorption system, or scrubber. PPG has analyzed all control technologies and determined that they are not feasible:

- ▶ The OLED process is a batch operation where the majority of emissions are generated during brief periods of sparging and filtering solvents to drums. During other times in the batch process, emissions are minimal and there is an extremely low flow rate through the reactors of approximately 0.03 standard cubic feet per minute (scfm) of nitrogen. Even during the brief sparging operations, the flow rate increases to only approximately 6.7 scfm. Because a single batch of OLED takes place over the course of days, where emissions from most steps generate a negligible amount of waste gas, PPG would need to continuously combust supplemental natural gas to maintain the temperature of an incinerator. This continuous combustion of natural gas would generate significant amounts of NO_x and CO which would offset emissions controls achieved for the VOCs. Because of the low flow rate of waste gas from the OLED process during most of its operation, PPG has determined that an incinerator is not a technically feasible control technology for the OLED process.
- ▶ PPG has already installed a condenser to control VOC emissions at the OLED and previously determined that further optimization of the existing system was technically feasible by reducing their operating temperature. PPG has since lowered condenser temperatures to 5°C, which has improved solvent recovery efficiency and further reduced VOC emissions. PPG cannot reduce the temperature of the condenser further without risk of freezing water in the system from certain OLED batches. Increasing the capacity of the condensing system would also not reduce emissions due to the large oversize and effectiveness of the existing system. Energy balance calculations were done to determine if the existing transfer areas of the condensers were adequate to provide total condensation at OLED's most aggressive vapor flow rates, and it was found that all three production cells use condensers that are considerably oversized (466%, 241%, and 277% of the necessary heat transfer area for P070, P071, and P123, respectively). Given that this implies maximum condensation of overhead vapor flow, no additional improvements to the existing condenser have been deemed technically feasible or cost effective.
- ▶ The OLED process uses a wide range of solvents, depending on the specific product for a batch. Carbon adsorption could control some of the organic solvents used in the process. However, many of the solvents, especially the low-molecular weight polar solvents (e.g., methanol, ethanol, isopropyl alcohol, acetonitrile, etc.) are poor adsorbers due to their polarity. Such chemicals make up a significant portion, and in some cases the entirety, of the solvents that are used in a batch. Since PPG would be attempting to intermittently adsorb a wide variety of solvents, a single specialized polymer adsorber would not be sufficient to handle them all, necessitating a large number of adsorbing beds to ensure no breakthrough takes place. The feeds to those adsorbers would already be at the dew point of the solvents and very low in humidity. To subsequently regenerate those adsorbers, large quantities of steam would need to be used and the energy input in natural gas cost to create that steam would outrun the small amount of VOCs emitted from the typical batch process. This would also require management of the generated wastewater as either hazardous waste in its own right or send the water to another boiling system to reclaim the pure solvents, requiring another round of energy-intensive steam generation. Lastly, according to page 3-2 of US EPA's Control Techniques Guidelines, carbon adsorption may prove too difficult and expensive for VOCs with vapor concentrations <700 ppmv⁴. As mentioned above, organic emissions are minimal for the majority of a batch. During the majority of an OLED batch, the VOC concentration would likely be below 700 ppmv. As such, carbon adsorption is not a technically feasible control technology for the OLED process.
- ▶ Scrubbing is not technically feasible for the OLED due to both performance and reliability limitations. Effective operation for scrubbing systems requires gases with high solubility in the scrubbing liquid. Due

⁴ EPA-450/3-84-015 – Guideline Series, Control of Volatile Organic Compound Emissions from Air Oxidation Processes in Synthetic Organic Chemical Manufacturing Industry, December 1984.

to the wide range of solvents that are used, many of the VOCs present in the gas streams will not have high enough solubility and lead to ineffective removal via scrubbing. Additionally, absorption systems are generally not considered effective for VOC control when inlet VOC concentrations are below approximately 200 to 300 ppmv. As noted above, VOC emissions are expected to be minimal during most of an OLED batch.

Finally, PPG has also established a 39.9 tpy VOC synthetic minor, PSD-avoidance emission limitation across all process vents, fugitive emissions from equipment leaks, and storage tanks for P070, P071, and P123 combined.

Given that PPG is recovering VOC from process vents by using an inherent process condenser and the majority of emissions are fugitive emissions regulated through the site's LDAR program, PPG believes that RACT has been met for these operations. PPG proposes continued compliance with the existing synthetic minor limitation, best management practices associated with Group 2 process vents, and compliance with the existing LDAR program as RACT for the OLED processes.

Appendix C provides the source specific information required for these emission units by OAC 3745-21-11(b)(1) through (7).

3.3 Teslin Plant Operations

The following is a summary of potentially available control technology for the units within this plant:

Carbon Adsorption: Adsorption is mass transfer of a molecule from the gas to liquid phase to a solid surface. The molecule (adsorbate) is held on the adsorbent surface by either physical or chemical bonding. Adsorption technology can achieve VOC removal efficiencies of 95-98%, but the material adsorbent will require frequent replacement or regeneration.

Thermal Incineration: Thermal Incineration oxidizes combustible materials by raising their temperature above the auto-ignition point in the presence of oxygen, and maintaining a high temperature for sufficient time to complete combustion to Carbon Dioxide and Water. Specifically, Regenerative Thermal Oxidizers (RTOs) use high density media from a previous cycle to preheat waste streams. The partially oxidized gases then are heated by combustion of auxiliary fuel to a final oxidation temperature between 1400 and 1500 °F. RTOs can achieve VOC removal efficiencies of 95-99%, but removal efficiency is typically determined by site-specific requirements.

Catalytic Incinerator: Catalytic Incineration operates similarly to Thermal Incineration, but after passing through the flame area, the gas passes through a catalyst bed. Catalyst increases the oxidation rate enabling conversion at lower reaction temperatures. For VOC, typically the catalyst used includes metal oxides such as platinum. Catalytic incinerators can achieve VOC removal efficiencies of 95-99%, but removal efficiencies are typically determined by site-specific requirements.

Condenser: Condensation is a technique where volatile components are separated through saturation from the gas phase, followed by a phase change, either through compression or by refrigeration. Typically, condensers can be used as control for upstream control devices, or alone for controlling high VOC concentration streams. The VOC removal efficiency is heavily dependent on the gas speciation, method, stream temperature, pressure, concentration, and coolant type, but typical condensers strive to achieve a 90% control efficiency.

Scrubber: Absorption (Scrubbing) is the selective transfer of one or more components of a gas mixture into a liquid solvent. Absorption depends heavily on the properties of both the gas stream and liquid solvent, such as density, viscosity, and the pollutants in each stream. Scrubber control efficiency can range from 70-98% depending on the properties of the gas and liquid streams. Scrubbers typically need a secondary form of treatment for the removal of pollutants from the scrubber liquid.

The Teslin Plant operates three significant production lines (i.e., Ohio EPA Emission Unit ID P110, P114, P115) that have the potential to emit VOC. PPG must achieve an overall 90% reduction in VOC emissions from combined stack and fugitive emissions across the Teslin production lines. Evaporative losses from the process are directed from the principal process equipment to the Carbon Adsorption Unit (CAU) for solvent recovery and reuse in the Teslin manufacturing process. All three Teslin production lines have capture points throughout the process that are routed to the CAU for VOC control. The CAU uses five carbon bed units in parallel that cycle through adsorption and regeneration stages to provide greater than 99% VOC removal efficiency from the stack exhaust. Through the carbon regeneration process, unrecovered VOC emissions are discharged to the atmosphere from a single, vertical stack. After reviewing the potential additional control devices, PPG is already achieving best-in-class level of emissions control and any add-on control measures for the stack exhaust would provide negligible incremental improvement and be cost prohibitive.

Table 3-4 below shows actual VOC emissions from each Teslin production line from 2023-2025. As seen below, and in comparison to the total Teslin emissions that are presented in Table 2-2, stack emissions from the Teslin processes are a small fraction of the overall emissions, indicating that the carbon adsorption and regeneration emission control processes are performing well. Given the low level of VOC emissions from these sources with the carbon adsorption unit, further installations of add-on control devices for stack emissions would not be economically feasible.

Table 3-4. Production Lines Actual Stack VOC Emissions

Emission Unit ID	Emission Unit Description	2023 VOC Stack Emissions (tpy)	2024 VOC Stack Emissions (tpy)	2025 VOC Stack Emissions (tpy)
P110	Teslin Line 2	0.37	0.33	0.34
P114	Teslin Line 3	0.29	0.35	0.39
P115	Teslin Line 4	0.32	0.34	0.36

Table 3-5 below provides the prior three years of actual emissions of fugitive emissions from the three Teslin production lines. Since the Barberton Plants are considered a major source of HAP/VOC and the Teslin processes have the potential to emit more than the major source threshold, they are subject to case-by-case NESHAP requirements under sections 112(g) and 112(j) of the Clean Air Act (CAA). Through the case-by-case NESHAP process, PPG evaluated means of reducing or eliminating fugitive emissions from the Teslin process. PPG assessed the feasibility of process enclosures, equipment leak programs, and other design features to reduce fugitive emissions.

Since enclosing the entire Teslin process would present safety issues at the site, PPG evaluated the capability of capturing VOC emissions through each individual process step in the Teslin manufacturing process. PPG was able to design and implement emission capture points starting at the introduction of VOC to the process in the mixers, as well as the subsequent extruders, extractors, dryers, ovens, and VOC recovery processes. Furthermore, permanent total enclosures were achieved at the mixers, extractors,

dryers, and ovens to fully capture emissions during normal operating conditions. These permanent enclosures are maintained under negative pressure and help to ensure the largest potential sources of fugitive emissions are captured and controlled by the CAU.

PPG has also implemented a leak detection and repair (LDAR) program for the Teslin manufacturing process to minimize emissions from equipment in VOC service including: pumps, valves, flanges, connectors, and open-ended lines. The existing LDAR program provides routine monitoring and repair timelines to ensure leaks are identified and repaired in a timely manner. The LDAR program is consistent with other VOC containing processes at the Barberton Plant as well as other chemical manufacturing processes throughout the nation. Similar to the other process units, very few leaks of fugitive components are observed for the Teslin process. As such, enhanced LDAR controls such as installation of no detectable emissions (NDE) components would result in a negligible reduction in fugitive emissions.

For fugitive emissions, it is not technologically feasible to capture these emissions and route to an add-on control device, therefore, PPG considered the possibility of upgrading the LDAR program. PPG currently utilizes Method 21 instrument-based testing. This method of testing is the most up-to-date program available; therefore, no additional upgrades can be made.

Given that the same concerns regarding industrial hygiene, safety, and technical issues exist with enclosing the entire Teslin process, PPG believes the case-by-case MACT study performed previously remains valid today. Since the MACT study was performed, PPG has evaluated and implemented incremental improvements to the permanent total enclosures and capture points including the addition of an air stripper to help further recover captured VOC emissions from the process. There are no further technically and economically feasible control technologies that were identified as available at the current time to reduce fugitive emissions from the Teslin process that have not already been implemented at the Barberton Plant.

Table 3-5. Production Lines Actual Fugitive VOC Emissions

Emission Unit ID	Emission Unit Description	2023 VOC Fugitive Emissions (tpy)	2024 VOC Fugitive Emissions (tpy)	2025 VOC Fugitive Emissions (tpy)
P110	Teslin Line 2	12.74	11.61	14.91
P114	Teslin Line 3	12.25	11.61	14.91
P115	Teslin Line 4	12.75	11.61	14.91

As described above, PPG implements various work practices when operating the production lines to minimize VOC emissions, many of which are required by the Title V operating permit. Additionally, the emission units are subject to existing VOC emission limits and emission control requirements through the current Title V Operating Permit. PPG proposes the combination of existing carbon adsorption capture and control requirements, compliance with existing LDAR work practices, and demonstration of compliance through existing monitoring and recordkeeping requirements meet VOC RACT for each production line.

Appendix C provides the source specific information required for these emission units by OAC 3745-21-11(b)(1) through (7).

3.4 Summary of RACT Determinations

A summary of the proposed RACT determinations for each source is presented in Table 3-6 below. Please note that PPG does not use any coatings at this source and PPG will continue to comply with the state and federal limits that apply to these units effective immediately.

Table 3-6. Summary of Proposed RACT Determinations for the Barberton Facility

Emission Unit	Location	Emission Unit Description	Proposed VOC RACT Determination
P098	South Plant	Chloroformate plant	Compliance 98% control and ongoing control device monitoring and continuation of the LDAR program in accordance with the requirements of 40 CFR 63, Subpart UU.
P099	South Plant	CR-39 Process	Compliance with OAC 3745-21-07(M)(2) as dictated by the existing Title V permit, including 85% control and ongoing control device monitoring. Implementation of an LDAR program in accordance with the requirements of 40 CFR 63, Subpart UU.
P070	North Plant	Process Unit Cell #1	Continued use of an inherent process condenser to recover solvents. Compliance with existing Synthetic Minor requirements, as dictated by the existing Title V permit to reduce fugitive VOC emissions, and continuation of the LDAR program in accordance with the requirements of 40 CFR 63, Subpart UU.
P071	North Plant	OLED Cell 1	Continued use of an inherent process condenser to recover solvents. Compliance with existing Synthetic Minor requirements, as dictated by the existing Title V permit to reduce fugitive VOC emissions, and continuation of the LDAR program in accordance with the requirements of 40 CFR 63, Subpart UU.
P123	North Plant	OLED Cell #3	Continued use of an inherent process condenser to recover solvents. Compliance with existing Synthetic Minor requirements, as dictated by the existing Title V permit to reduce fugitive VOC emissions, and continuation of the LDAR program in accordance with the requirements of 40 CFR 63, Subpart UU.
P080	North Plant	Multipurpose Plant ^a	Operation of carbon adsorption, packed tower, scrubbers, and/or flare depending on product and/or activity to ensure OC emissions do not exceed 40 pounds per day and continuation of the LDAR program in accordance with the requirements of 40 CFR 63, Subpart UU.

Emission Unit	Location	Emission Unit Description	Proposed VOC RACT Determination
P110	Teslin Plant	Teslin Line 2	Compliance with 99% stack VOC emissions control, 90% combined stack and fugitive VOC emissions control, ongoing recordkeeping associated with the carbon adsorption system and continuation of the LDAR program in accordance with the requirements of OAC 3745-21-09(DD).
P114	Teslin Plant	Teslin Line 3	Compliance with 99% stack VOC emissions control, 90% combined stack and fugitive VOC emissions control, ongoing recordkeeping associated with the carbon adsorption system, and continuation of the LDAR program in accordance with the requirements of OAC 3745-21-09(DD).
P115	Teslin Plant	Teslin Line 4	Compliance with 99% stack VOC emissions control, 90% combined stack and fugitive VOC emissions control, ongoing recordkeeping associated with the carbon adsorption system, and continuation of the LDAR program in accordance with the requirements of OAC 3745-21-09(DD).

APPENDIX A. POTENTIAL-TO-EMIT DOCUMENTATION

NORTH PLANT TITLE V PERMIT RENEWAL PTE CALCULATIONS

Table A.1 - Barberton North Plant Emissions Summary

Emission Unit ID	Unit Description	Exemption Status	Potential Emissions (tpy)											
			CO	NO _x	PM ₁₀ (FILT)	PM ₁₀ (PRI)	PM _{2.5} (FILT)	PM _{2.5} (PRI)	Lead	SO ₂	VOC	Toluene	Total HAP	CO ₂ e
B009	#1 Silica Boiler	Permit Exempt	2.20	2.62	5.0E-02	0.20	5.0E-02	0.20	1.3E-05	1.6E-02	0.14	8.9E-05	4.9E-02	3,129
B010	#2 Silica Boiler	Permit Exempt	1.88	2.23	4.2E-02	0.17	4.2E-02	0.17	1.1E-05	1.3E-02	0.12	7.6E-05	4.2E-02	2,667
B011	OLED Generator Kohler 150REOZJF	N/A	0.34	1.56	0.11	0.12	0.11	0.12	3.1E-06	0.10	0.13	1.4E-04	1.4E-03	57.59
TMP221510	OLED Generator #2	N/A	0.34	1.56	0.11	0.12	0.11	0.12	3.1E-06	0.10	0.13	1.4E-04	1.4E-03	57.59
B033	Steam Superheater	<i>De minimis</i>	0.21	0.25	4.8E-03	1.9E-02	4.8E-03	1.9E-02	1.3E-06	1.5E-03	1.4E-02	8.6E-06	4.8E-03	303
B034	Steam Superheater	<i>De minimis</i>	0.21	0.25	4.8E-03	1.9E-02	4.8E-03	1.9E-02	1.3E-06	1.5E-03	1.4E-02	8.6E-06	4.8E-03	303
TMP221487	OLED Boiler B-102	<i>De minimis</i>	3.4E-02	8.1E-02	1.6E-03	6.5E-03	1.6E-03	6.5E-03	4.3E-07	5.2E-04	4.7E-03	2.9E-06	1.6E-03	103
TMP221488	OLED Boiler B-103	<i>De minimis</i>	3.4E-02	8.1E-02	1.6E-03	6.5E-03	1.6E-03	6.5E-03	4.3E-07	5.2E-04	4.7E-03	2.9E-06	1.6E-03	103
TMP221489	OLED Boiler B-104	<i>De minimis</i>	3.4E-02	8.1E-02	1.6E-03	6.5E-03	1.6E-03	6.5E-03	4.3E-07	5.2E-04	4.7E-03	2.9E-06	1.6E-03	103
TMP221490	OLED Boiler B-105	<i>De minimis</i>	3.4E-02	8.1E-02	1.6E-03	6.5E-03	1.6E-03	6.5E-03	4.3E-07	5.2E-04	4.7E-03	2.9E-06	1.6E-03	103
TMP221491	OLED Boiler B-106	<i>De minimis</i>	0.18	0.21	4.1E-03	1.6E-02	4.1E-03	1.6E-02	1.1E-06	1.3E-03	1.2E-02	7.3E-06	4.1E-03	256
TMP221492	OLED Boiler B-107	<i>De minimis</i>	0.18	0.21	4.1E-03	1.6E-02	4.1E-03	1.6E-02	1.1E-06	1.3E-03	1.2E-02	7.3E-06	4.1E-03	256
F010	Road Fugitives-North	<i>De minimis</i>	-	-	0.17	0.17	4.7E-02	4.7E-02	-	-	-	-	-	-
J001	32% HCl Loading Rack	NA	-	-	-	-	-	-	-	-	-	-	0.72	-
TMP221784	Waste Toluene Loading	<i>De minimis</i>	-	-	-	-	-	-	-	-	6.7E-02	6.7E-02	-	-
TMP221785	Waste THF Loading	<i>De minimis</i>	-	-	-	-	-	-	-	-	9.1E-02	-	-	-
P001	Ventilation Hoods	<i>De minimis</i>	-	-	-	-	-	-	-	-	2.86	4.9E-02	4.9E-02	-
P034	LoVel 29 Unit	<i>De minimis</i>	-	-	1.35	1.35	1.35	1.35	-	-	-	-	-	-
P070	P070	NA	-	-	1.0E-03	1.0E-03	1.0E-03	1.0E-03	-	-	39.90	12.10	16.02	-
P071	P071	NA	-	-	1.0E-03	1.0E-03	1.0E-03	1.0E-03	-	-		3.98	5.98	-
P123	OLED Cell #3	NA	-	-	1.0E-03	1.0E-03	1.0E-03	1.0E-03	-	-		4.67	7.58	-
P080	Multipurpose Plant ^a	NA	-	-	-	-	-	-	-	-	7.30	-	3.14	-
P104	#1 LoVel 27 Unit	NA	-	-	3.75	3.75	3.75	3.75	-	-	-	-	-	-
P105	LoVel Feed System	NA	-	-	3.75	3.75	3.75	3.75	-	-	-	-	-	-
P124	MPP Cooling Tower	<i>De minimis</i>	-	-	0.39	0.39	0.39	0.39	-	-	-	-	-	-
P125	Sublimation Process	NA	-	-	-	-	-	-	-	-	0.12	0.12	0.12	-
P126	Netsch Fluidized Jet Mill	<i>De minimis</i>	-	-	1.50	1.50	1.50	1.50	-	-	-	-	-	-
P901	FIBC Packaging System	<i>De minimis</i>	-	-	0.94	0.94	0.94	0.94	-	-	-	-	-	-
P914	Tote Mixing Operations	NA	Tote mixing operation was permanently shut down in February 2013											
T032	200,000 Gallons HCl Tank - T-195	NA	-	-	-	-	-	-	-	-	-	-	0.86	-
T033	200,000 Gallons HCl Tank - T-194	NA	-	-	-	-	-	-	-	-	-	-	0.86	-
T073	10,000 Gallon THF Tank	Permit Exempt	-	-	-	-	-	-	-	-	0.59	-	-	-
T074	10,000 Gallon Toluene Tank	Permit Exempt	-	-	-	-	-	-	-	-	6.5E-02	-	6.5E-02	-
T075	10,000 Gallon THF Staging Tank	Permit Exempt	-	-	-	-	-	-	-	-	0.58	-	3.2E-03	-
T076	10,000 gallon fixed roof storage tank used to	Permit Exempt	-	-	-	-	-	-	-	-	6.6E-02	-	6.5E-02	-
T077	6,000 Gallons Caustic Tank - T-171	Invalid	Caustic (NaOH) is not a regulated air contaminant; source has been made invalid in Air Services											
T078	3,000 Gallons Nitrogen Tank - T-003	Invalid	Nitrogen (N ₂) is not a regulated air contaminant; source has been made invalid in Air Services											
T079	Ethylene Glycol Coolant Tank - T-193	Permit Exempt	-	-	-	-	-	-	-	-	5.4E-04	-	-	-
North Plant Total:			5.67	9.23	12.20	12.57	12.08	12.45	3.7E-05	0.24	52.23	20.98	35.59	7,440

^a VOC emission limit for P080 are based on OAC 3745-21-07(M)(3)(d)(ix) converted to tpy. HAP emissions are based on emission testing.

Table A.2 - #1 Silica Boiler Natural Gas Combustion (B009) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	6.1 MMBtu/hr
Maximum Annual Heat Input Capacity	53,436 MMBtu/yr
Maximum Hourly Natural Gas Use	6.0E-03 MMscf/hr
Maximum Annual Natural Gas Use	52.39 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	0.60	2.62
CO	0.50	2.20
SO ₂	3.6E-03	1.6E-02
Filterable PM/PM ₁₀ /PM _{2.5}	1.1E-02	0.05
Condensable PM	3.4E-02	0.15
Total PM ₁₀ /PM _{2.5}	4.5E-02	0.20
VOC	3.3E-02	0.14
OC	3.3E-02	0.14
Lead (Pb)	3.0E-06	1.3E-05
Hexane	1.1E-02	4.7E-02
Total HAP	1.1E-02	4.9E-02
CO ₂	-	3,125
CH ₄	-	0.06
N ₂ O	-	5.9E-03
CO ₂ e ^c	-	3,129

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂ e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.3 - #2 Silica Boiler Natural Gas Combustion (B010) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	5.2 MMBtu/hr
Maximum Annual Heat Input Capacity	45,552 MMBtu/yr
Maximum Hourly Natural Gas Use	5.1E-03 MMscf/hr
Maximum Annual Natural Gas Use	44.66 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	0.51	2.23
CO	0.43	1.88
SO ₂	3.1E-03	1.3E-02
Filterable PM/PM ₁₀ /PM _{2.5}	9.7E-03	0.04
Condensable PM	2.9E-02	0.13
Total PM ₁₀ /PM _{2.5}	3.9E-02	0.17
VOC	2.8E-02	0.12
OC	2.8E-02	0.12
Lead (Pb)	2.5E-06	1.1E-05
Hexane	9.2E-03	4.0E-02
Total HAP	9.6E-03	4.2E-02
CO ₂	-	2,664
CH ₄	-	0.05
N ₂ O	-	5.0E-03
CO ₂ e ^c	-	2,667

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
 All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.4 - Diesel Emergency Generator (B011) Potential Emissions

POTENTIAL PROCESS DATA

Engine Capacity	150 KW	
Engine Capacity	201 hp	= Maximum Hourly Heat Input Capacity (KW) x 1,000 (W/KW) / 745.7 (W/hp)
Annual Operating Hours	500 hr/yr	Emergency generator maximum annual operating hours [OAC 3745-31-03(C)(2)(a)]
Brake-Specific Fuel Consumption (BSFC)	7,000 Btu/hp-hr	AP-42 Section 3.3, Table 3.3-1, footnote a
Heat Input	704 MMBtu/yr	= Engine Capacity (hp) x Annual Operating Hours (hr/yr) x BSFC (Btu/hp-hr) / 1,000,000 (Btu/MMBtu)

DIMENSIONAL ANALYSIS

Mass Conversion	745.7 W/hp	NIST SP1038
Mass Conversion	1,000 W/KW	NIST SP1038
Mass Conversion	1,000,000 Btu/MMBtu	NIST SP1038
Mass Conversion	0.454 kg/lb	NIST SP1038
Mass Conversion	2,000 lb/ton	NIST SP1038

EMISSION FACTORS

AP-42 Section 3.3 - Gasoline and Diesel Industrial Engines

NO _x	3.10E-02 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
CO	6.68E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
SO ₂	2.05E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
Condensable PM ^a	2.73E-04 lb/hp-hr	
Filterable PM/PM ₁₀ /PM _{2.5}	2.20E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
Total PM ₁₀ /PM _{2.5}	2.47E-03 lb/hp-hr	= Condensable PM EF (lb/hp-hr) + Filterable PM/PM ₁₀ /PM _{2.5} EF (lb/hp-hr)
VOC	2.51E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel (exhaust + crankcase). Assumes VOC = TOC
OC	2.51E-03 lb/hp-hr	Equivalent to VOC emissions
Lead (Pb)	8.90 lb/10 ¹² Btu	Guidance for Reporting Releases and Other Waste Management Quantities of Toxic Chemicals: Lead and Lead Compounds (12/2001), EPA 260-B-01-027, page 5-4.
Lead (Pb)	8.90E-06 lb/MMBtu	= Lead EF (lb/10 ¹² Btu) / 1,000,000 (MMBtu/10 ¹² Btu)
Total Combustion HAP	3.87E-03 lb/MMBtu	AP-42 Section 3.3, Table 3.3-2 (10/96)

^a PM-CON emission factors are not provided in AP-42 Section 3.3; however, AP-42 Section 3.4, Table 3.4-2 provides PM10-FIL (0.0620 lb/MMBtu) and PM-CON (0.0077 lb/MMBtu) emission factors for large uncontrolled stationary diesel engines. The ratio of these emission factors is used to calculate the PM-CON emission factor for the diesel fire pump.

40 CFR 98, Subparts A and C - GHG

CO ₂	73.96 kg/MMBtu	40 CFR 98, Subpart C, Table C-1 for distillate fuel oil no.2
CH ₄	3.0E-03 kg/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum
N ₂ O	6.0E-04 kg/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum
CO ₂	163.05 lb/MMBtu	40 CFR 98, Subpart C, Table C-1 for distillate fuel oil no.2 (converted using NIST SP1038)
CH ₄	6.6E-03 lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum (converted using NIST SP1038)
N ₂ O	1.3E-03 lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum (converted using NIST SP1038)
CO ₂ - GWP	1 GWP	40 CFR 98, Subpart A, Table A-1
CH ₄ - GWP	25 GWP	40 CFR 98, Subpart A, Table A-1
N ₂ O - GWP	298 GWP	40 CFR 98, Subpart A, Table A-1

POTENTIAL EMISSION CALCULATIONS

Diesel Engine Combustion Emissions

Pollutant	Potential Emissions (tpy) ^a
NO _x	1.56
CO	0.34
SO ₂	0.10
Condensable PM	1.4E-02
Filterable PM/PM ₁₀ /PM _{2.5}	0.11
Total PM ₁₀ /PM _{2.5}	0.12
VOC	0.13
OC	0.13
Lead (Pb)	3.1E-06
Total HAP	1.4E-03
CO ₂	57
CH ₄	2.3E-03
N ₂ O	4.7E-04
CO ₂ e ^b	58

^a Lead, Total HAP, and GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)

All Other Pollutant Potential Emissions (tpy) = Engine Capacity (hp) x Annual Operating Hours (hr/yr) x BSFC (Btu/hp-hr) x Pollutant EF (lb/hp-hr) / 2,000 (lb/ton)

^b CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.5 - Diesel Emergency Generator (TMP221510) Potential Emissions

POTENTIAL PROCESS DATA

Engine Capacity	150 KW	
Engine Capacity	201 hp	= Maximum Hourly Heat Input Capacity (KW) x 1,000 (W/KW) / 745.7 (W/hp)
Annual Operating Hours	500 hr/yr	Emergency generator maximum annual operating hours [OAC 3745-31-03(C)(2)(a)]
Brake-Specific Fuel Consumption (BSFC)	7,000 Btu/hp-hr	AP-42 Section 3.3, Table 3.3-1, footnote a
Heat Input	704 MMBtu/yr	= Engine Capacity (hp) x Annual Operating Hours (hr/yr) x BSFC (Btu/hp-hr) / 1,000,000 (Btu/MMBtu)

DIMENSIONAL ANALYSIS

Mass Conversion	745.7 W/hp	NIST SP1038
Mass Conversion	1,000 W/KW	NIST SP1038
Mass Conversion	1,000,000 Btu/MMBtu	NIST SP1038
Mass Conversion	0.454 kg/lb	NIST SP1038
Mass Conversion	2,000 lb/ton	NIST SP1038

EMISSION FACTORS

AP-42 Section 3.3 - Gasoline and Diesel Industrial Engines

NO _x	3.10E-02 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
CO	6.68E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
SO ₂	2.05E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
Condensable PM ^a	2.73E-04 lb/hp-hr	
Filterable PM/PM ₁₀ /PM _{2.5}	2.20E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel
Total PM ₁₀ /PM _{2.5}	2.47E-03 lb/hp-hr	= Condensable PM EF (lb/hp-hr) + Filterable PM/PM ₁₀ /PM _{2.5} EF (lb/hp-hr)
VOC	2.51E-03 lb/hp-hr	AP-42 Section 3.3, Table 3.3-1 for diesel fuel (exhaust + crankcase). Assumes VOC = TOC
OC	2.51E-03 lb/hp-hr	Equivalent to VOC emissions
Lead (Pb)	8.90 lb/10 ¹² Btu	Guidance for Reporting Releases and Other Waste Management Quantities of Toxic Chemicals: Lead and Lead Compounds (12/2001), EPA 260-B-01-027, page 5-4.
Lead (Pb)	8.90E-06 lb/MMBtu	= Lead EF (lb/10 ¹² Btu) / 1,000,000 (MMBtu/10 ¹² Btu)
Total Combustion HAP	3.87E-03 lb/MMBtu	AP-42 Section 3.3, Table 3.3-2 (10/96)

^a PM-CON emission factors are not provided in AP-42 Section 3.3; however, AP-42 Section 3.4, Table 3.4-2 provides PM10-FIL (0.0620 lb/MMBtu) and PM-CON (0.0077 lb/MMBtu) emission factors for large uncontrolled stationary diesel engines. The ratio of these emission factors is used to calculate the PM-CON emission factor for the diesel fire pump.

40 CFR 98, Subparts A and C - GHG

CO ₂	73.96 kg/MMBtu	40 CFR 98, Subpart C, Table C-1 for distillate fuel oil no.2
CH ₄	3.0E-03 kg/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum
N ₂ O	6.0E-04 kg/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum
CO ₂	163.05 lb/MMBtu	40 CFR 98, Subpart C, Table C-1 for distillate fuel oil no.2 (converted using NIST SP1038)
CH ₄	6.6E-03 lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum (converted using NIST SP1038)
N ₂ O	1.3E-03 lb/MMBtu	40 CFR 98, Subpart C, Table C-2 for petroleum (converted using NIST SP1038)
CO ₂ - GWP	1 GWP	40 CFR 98, Subpart A, Table A-1
CH ₄ - GWP	25 GWP	40 CFR 98, Subpart A, Table A-1
N ₂ O - GWP	298 GWP	40 CFR 98, Subpart A, Table A-1

Table A.5 - Diesel Emergency Generator (TMP221510) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Diesel Engine Combustion Emissions

Pollutant	Potential Emissions (tpy)^a
NO _x	1.56
CO	0.34
SO ₂	0.10
Condensable PM	1.4E-02
Filterable PM/PM ₁₀ /PM _{2.5}	0.11
Total PM ₁₀ /PM _{2.5}	0.12
VOC	0.13
OC	0.13
Lead (Pb)	3.1E-06
Total HAP	1.4E-03
CO ₂	57
CH ₄	2.3E-03
N ₂ O	4.7E-04
CO ₂ e ^b	58

^a Lead, Total HAP, and GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)

All Other Pollutant Potential Emissions (tpy) = Engine Capacity (hp) x Annual Operating Hours (hr/yr) x BSFC (Btu/hp-hr) x Pollutant EF (lb/hp-hr) / 2,000 (lb/ton)

^b CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.6 - Steam Superheater Natural Gas Combustion (B033) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.591 MMBtu/hr
Maximum Annual Heat Input Capacity	5,177 MMBtu/yr
Maximum Hourly Natural Gas Use	5.8E-04 MMscf/hr
Maximum Annual Natural Gas Use	5.08 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	0.06	0.25
CO	0.05	0.21
SO ₂	3.5E-04	1.5E-03
Filterable PM/PM ₁₀ /PM _{2.5}	1.1E-03	4.8E-03
Condensable PM	3.3E-03	1.4E-02
Total PM ₁₀ /PM _{2.5}	4.4E-03	1.9E-02
VOC	3.2E-03	1.4E-02
OC	3.2E-03	1.4E-02
Lead (Pb)	2.9E-07	1.3E-06
Hexane	1.0E-03	4.6E-03
Total HAP	1.1E-03	4.8E-03
CO ₂	-	303
CH ₄	-	5.7E-03
N ₂ O	-	5.7E-04
CO ₂ e ^c	-	303

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.7 - Steam Superheater Natural Gas Combustion (B034) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.591 MMBtu/hr
Maximum Annual Heat Input Capacity	5,177 MMBtu/yr
Maximum Hourly Natural Gas Use	5.8E-04 MMscf/hr
Maximum Annual Natural Gas Use	5.08 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	0.06	0.25
CO	0.05	0.21
SO ₂	3.5E-04	1.5E-03
Filterable PM/PM ₁₀ /PM _{2.5}	1.1E-03	4.8E-03
Condensable PM	3.3E-03	1.4E-02
Total PM ₁₀ /PM _{2.5}	4.4E-03	1.9E-02
VOC	3.2E-03	1.4E-02
OC	3.2E-03	1.4E-02
Lead (Pb)	2.9E-07	1.3E-06
Hexane	1.0E-03	4.6E-03
Total HAP	1.1E-03	4.8E-03
CO ₂	-	303
CH ₄	-	5.7E-03
N ₂ O	-	5.7E-04
CO ₂ e ^c	-	303

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.8 - OLED Boiler B-102 (TMP221487) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.2 MMBtu/hr
Maximum Annual Heat Input Capacity	1,752 MMBtu/yr
Maximum Hourly Natural Gas Use	2.0E-04 MMscf/hr
Maximum Annual Natural Gas Use	1.72 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	94 lb/MMscf
CO	40 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

Table A.8 - OLED Boiler B-102 (TMP221487) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	1.8E-02	8.1E-02
CO	7.8E-03	3.4E-02
SO ₂	1.2E-04	5.2E-04
Filterable PM/PM ₁₀ /PM _{2.5}	3.7E-04	1.6E-03
Condensable PM	1.1E-03	4.9E-03
Total PM ₁₀ /PM _{2.5}	1.5E-03	6.5E-03
VOC	1.1E-03	4.7E-03
OC	1.1E-03	4.7E-03
Lead (Pb)	9.8E-08	4.3E-07
Hexane	3.5E-04	1.5E-03
Total HAP	3.7E-04	1.6E-03
CO ₂	-	102
CH ₄	-	1.9E-03
N ₂ O	-	1.9E-04
CO ₂ e ^c	-	103

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
 All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.9 - OLED Boiler B-103 (TMP221488) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.2 MMBtu/hr
Maximum Annual Heat Input Capacity	1,752 MMBtu/yr
Maximum Hourly Natural Gas Use	2.0E-04 MMscf/hr
Maximum Annual Natural Gas Use	1.72 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	94 lb/MMscf
CO	40 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

Table A.9 - OLED Boiler B-103 (TMP221488) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	1.8E-02	8.1E-02
CO	7.8E-03	3.4E-02
SO ₂	1.2E-04	5.2E-04
Filterable PM/PM ₁₀ /PM _{2.5}	3.7E-04	1.6E-03
Condensable PM	1.1E-03	4.9E-03
Total PM ₁₀ /PM _{2.5}	1.5E-03	6.5E-03
VOC	1.1E-03	4.7E-03
OC	1.1E-03	4.7E-03
Lead (Pb)	9.8E-08	4.3E-07
Hexane	3.5E-04	1.5E-03
Total HAP	3.7E-04	1.6E-03
CO ₂	-	102
CH ₄	-	1.9E-03
N ₂ O	-	1.9E-04
CO ₂ e ^c	-	103

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.10 - OLED Boiler B-104 (TMP221489) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.2 MMBtu/hr
Maximum Annual Heat Input Capacity	1,752 MMBtu/yr
Maximum Hourly Natural Gas Use	2.0E-04 MMscf/hr
Maximum Annual Natural Gas Use	1.72 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	94 lb/MMscf
CO	40 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

Table A.10 - OLED Boiler B-104 (TMP221489) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	1.8E-02	8.1E-02
CO	7.8E-03	3.4E-02
SO ₂	1.2E-04	5.2E-04
Filterable PM/PM ₁₀ /PM _{2.5}	3.7E-04	1.6E-03
Condensable PM	1.1E-03	4.9E-03
Total PM ₁₀ /PM _{2.5}	1.5E-03	6.5E-03
VOC	1.1E-03	4.7E-03
OC	1.1E-03	4.7E-03
Lead (Pb)	9.8E-08	4.3E-07
Hexane	3.5E-04	1.5E-03
Total HAP	3.7E-04	1.6E-03
CO ₂	-	102
CH ₄	-	1.9E-03
N ₂ O	-	1.9E-04
CO ₂ e ^c	-	103

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton),
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.11 - OLED Boiler B-105 (TMP221490) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.2 MMBtu/hr
Maximum Annual Heat Input Capacity	1,752 MMBtu/yr
Maximum Hourly Natural Gas Use	2.0E-04 MMscf/hr
Maximum Annual Natural Gas Use	1.72 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	94 lb/MMscf
CO	40 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-1 (7/98) for residential furnaces (<0.3 MMBtu/hr)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

Table A.11 - OLED Boiler B-105 (TMP221490) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	1.8E-02	8.1E-02
CO	7.8E-03	3.4E-02
SO ₂	1.2E-04	5.2E-04
Filterable PM/PM ₁₀ /PM _{2.5}	3.7E-04	1.6E-03
Condensable PM	1.1E-03	4.9E-03
Total PM ₁₀ /PM _{2.5}	1.5E-03	6.5E-03
VOC	1.1E-03	4.7E-03
OC	1.1E-03	4.7E-03
Lead (Pb)	9.8E-08	4.3E-07
Hexane	3.5E-04	1.5E-03
Total HAP	3.7E-04	1.6E-03
CO ₂	-	102
CH ₄	-	1.9E-03
N ₂ O	-	1.9E-04
CO ₂ e ^c	-	103

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.12 - OLED Boiler B-106 (TMP221491) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.5 MMBtu/hr
Maximum Annual Heat Input Capacity	4,380 MMBtu/yr
Maximum Hourly Natural Gas Use	4.9E-04 MMscf/hr
Maximum Annual Natural Gas Use	4.29 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

Table A.12 - OLED Boiler B-106 (TMP221491) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	4.9E-02	0.21
CO	4.1E-02	0.18
SO ₂	2.9E-04	1.3E-03
Filterable PM/PM ₁₀ /PM _{2.5}	9.3E-04	4.1E-03
Condensable PM	2.8E-03	1.2E-02
Total PM ₁₀ /PM _{2.5}	3.7E-03	1.6E-02
VOC	2.7E-03	1.2E-02
OC	2.7E-03	1.2E-02
Lead (Pb)	2.5E-07	1.1E-06
Hexane	8.8E-04	3.9E-03
Total HAP	9.3E-04	4.1E-03
CO ₂	-	256
CH ₄	-	4.8E-03
N ₂ O	-	4.8E-04
CO ₂ e ^c	-	256

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.13 - OLED Boiler B-107 (TMP221492) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Hourly Heat Input Capacity	0.5 MMBtu/hr
Maximum Annual Heat Input Capacity	4,380 MMBtu/yr
Maximum Hourly Natural Gas Use	4.9E-04 MMscf/hr
Maximum Annual Natural Gas Use	4.29 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Potential Annual Hours of Operation	8,760 hr/yr

= Maximum Hourly Heat Input Capacity (MMBtu/hr) x Potential Operating Hours (hr/yr)
 = Maximum Hourly Heat Input Capacity (MMBtu/hr) / Natural Gas HHV (MMBtu/MMscf)
 = Maximum Annual Heat Input Capacity (MMBtu/yr) / Natural Gas HHV (MMBtu/MMscf)
 AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
 NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
OC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-1 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 Equivalent to VOC emissions
 AP-42, Section 1.4, Table 1.4-2 (7/98)
 AP-42, Section 1.4, Table 1.4-3 (7/98)
 AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-2 for natural gas
 40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1
 40 CFR 98, Subpart A, Table A-1

Table A.13 - OLED Boiler B-107 (TMP221492) Potential Emissions

POTENTIAL EMISSION CALCULATIONS

Natural Gas Combustion Emissions

Pollutant	Potential Emissions	
	(lb/hr) ^a	(tpy) ^b
NO _x	4.9E-02	0.21
CO	4.1E-02	0.18
SO ₂	2.9E-04	1.3E-03
Filterable PM/PM ₁₀ /PM _{2.5}	9.3E-04	4.1E-03
Condensable PM	2.8E-03	1.2E-02
Total PM ₁₀ /PM _{2.5}	3.7E-03	1.6E-02
VOC	2.7E-03	1.2E-02
OC	2.7E-03	1.2E-02
Lead (Pb)	2.5E-07	1.1E-06
Hexane	8.8E-04	3.9E-03
Total HAP	9.3E-04	4.1E-03
CO ₂	-	256
CH ₄	-	4.8E-03
N ₂ O	-	4.8E-04
CO ₂ e ^c	-	256

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMBtu/hr) x Pollutant EF (lb/MMBtu)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton),
All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

Table A.14 - North Plant Roadway and Parking Area (F010) Potential Emissions

$E = k (sL)^{0.91} (W)^{1.02} + C$	Hourly/Daily emission factor equation for Paved Roads, AP-42 Section 13.2.1, Equation 1 (January 2011). Equation 1 has been modified to add the C factors from the November 2006 edition of AP-42 into the empirical equation to account for emissions from tire wear, brake wear, and exhaust.
$E = [k (sL)^{0.91} (W)^{1.02}] (1-P/4N) + C$	Yearly emission factor equation for Paved Roads, AP-42 Section 13.2.1, Equation 2 (January 2011). Equation 2 has been modified to add the C factors from the November 2006 edition of AP-42 into the empirical equation to account for emissions from tire wear, brake wear, and exhaust.

VEHICLE TRAFFIC

Vehicle Type	Frequency (Trips/year)	Vehicle Type	Paved Road Length Ft	Weight (tons)
Employee personal vehicles & Silica Truck traffic	88,600	Personal and Truck	2,640	5
Employee personal vehicles	47,450	Personal and Truck	1,000	2

POTENTIAL PROCESS DATA

Average Vehicle Weight	4.5 tons	Weighted against vehicle miles travelled on paved roads
Total Vehicle Miles Travelled	53,287 VMT/yr	Sum of VMT for all vehicles entering and exiting facility on paved roads
Silt Loading (sL) Annual Average	0.60 g/m ²	AP-42 Section 13.2.1, Table 13.2.1-2 (1/2011) for ubiquitous baseline
Number of Days with at least 0.01" of Precipitation (P)	150 days	AP-42, Section 13.2.2, Figure 13.2.2-1

EMISSION PARAMETERS

Particle Size Multiplier (k) - PM	1.1E-02 lb/VMT	AP-42 Section 13.2.1, Table 13.2.1-1 (January 2011)
Particle Size Multiplier (k) - PM ₁₀	2.2E-03 lb/VMT	AP-42 Section 13.2.1, Table 13.2.1-1 (January 2011)
Particle Size Multiplier (k) - PM _{2.5}	5.4E-04 lb/VMT	AP-42 Section 13.2.1, Table 13.2.1-1 (January 2011)
Empirical Constant, a	0.91	AP-42 Section 13.2.1, Equation (1) (January 2011)
Empirical Constant, b	1.02	AP-42 Section 13.2.1, Equation (1) (January 2011)
Brake Wear and Tire Wear Factor (C) - PM/PM ₁₀	4.7E-04 lb/VMT	AP-42, Section 13.2.1, Table 13.2.1-2 (November 2006)
Brake Wear and Tire Wear Factor (C) - PM _{2.5}	3.6E-04 lb/VMT	AP-42, Section 13.2.1, Table 13.2.1-2 (November 2006)
Number of Days in the Averaging Period (N)	365 days	AP-42, Section 13.2.1 (11/2006)
PM Emission Factor Annual Average	2.9E-02 lb/VMT	$= k_{PM} (sL)^a * (W)^b * (1-P/4N) + C_{PM/PM10}$
PM ₁₀ Emission Factor Annual Average	6.2E-03 lb/VMT	$= k_{PM10} (sL)^a * (W)^b * (1-P/4N) + C_{PM/PM10}$
PM _{2.5} Emission Factor Annual Average	1.8E-03 lb/VMT	$= k_{PM2.5} (sL)^a * (W)^b * (1-P/4N) + C_{PM2.5}$

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	NIST SP1038
Length Conversion	5,280 ft/mile	
Time Conversion	8,760 hr/yr	
Time Conversion	365 day/yr	

POTENTIAL EMISSION CALCULATIONS

Pollutant	Potential Emissions (tpy) ^a
PM	0.78
PM ₁₀	0.17
PM _{2.5}	0.05

^a Emissions (tpy) = Vehicle Miles Travelled (VMT/yr) x Annual Emissions Factor (lb/VMT) / 2,000 (lb/ton),

Table A.15 - 32% HCl Loading Operations (J001) Potential Stack Emissions

DIMENSIONAL ANALYSIS

Volume Conversion	1,000 gal/Mgal	
Pressure Conversion	6.894757 kPa/psi	NIST SP1038
Pressure Conversion	0.1333224 kPa/mmHg	NIST SP1038
Mass Conversion	2,000 lb/ton	NIST SP1038

MATERIAL PARAMETERS & OPERATING RATES

Maximum Pump Rate	88 GPM	Single truck can be loaded at a time at 88 gal/min.
Maximum Hourly Loading	5.28 Mgal/hr	= Maximum Pump Rate (gpm) x 60 (min/hr) / 1,000 (gal/Mgal)
Maximum Daily Loading	126.72 Mgal/day	= Maximum Pump Rate (gpm) x 60 (min/hr) x 24 (hr/day) / 1,000 (gal/Mgal)
Average Annual Loading	46,253 Mgal/yr	= Maximum Pump Rate (gpm) x 60 (min/hr) x 24 (hr/day) x 365 (day/yr) / 1,000 (gal/Mgal)
Control Efficiency	99.0%	HCl MACT Requirement for Transfer Operations

EMISSION FACTOR

Molecular Weight (M)	36.5 lb/lbmol	Hydrogen Chloride Molecular Weight
Saturation Factor (S)	1.45	AP-42, Section 5.2, Table 5.2-1. for Splash loading in dedicated normal service
Daily Maximum Ambient Temperature	82.3 F	Meteorological Data from Akron, Ohio
Daily Maximum Ambient Temperature (T1)	542 R	NIST SP1038
Maximum True Vapor Pressure (P1)	0.77 psia	Table 2-10 Partial Pressures of HCl over Aqueous Solutions of HCl http://terpconnect.umd.edu/~nsw/chbe301/chap02.pdf
Loading Losses (L ₁₁)	0.93 lb/Mgal	Calculated according to Eqn. 1 of AP-42, Section 5.2 using the maximum true vapor pressure (P1) and daily maximum ambient temperature (T1)

POTENTIAL EMISSION CALCULATIONS

Pollutant	(lb/hr) ^a	(tons/yr) ^b
Hydrogen Chloride	0.05	0.22
Total HAPs ^c	-	0.22

^a Stack Emissions (lb/hr) = Hydrogen Chloride Throughput (Mgal/hr) x Daily Maximum Loading Losses L₁₁ (lb/Mgal) x [1 - Control Efficiency]

^b Stack Emissions (tpy) = Hydrogen Chloride Throughput (Mgal/yr) x Daily Maximum Loading Losses L₁₁ (lb/Mgal) x [1 - Control Efficiency] / 2,000 (lb/ton)

^c Assumes HAP Emissions (tpy) = Hydrogen Chloride Emissions (tpy)

Table A.16 - 32% HCl Loading Operations (J001) Potential Fugitive Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	NIST SP1038
Mass Conversion	0.454 kg/lb	NIST SP1038

SAFETY FACTOR

Safety Factor	1.1
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PROCESS INFORMATION

Leak Percent	1%	Conservative Estimate
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FUGITIVE COMPONENTS, FACTORS, AND EMISSIONS

Component	Service	Components in			Leak Duration (hr)	Leak Emission Factor ^b (kg/hr/source)	No-Leak Emission Factor ^b (kg/hr/source)	Leak Emission Factor (lb/hr/source)	No-Leak Emission Factor (lb/hr/source)	Annual Emissions ^c (tpy)
		Inorganic Service ^a	Leaking Components	Non-leaking Components						
Valves	Gas Vapor Service	3	1	2	744	0.0782	0.000131	1.72E-01	2.89E-04	0.07
	Light Liquid	13	1	12	744	0.0892	0.000165	1.97E-01	3.64E-04	0.08
	Heavy Liquid	-	-	-	-	0.00023	0.00023	5.07E-04	5.07E-04	-
Pump/Agitator Seals	Light Liquid	1	1	0	744	0.243	0.00187	5.36E-01	4.12E-03	0.20
	Heavy Liquid	-	-	-	-	0.216	0.0021	4.76E-01	4.63E-03	-
Compressor Seals	Gas Vapor Service	-	-	-	-	1.608	0.0894	3.55E+00	1.97E-01	-
Pressure Relief Valves	Gas Vapor Service	-	-	-	-	1.691	0.0447	3.73E+00	9.85E-02	-
Connectors	All	99	1	98	744	0.113	0.000081	2.49E-01	1.79E-04	0.12
Open-ended Lines	All	5	1	4	744	0.01195	0.0015	2.63E-02	3.31E-03	0.03

^a Component counts based on received received e-mail from David Warner at PPG. E-mail includes count for 2 instruments which are not included here: M:\CLIENTS\P-S\PPG\Barberton\193601.0068 - 2019 Onsite Support\28 NOV Response\HCl Loading Rack PTI\Client Supplied\Fwd_ HCL Loading Rack - Information Needed .msg

^b U.S. EPA Protocol for Equipment Leak Estimates (November 1995), Table 2-5. SOCMI Screening Emission Factors

Leak Emission Factor means >10,000 ppmv

No-leak Emission Factor means <10,000 ppmv

^c Annual Emissions (tpy) = [Number of Leaking Component x Leak Emission Factor (lb/source/hr) x Leak Duration (hr/yr) + Number of Non-leaking Component x No-Leak Emission Factor (lb/source/hr) x (8,760 - Leak Duration (hr/yr))] / 2,000 (lb/ton)

POTENTIAL EMISSION CALCULATIONS

Pollutant	(tons/yr)	
Hydrogen Chloride	0.50	= Σ [Annual Emissions from Components, (tpy)] Assumes Total HAPs = HCl
Total HAPs	0.50	

Table A.17 - Ventilation Hoods (P001) Potential Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	3.785 L/gal
Conversion Factor	2,000 lb/ton
Time Conversion	7 days/week
Time Conversion	365 days/yr

POTENTIAL PROCESS DATA

Number of Ventilation Hoods	5	<i>All ventilation hoods operate independently from one another</i>
Maximum Daily Solvent Usage (Total)	8 L/day	<i>Maximum daily solvent usage across all 5 ventilation hoods</i>
Maximum Daily Solvent Usage (Per Hood)	0.42 gal/day per hood	<i>= Maximum Daily Solvent Usage (L/day) / 3.785 (L/gal) / 5 Ventilation Hoods</i>
Maximum Weekly HAP Usage (Total)	1 L/week	<i>Maximum weekly solvent usage containing HAP (toluene) across all 5 ventilation hoods</i>
Maximum Daily HAP Usage (Per Hood)	7.5E-03 gal/day per hood	<i>= Maximum Weekly HAP Usage (L/week) / 7 (days/week) / 3.785 (L/gal) / 5 Ventilation Hoods</i>

POTENTIAL PROCESS DATA

Density of THF Solvent	7.43 lb/gal per hood	<i>THF is the primary solvent that is used in the ventilation hoods (specific gravity of 0.89)</i>
Concentration of VOC in Solvent	100% by weight	
Density of Toluene Solvent	7.18 % of lbs solvent	<i>Toluene is the only HAP that is used in the ventilation hoods (specific gravity of 0.86)</i>
Concentration of Toluene in Solvent	100% by weight	

POTENTIAL EMISSIONS PER HOOD

Daily VOC Emissions	3.14 lb/day	<i>= Maximum Daily Solvent Usage (gal/day) x Density of THF Solvent (lb/gal) x VOC Concentration (%)</i>
Daily Toluene Emissions	5.4E-02 lb/day	<i>= Maximum Daily Toluene Usage (gal/day) x Density of Toluene Solvent (lb/gal) x Toluene Concentration (%)</i>
Daily Total HAP Emissions	5.4E-02 lb/day	<i>Equivalent to toluene emissions</i>
Annual VOC Emissions	0.57 tpy	<i>= Daily VOC Emissions (lb/day) x 365 (days/yr) / 2,000 (lb/ton)</i>
Annual Toluene Emissions	9.9E-03 tpy	<i>= Daily Toluene Emissions (lb/day) x 365 (days/yr) / 2,000 (lb/ton)</i>
Annual Total HAP Emissions	9.9E-03 tpy	<i>Equivalent to toluene emissions</i>

TOTAL P001 POTENTIAL EMISSIONS

Annual VOC Emissions	2.86 tpy	<i>= Annual VOC Emissions per Hood (tpy) x 5 Ventilation Hoods</i>
Annual Toluene Emissions	4.9E-02 tpy	<i>= Annual Toluene Emissions per Hood (tpy) x 5 Ventilation Hoods</i>
Annual Total HAP Emissions	4.9E-02 tpy	<i>Equivalent to toluene emissions</i>

Table A.18 - LoVel 29 Unit (P034) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Rated Air Flow Rate	1,200 scfm
Particulate Emission Rate	0.03 gr/dscf
Potential Annual Hours of Operation	8,760 hr/yr

DIMENSIONAL ANALYSIS

Mass Conversion	7,000 gr/lb
Mass Conversion	2,000 lb/ton
Time Conversion	60 min/hr

POTENTIAL EMISSION CALCULATIONS

Total PM/PM ₁₀ /PM _{2.5} Emissions	1.35 tpy
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= Air Flow Rate (scfm) x Particulate EF (gr/dscf) / 7,000 (gr/lb) x 60 (min/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Table A.19 - Worst-Case OLED Batch Analysis (P070) & (P071) Potential Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lbs/ton
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WORST CASE BATCH EMISSIONS

Source of Emissions	Pollutant	Potential Emissions ^a	
		(lb/batch)	(tpy)
Process Vents (P070)	VOC	302.75	5.45
	Methanol	65.53	1.18
	2-Ethoxy Ethanol	0.27	4.9E-03
	Toluene	120.13	2.16
	Acetonitrile	58.13	1.05
	Total HAP	200.92	3.62
Process Vents (P071)	VOC	302.75	5.45
	Methanol	65.53	1.18
	2-Ethoxy Ethanol	0.27	4.9E-03
	Toluene	120.13	2.16
	Acetonitrile	58.13	1.05
	Total HAP	200.92	3.62
Process Vents (Total)	VOC		10.90
	Methanol		2.36
	2-Ethoxy Ethanol		9.7E-03
	Toluene		4.32
	Acetonitrile		2.09
	Total HAP		7.23
Equipment Leaks (P070)	VOC		20.78
	Methanol		3.14
	2-Ethoxy Ethanol		0.44
	Toluene		9.93
	Acetonitrile		5.60
	Total HAP		12.41
Equipment Leaks (P071)	VOC		3.72
	Methanol		0.57
	2-Ethoxy Ethanol		0.08
	Toluene		1.82
	Acetonitrile		1.06
	Total HAP		2.37
Equipment Leaks (Total)	VOC		24.50
	Methanol		3.71
	2-Ethoxy Ethanol		0.52
	Toluene		11.75
	Acetonitrile		6.66
	Total HAP		14.77

^a Process vent emissions are calculated based on the worst-case batch emissions (lb/batch) and the maximum of number of batches that can be produced in a year.

OPERATIONAL INFORMATION

Maximum Batches Per Year (Per OLED Cell)	36 batches
Maximum Batches Per Year (Combined P070/P071)	72 batches

Emission Unit ID	Equipment Description	Potential Emissions (tpy)						
		VOC ^a	Methanol	Toluene	Acetonitrile	2-Ethoxy Ethanol	Total HAP	PM/PM ₁₀ / PM _{2.5}
P070	OLED Cell #1	39.9	4.32	12.10	6.65	0.44	16.02	0.001
P071	OLED Cell #2		1.75	3.98	2.11	0.08	5.98	

^a Synthetic minor limit of 39.9 tpy VOC established for process emissions and LDAR emissions from units P070, P071, and P123.

Table A.20 - LDAR (P070) & (P071) Potential Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lbs/ton	NIST SP1038
Mass Conversion	0.4536 kg/lb	
Time Conversion	8,760 hr/yr	

LDAR VOC COMPOSITION - MON MACT COMPONENTS^a

Methanol	21.6% by weight
Toluene	75.1% by weight
Acetonitrile	42.7% by weight
2-Ethoxy Ethanol	2.1% by weight
Total HAP	98.8% by weight

^a The HAP composition for LDAR components that are regulated under the MON has been estimated based the total quantity of each VOC-containing material which is charged in the worst-case batch scenario.

LDAR VOC COMPOSITION - NON-MON MACT COMPONENTS^a

Methanol	4.9% by weight
Toluene	4.9% by weight
Acetonitrile	4.9% by weight
2-Ethoxy Ethanol	2.1% by weight
Total HAP	4.9% by weight

^a Components that are not regulated by the MON have < 5% organic HAP in the process fluid. As such, the calculations conservatively 4.9% of toluene, methanol, or acetonitrile in these components.

P070 EMISSION CALCULATIONS

Component	Service	SOCMI Average Emission Factor ^a		Component Counts ^b	Control Efficiency (%) ^c	Potential Emissions (tpy) ^d					
		(kg/hr-source)	(lb/hr-source)			VOC	Methanol	Toluene	Acetonitrile	2-Ethoxy Ethanol	Total HAP
Valves (MON MACT)	Gas/Vapor	0.00597	0.01316	39	92%	0.18	0.04	0.14	0.08	3.8E-03	0.18
	Light Liquid	0.00403	0.00888	105	88%	0.49	0.11	0.37	0.21	1.0E-02	0.48
	Heavy Liquid	0.00023	0.00051	-							
Valves (Non-MON MACT)	Gas/Vapor	0.00597	0.01316	13	0%	0.75	0.04	0.04	0.04	1.6E-02	0.04
	Light Liquid	0.00403	0.00888	57	0%	2.22	0.11	0.11	0.11	4.7E-02	0.11
	Heavy Liquid	0.00023	0.00051	-							
Connectors (MON MACT)	All	0.00183	0.00403	796	93%	0.98	0.21	0.74	0.42	2.1E-02	0.97
Connectors (Non-MON MACT)	All	0.00183	0.00403	289	0%	5.11	0.25	0.25	0.25	0.11	0.25
Pump seals (MON MACT)	Light Liquid	0.0199	0.0439	4	75%	0.19	0.04	0.14	0.08	4.0E-03	0.19
	Heavy Liquid	0.00862	0.01900	-							
Pump seals (Non-MON MACT)	Light Liquid	0.0199	0.0439	3	0%	0.58	0.03	2.8E-02	2.8E-02	1.2E-02	2.8E-02
	Heavy Liquid	0.00862	0.01900	-							
Agitator Seals (MON MACT)	Light Liquid	0.0199	0.0439	5	75%	0.24	0.05	0.18	0.10	5.1E-03	0.24
	Heavy Liquid	0.00862	0.01900	-							
Pressure Relief Valves (PRV)	All	0.104	0.229	10	0%	10.04	2.17	7.54	4.29	0.21	9.92
Total:						20.78	3.04	9.53	5.60	0.44	12.41

^a SOCMI average emission factors from Table 2-1 of EPA Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, November 1995.

^b Component counts include a 10% safety factor in order to account for day-to-day LDAR changes that are inherent to chemical processing plants.

^c HON-equivalent LDAR control efficiencies from Table 5-2 of EPA Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, November 1995. While PPG performs Method 21 monitoring on components which are not subject to the MON (e.g., less than 5% organic HAP), the HON-equivalent control efficiencies are applied only for the components which are specifically regulated under the MON. The pump control efficiency is also applied to agitators.

^d Component VOC Emissions (tpy) = Component Count x VOC EF (lb/hr-component) x [1 - Control Efficiency (%)] x 8,760 (hr/yr) / 2,000 (lb/ton)

MON MACT Component HAP Emissions (tpy) = VOC Emissions (tpy) x MON MACT Component HAP Composition (%)

Non-MON MACT Component HAP Emissions (tpy) = VOC Emissions (tpy) x Non-MON MACT Component HAP Composition (%)

Table A.20 - LDAR (P070) & (P071) Potential Emissions

P071 EMISSION CALCULATIONS

Component	Service	SOCMI Average Emission Factor ^a		Component Counts ^b	Control Efficiency (%) ^c	Potential Emissions (tpy) ^d					
		(kg/hr-source)	(lb/hr-source)			VOC ^e	Methanol	Toluene	Acetonitrile	2-Ethoxy Ethanol	Total HAP
Valves (MON MACT)	Gas/Vapor	0.00597	0.01316	41	92%	0.19	0.04	0.14	0.08	4.0E-03	0.19
	Light Liquid	0.00403	0.00888	113	88%	0.53	0.11	0.40	0.23	1.1E-02	0.52
	Heavy Liquid	0.00023	0.00051	-							
Valves (Non-MON MACT)	Gas/Vapor	0.00597	0.01316	-							
	Light Liquid	0.00403	0.00888	8	0%	0.31	0.02	0.02	0.02	6.6E-03	0.02
	Heavy Liquid	0.00023	0.00051	-							
Connectors (MON MACT)	All	0.00183	0.00403	798	93%	0.99	0.21	0.74	0.42	2.1E-02	0.98
Connectors (Non-MON MACT)	All	0.00183	0.00403	61	0%	1.08	0.05	0.05	0.05	2.3E-02	0.05
Pump seals (MON MACT)	Light Liquid	0.0199	0.0439	6	75%	0.29	0.06	0.22	0.12	6.1E-03	0.28
	Heavy Liquid	0.00862	0.01900	-							
Pump seals (Non-MON MACT)	Light Liquid	0.0199	0.0439	-							
	Heavy Liquid	0.00862	0.01900	-							
Agitator Seals (MON MACT)	Light Liquid	0.0199	0.0439	7	75%	0.34	0.07	0.25	0.14	7.1E-03	0.33
	Heavy Liquid	0.00862	0.01900	-							
Pressure Relief Valves (PRV)	All	0.104	0.229	-							
Total:						3.72	0.57	1.82	1.06	7.8E-02	2.37

^a SOCMI average emission factors from Table 2-1 of EPA Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, November 1995.

^b Component counts include a 10% safety factor in order to account for day-to-day LDAR changes that are inherent to chemical processing plants.

^c HON-equivalent LDAR control efficiencies from Table 5-2 of EPA Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, November 1995. While PPG performs Method 21 monitoring on components which are not subject to the MON (e.g., less than 5% organic HAP), the HON-equivalent control efficiencies are applied only for the components which are specifically regulated under the MON. The pump control efficiency is also applied to agitators.

^d Component VOC Emissions (tpy) = Component Count x VOC EF (lb/hr-component) x [1 - Control Efficiency (%)] x 8,760 (hr/yr) / 2,000 (lb/ton)
 MON MACT Component HAP Emissions (tpy) = VOC Emissions (tpy) x MON MACT Component HAP Composition (%)
 Non-MON MACT Component HAP Emissions (tpy) = VOC Emissions (tpy) x Non-MON MACT Component HAP Composition (%)

^e Synthetic minor limit of 39.9 tpy VOC established for process emissions and LDAR emissions from units P070, P071, and P123.

Table A.21 - #1 LoVel 27 Unit (P104) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Rated Air Flow Rate	2,000 scfm
Particulate Emission Rate	0.05 gr/dscf
Potential Annual Hours of Operation	8,760 hr/yr

DIMENSIONAL ANALYSIS

Mass Conversion	7,000 gr/lb
Mass Conversion	2,000 lb/ton
Time Conversion	60 min/hr

POTENTIAL EMISSION CALCULATIONS

Total PM/PM ₁₀ /PM _{2.5} Emissions	3.75 tpy
--	----------

= Air Flow Rate (scfm) x Particulate EF (gr/dscf) / 7,000 (gr/lb) x 60 (min/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Table A.22 - LoVel Feed System (P105) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Rated Air Flow Rate	2,000 scfm
Particulate Emission Rate	0.05 gr/dscf
Potential Annual Hours of Operation	8,760 hr/yr

DIMENSIONAL ANALYSIS

Mass Conversion	7,000 gr/lb
Mass Conversion	2,000 lb/ton
Time Conversion	60 min/hr

POTENTIAL EMISSION CALCULATIONS

Total PM/PM ₁₀ /PM _{2.5} Emissions	3.75 tpy
--	----------

= Air Flow Rate (scfm) x Particulate EF (gr/dscf) / 7,000 (gr/lb) x 60 (min/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Table A.23 Worst-Case OLED Batch Analysis (P123) Potential Emissions

EMISSIONS PER BATCH (THF AS SOLVENT)

Process Step	Emissions (lb/batch) ^a			
	VOC	Methanol	Toluene	Total HAP
Dimer Reaction	0.67	--	--	--
Crude Reaction	9.25	9.25	--	9.25
Column/Distillation	149.94	10.61	--	10.61
Thermal Equilibrium	24.21	8.70	--	8.70
Total	184.07	28.56	--	28.56

^a Emissions calculated using Mitchell Scientific, Inc. Emission Master[®] software.

EMISSIONS PER BATCH (TOLUENE AS SOLVENT)

Process Step	Emissions (lb/batch) ^a			
	VOC	Methanol	Toluene	Total HAP
Dimer Reaction	0.67	--	--	--
Crude Reaction	9.25	9.25	--	9.25
Column/Distillation	47.16	10.64	36.51	47.16
Thermal Equilibrium	9.86	4.54	5.32	9.86
Total	66.93	24.43	41.84	66.27

^a Emissions calculated using Mitchell Scientific, Inc. Emission Master[®] software.

WORST CASE BATCH EMISSIONS

Source of Emissions	Pollutant	Emissions	
		(lb/batch)	(tpy)
Process Vents	VOC	184.07	15.83
	Methanol	28.56	2.46
	Toluene	41.84	3.60
	Total HAP	66.27	5.70
Equipment Leaks	VOC		3.07
	Methanol		0.85
	Toluene		1.08
	Total HAP		1.88
Raw/Staging Material Tanks	VOC		1.30
	Methanol		3.2E-03
	Toluene		0.13
	Total HAP		0.13

OPERATIONAL INFORMATION

Maximum Batches Per Year	172 batches
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Emission Unit ID	Equipment Description	Potential Emissions (tpy)				
		VOC ^a	Methanol	Toluene	Total HAP	PM/PM ₁₀ /P M _{2.5}
P123	OLED Cell #3	39.9	3.31	4.67	7.58	0.001

^a Synthetic minor limit of 39.9 tpy VOC established for process emissions and LDAR emissions from units P070, P071, and P123.

Table A.24 - OLED CELL #3 LDAR (P123) Potential Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lbs/ton	NIST SP1038
Mass Conversion	0.4536 kg/lb	
Time Conversion	8,760 hr/yr	

LDAR VOC COMPOSITION - MON MACT COMPONENTS^a

Methanol	38.5% by weight
Toluene	49.2% by weight
Total HAP	87.8% by weight

^a The HAP composition for LDAR components that are regulated under the MON has been estimated based the total quantity of each VOC-containing material which is charged in the worst-case batch scenario.

LDAR VOC COMPOSITION - NON-MON MACT COMPONENTS^a

Methanol	4.9% by weight
Toluene	4.9% by weight
Total HAP	4.9% by weight

^a Components that are not regulated by the MON have < 5% organic HAP in the process fluid. As such, the calculations conservatively 4.9% of toluene or methanol in these components.

OLED CELL #3 EMISSION CALCULATIONS

Component	Service	SOCMI Average Emission Factor ^a		Component Counts ^b	Control Efficiency (%) ^c	Potential Emissions (tpy) ^d			
		(kg/hr-source)	(lb/hr-source)			VOC ^e	Methanol	Toluene	Total HAP
Valves (MON MACT)	Gas/Vapor	0.00597	0.01316	44	92%	0.20	0.08	0.10	0.18
	Light Liquid	0.00403	0.00888	82	88%	0.38	0.15	0.19	0.34
	Heavy Liquid	0.00023	0.00051	-					
Valves (Non-MON MACT)	Gas/Vapor	0.00597	0.01316	-					
	Light Liquid	0.00403	0.00888	8	0%	0.31	0.02	0.02	0.02
	Heavy Liquid	0.00023	0.00051	-					
Connectors (MON MACT)	All	0.00183	0.00403	748	93%	0.93	0.36	0.46	0.81
Connectors (Non-MON MACT)	All	0.00183	0.00403	38	0%	0.67	0.03	0.03	0.03
Pump seals (MON MACT)	Light Liquid	0.0199	0.0439	8	75%	0.38	0.15	0.19	0.34
	Heavy Liquid	0.00862	0.01900	-					
Pump seals (Non-MON MACT)	Light Liquid	0.0199	0.0439	-					
	Heavy Liquid	0.00862	0.01900	-					
Agitator Seals (MON MACT)	Light Liquid	0.0199	0.0439	4	75%	0.19	0.07	0.09	0.17
	Heavy Liquid	0.00862	0.01900	-					
Pressure Relief Valves (PRV)	All	0.104	0.229	-					
Total:						3.07	0.85	1.08	1.88

^a SOCMI average emission factors from Table 2-1 of EPA Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, November 1995.

^b Component counts include a 10% safety factor in order to account for day-to-day LDAR changes that are inherent to chemical processing plants.

^c HON-equivalent LDAR control efficiencies from Table 5-2 of EPA Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, November 1995. While PPG performs Method 21 monitoring on components which are not subject to the MON (e.g., less than 5% organic HAP), the HON-equivalent control efficiencies are applied only for the components which are specifically regulated under the MON. The pump control efficiency is also applied to agitators.

^d Component VOC Emissions (tpy) = Component Count x VOC EF (lb/hr-component) x [1 - Control Efficiency (%)] x 8,760 (hr/yr) / 2,000 (lb/ton)

MON MACT Component HAP Emissions (tpy) = VOC Emissions (tpy) x MON MACT Component HAP Composition (%)

Non-MON MACT Component HAP Emissions (tpy) = VOC Emissions (tpy) x Non-MON MACT Component HAP Composition (%)

^e Synthetic minor limit of 39.9 tpy VOC established for process emissions and LDAR emissions from units P070, P071, and P123.

Table A.25 - Multipurpose Plant Cooling Tower (P124) Potential Emissions

PROCESS DATA

Total P124 Flow Rate	850 gpm	Based on cooling tower capacity and assumed one cycle per minute
Uncontrolled Drift Loss	1.7 lb/1,000 gal	AP-42, Section 13.4, Table 13.4-1
Drift Loss with Eliminator	0.005 %	Industry standard for standard cooling towers
Maximum Conductivity	1,600 μ S/cm	Conductivity setpoint which triggers cooling tower blowdowns to reduce TDS

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton
Time Conversion	60 min/hr
Time Conversion	8,760 hr/yr
Time Conversion	24 hr/day
Mass Conversion	1,000 mg/g
Mass Conversion	453.59 g/lb
Volume Conversion	3.785 L/gal

TDS EMISSION FACTORS

Total Dissolved Solids (TDS) ^a	1,024 mg/L	= Maximum Conductivity (μ S/cm) x 640 / 10^3 [(μ S/cm) / (dS/m)]
Total Dissolved Solids (TDS)	8.5E-03 lb/gal	= TDS (mg/L) / 1,000 (mg/g) / 453.59 (g/lb) x 3.785 (L/gal)

^a Conversion is based on Equation 16-1 on page 1145 of Wastewater Engineering, Metcalf and Eddy.

POTENTIAL EMISSIONS

Uncontrolled Emissions

Total PM/PM ₁₀ /PM _{2.5} Emissions	0.09 lb/hr	= Uncontrolled Drift Loss (lb/1,000 gal) / 1,000 x Total Flow Rate (gpm) x 60 (min/hr) / Density of water (8.345 lb/gal) x TDS (lb/gal)
Total PM/PM ₁₀ /PM _{2.5} Emissions	2.13 lb/day	= Hourly PM Emission Rate (lb/hr) x 24 (hr/day)
Total PM/PM ₁₀ /PM _{2.5} Emissions	0.39 tpy	= Hourly PM Emission Rate (lb/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Controlled Emissions

Total PM/PM ₁₀ /PM _{2.5} Emissions	2.2E-02 lb/hr	= Drift Loss (%) x Maximum Conductivity TDS Content (lb/gal) x Total Flow Rate (gpm) x 60 (min/hr)
Total PM/PM ₁₀ /PM _{2.5} Emissions	0.52 lb/day	= Hourly PM Emission Rate (lb/hr) x 24 (hr/day)
Total PM/PM ₁₀ /PM _{2.5} Emissions	9.5E-02 tpy	= Hourly PM Emission Rate (lb/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Table A.26 - Sublimation Summary (P125) Potential Emissions

SUBLIMATION SUMMARY

Emission Unit ID Process Description		Allowable Emissions (tpy)		
		OC	VOC	HAP
TMP213963	Sublimation Process	0.12	0.12	0.12
	Cleaning	20.13	-	-
Project Total Emissions		20.25	0.12	0.12
NANSR Significant Emission Rate (SER)		--	40	--
Trigger NANSR?		--	No	--

Table A.27 - Sublimation Process (P125) Potential Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	NIST SP1038
Mass Conversion	1,000 gr/Kg	
Mass Conversion	0.4535924 Kg/lb	
Time Conversion	24 hr/day	

PROCESS INFORMATION

OLED Loading per Cycle	1,200 grams/cycle
Maximum Residual Toluene Content	0.50%
Shortest Cycle Time	6 hours/cycle
Number of Sublimators	12
Maximum Operating Hours	8760 hr/yr

POTENTIAL EMISSION CALCULATIONS - SUBLIMATION PROCESS

Pollutant	(tpy)
VOC ^a	0.12
OC ^b	0.12
Total HAPs (Toluene) ^c	0.12

^a VOC Emissions (tpy) = Number of Sublimators (12) x [OLED Loading (Gram/Cycle) / 6 (Hours/Cycle) / 1000 (Gram/Kilogram) / 0.4536 (Kilogram/Pound) x 0.50% (Toluene Content)] x 8,760 (hr/yr) / 2,000 (lb/ton)

^b OC Emissions (tpy) = VOC Emissions (tpy)

^c Total HAP Emissions (tpy) = VOC Emissions (tpy)

Table A.28 - Sublimation Cleaning (P125) Potential Emissions

DIMENSIONAL ANALYSIS

Mass Conversion	1,000 gr/Kg	NIST SP1038
Mass Conversion	0.45359237 Kg/lb	
Mass Conversion	2,000 lb/ton	

CHEMICAL USAGE INFORMATION

Acetone Wipes Used per Cleaning	75 wipes/cleaning	= Acetone Wipes Used per Cleaning (wipes/cleaning) x Grams Acetone per Wipe (grams/wipe)
Grams Acetone per Wipe	13.9 grams/wipe	
Acetone Usage per Cleaning (Grams)	1,042.5 grams/cycle	
Cycles per Day	4 cycles/day	
Number of Sublimators	12	
Maximum Operating Days	365 days/yr	

POTENTIAL EMISSION CALCULATIONS - CLEANING

Pollutant	(tpy)
VOC ^a	N/A
OC ^b	20.13
Total HAPs ^c	N/A

^a Acetone is not a VOC

^b OC Emissions (tpy) = Number of Sublimators (12) x [Acetone Usage per Cleaning (grams/cleaning cycle) x 4 (Cycles/Day) / 1000 (Grams/Kilogram) / 0.4535 (Kilogram/Pound)] x 365 (days/yr) / 2,000 (lb/ton)

^c Acetone is not a HAP.

Table A.29 - Netzsch Fluidized Jet Mill (P126) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Rated Air Flow Rate	800 scfm
Particulate Emission Rate	0.05 gr/dscf
Potential Annual Hours of Operation	8,760 hr/yr

DIMENSIONAL ANALYSIS

Mass Conversion	7,000 gr/lb
Mass Conversion	2,000 lb/ton
Time Conversion	60 min/hr

POTENTIAL EMISSION CALCULATIONS

Total PM/PM ₁₀ /PM _{2.5} Emissions	1.50 tpy
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= Air Flow Rate (scfm) x Particulate EF (gr/dscf) / 7,000 (gr/lb) x 60 (min/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Table A.30 - FIBC Packaging System (P901) Potential Emissions

POTENTIAL PROCESS DATA

Maximum Rated Air Flow Rate	2,500 scfm
Particulate Emission Rate	0.01 gr/dscf
Potential Annual Hours of Operation	8,760 hr/yr

DIMENSIONAL ANALYSIS

Mass Conversion	7,000 gr/lb
Mass Conversion	2,000 lb/ton
Time Conversion	60 min/hr

POTENTIAL EMISSION CALCULATIONS

Total PM/PM ₁₀ /PM _{2.5} Emissions	0.94 tpy
--	----------

= Air Flow Rate (scfm) x Particulate EF (gr/dscf) / 7,000 (gr/lb) x 60 (min/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)

Table A.31 - Waste Toluene Loading (TMP221783) Potential Emissions

Loading Loss Equation, AP-42, Section 5.2.2.1.1 (June 2008)

$$LL = 12.46 \times SPM / (T_R)$$

where:

LL = Loading Losses (lb/Mgal Loaded)

S = saturation factor from AP-42 Table 5.2-1

P = true vapor pressure of liquid (psia)

M = molecular weight of vapors (lb/lbmole)

T_R = temperature of liquid loaded, °R

DIMENSIONAL ANALYSIS

Volume Conversion	1,000 gal/Mgal
Mass Conversion	2,000 lb/ton
Length Conversion	12 in/ft
Time Conversion	365 days/yr

MATERIAL PARAMETERS & OPERATING RATES

Toluene Molecular Weight (M)	92.14 lb/lbmol
Saturation Factor (S)	0.60
Temperature of Loaded Toluene	68.0 °F
Temperature of Loaded Toluene (T)	528 °R
Loaded Toluene Maximum True Vapor Pressure	21.9 mmHg
Loaded Toluene Maximum True Vapor Pressure (P)	0.42 psia
Loading Losses (LL)	0.55 lb/Mgal
Hose Diameter	2 inches
Hose Length	30 feet
Vapor Saturation	100 %
Toluene Vapor Density	0.24 lb/ft ³
Number of Blowdowns	2 per day
Volume of Hose	0.65 ft ³
Maximum Daily Waste Tank Loading	10,000 gal/day
Maximum Daily Waste Tank Loading	10.00 Mgal/day
Maximum Waste Tank Loading	3,650 Mgal/yr
Carbon Capture System Efficiency	99% by weight

NIST Chemistry WebBook; <https://webbook.nist.gov/cgi/cbook.cgi?Name=toluene&Units=SI>

AP-42, Section 5.2, Table 5.2-1 for submerged loading in dedicated normal service

Normal temperature and pressure conditions, https://www.engineeringtoolbox.com/stp-standard-ntp-normal-air-d_772.html

Temperature converted from Fahrenheit to Rankine

CHEMCAD chemical database

Pressure converted from mmHg to psia

Calculated according to Eqn. 1 of AP-42, Section 5.2

Assumed

Calculated according to the ideal gas law

Two (2) trucks would be needed to empty the waste toluene tank

$= (\text{Hose Diameter (in)} / 12 \text{ (in/ft)} / 2)^2 \times \pi \times \text{Hose Length (ft)}$

Assumes the entire 10,000-gallon waste toluene tank is unloaded in a single day

$= \text{Maximum Daily Loading (gal/day)} / 1,000 \text{ (gal/Mgal)}$

$= \text{Maximum Daily Loading (Mgal/day)} \times 365 \text{ (days/yr)}$

Assumed

LOADING POTENTIAL EMISSIONS WITHOUT COLLECTION/CONTROL EFFICIENCY

Daily VOC Emissions from Truck Loading	0.06 lb/day
Daily Hose Blowdown VOC Emissions	0.31 lb/day
Total Daily VOC Emissions (lb/day)	0.37 lb/day
Annual VOC Emissions from Truck Loading	0.01 tpy
Annual Hose Blowdown VOC Emissions	0.06 tpy
Total Annual VOC Emissions	0.07 tpy

$= \text{Maximum Daily Loading (Mgal/day)} \times \text{Loading Losses (lb/Mgal)} \times [1 - \text{Capture Efficiency (\%)}]$

$= \text{Toluene Vapor Density} \times \text{Vapor Saturation (\%)} \times \text{Volume of Hose (lb/ft}^3) \times \text{Number of Blowdowns (blowdowns/day)}$

$= \text{Daily Tank Loading Emissions (lb/day)} + \text{Daily Hose Blowdown Emissions (lb/day)}$

$= \text{Maximum Annual Loading (Mgal/yr)} \times \text{Loading Losses (lb/Mgal)} / 2,000 \text{ (lb/ton)} \times [1 - \text{Capture Efficiency (\%)}]$

$= \text{Daily VOC Emissions (lb/day)} \times 365 \text{ (days/yr)} / 2000 \text{ (lb/ton)}$

$= \text{Annual Tank Loading VOC Emissions (tpy)} + \text{Annual Hose Blowdown VOC Emissions (tpy)}$

Table A.32 Waste Tetrahydrofuran Loading (TMP221784) Potential Emissions

Loading Loss Equation, AP-42, Section 5.2.2.1.1 (June 2008)

$$LL = 12.46 \times SPM / (T_R)$$

where:

LL = Loading Losses (lb/Mgal Loaded)

S = saturation factor from AP-42 Table 5.2-1

P = true vapor pressure of liquid (psia)

M = molecular weight of vapors (lb/lbmole)

T_R = temperature of liquid loaded, °R

DIMENSIONAL ANALYSIS

Volume Conversion	1,000 gal/Mgal
Mass Conversion	2,000 lb/ton
Length Conversion	12 in/ft
Time Conversion	365 days/yr

MATERIAL PARAMETERS & OPERATING RATES

THF Molecular Weight (M)	72.1 lb/lbmol
Saturation Factor (S)	0.60
Temperature of Loaded THF	68.0 °F
Temperature of Loaded THF (T)	528 °R
Loaded THF Maximum True Vapor Pressure	17 kPa
Loaded THF Maximum True Vapor Pressure (P)	2.51 psia
Loading Losses (LL)	2.56 lb/Mgal
Hose Diameter	2 inches
Hose Length	30 feet
Vapor Saturation	100 %
THF Vapor Density	0.19 lb/ft ³
Number of Blowdowns	2 per day
Volume of Hose	0.65 ft ³
Maximum Daily Waste Tank Loading	10,000 gal/day
Maximum Daily Waste Tank Loading	10.00 Mgal/day
Maximum Annual Waste Tank Loading	3,650 Mgal/yr
Carbon Capture System Efficiency	99% by weight

NIST Chemistry WebBook; <https://webbook.nist.gov/cgi/cbook.cgi?Name=Isopropanol&Units=SI>

AP-42, Section 5.2, Table 5.2-1 for submerged loading in dedicated normal service

Normal temperature and pressure conditions, https://www.engineeringtoolbox.com/stp-standard-ntp-normal-air-d_772.html

Temperature converted from Fahrenheit to Rankine

CHEMCAD Chemical Database

Pressure converted from kPa to psia

Calculated according to Eqn. 1 of AP-42, Section 5.2

Assumed

Calculated according to the ideal gas law

Two (2) trucks would be needed to empty the waste THF tank

$= (\text{Hose Diameter (in)} / 12 \text{ (in/ft)} / 2)^2 \times \pi \times \text{Hose Length (ft)}$

Assumes the entire 10,000-gallon waste THF tank is unloaded in a single day

$= \text{Maximum Daily Loading (gal/day)} / 1,000 \text{ (gal/Mgal)}$

$= \text{Maximum Daily Loading (Mgal/day)} \times 365 \text{ (days/yr)}$

Assumed

LOADING POTENTIAL EMISSIONS WITHOUT COLLECTION/CONTROL EFFICIENCY

Daily VOC Emissions from Truck Loading	0.26 lb/day
Daily Hose Blowdown VOC Emissions	0.24 lb/day
Total Daily VOC Emissions (lb/day)	0.50 lb/day
Annual VOC Emissions from Truck Loading	0.05 tpy
Annual Hose Blowdown VOC Emissions	0.04 tpy
Total Annual VOC Emissions	0.09 tpy

$= \text{Maximum Daily Loading (Mgal/day)} \times \text{Loading Losses (lb/Mgal)} \times [1 - \text{Capture Efficiency (\%)}]$

$= \text{THF Vapor Density (lb/ft}^3) \times \text{Vapor Saturation (\%)} \times \text{Volume of Hose (lb/ft}^3) \times \text{Number of Blowdowns (blowdowns/day)}$

$= \text{Daily Tank Loading Emissions (lb/day)} + \text{Daily Hose Blowdown Emissions (lb/day)}$

$= \text{Maximum Annual Loading (Mgal/yr)} \times \text{Loading Losses (lb/Mgal)} / 2,000 \text{ (lb/ton)} \times [1 - \text{Capture Efficiency (\%)}]$

$= \text{Daily VOC Emissions (lb/day)} \times 365 \text{ (days/yr)} / 2000 \text{ (lb/ton)}$

$= \text{Annual Tank Loading VOC Emissions (tpy)} + \text{Annual Hose Blowdown VOC Emissions (tpy)}$

Table A.33 - OLED Storage Tanks (T073, T074, T075, & T076) Potential Emissions

OPERATIONAL INFORMATION

Maximum Batches Per Year	172 batches
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UNIT CONVERSIONS

Mass Conversion	453.592 g/lb
Mass Conversion	2,000 lb/ton
Volume Conversion	3,785 ml/gal

MAXIMUM CHEMICAL USAGE

Chemical Name	Material Charged (lb/batch)	Density (lb/gal)
2-Ethoxyethanol	300	6.95
DI Water	293	8.35
Toluene	1,910	7.23
Tetrahydrofuran	1,960	7.42
Methanol	1,490	6.61
Ethanol	174	6.61

TANK PARAMETERS & OPERATING RATES

Tank ID	Description	Tank Type	Material Stored	Capacity	Current Maximum Annual Throughput ^a (gal/yr)	Throughput Increase Due to Project ^b (gal/yr)	New Maximum Annual Throughput ^a (gal/yr)	Turnovers ^{c,d} (n/year)
T073	THF	Fixed	THF	10,000	223,000	45,429	268,429	26.8
T075	THF Staging	Fixed	THF, Ethanol, Methanol	10,000	227,680	88,759	316,439	31.6
T074	Toluene	Fixed	Toluene	10,000	47,000	45,457	92,457	9.2
T076	Toluene Staging	Fixed	Toluene, Heptane	10,000	47,600	45,457	93,057	9.3

^a Current Maximum annual throughput for the OLED-related storage tanks, as presented in PTI Application A0064117 (submitted July 9, 2019).

^b 100% of throughput increase of toluene and tetrahydrofuran related to OLED Cell #3 were attributed to the raw material tanks.

^c Turnovers (n/yr) = Annual Throughput (gal/yr) / Capacity (gal)

TANK EMISSIONS

Chemical Name	Storage Tank Emissions (tpy)			
	T073	T075	T074	T076
Toluene	-	-	6.5E-02	6.5E-02
Tetrahydrofuran	0.59	0.57	-	-
Methanol	-	3.2E-03	-	-
Ethanol	-	1.9E-03	-	-
Heptane	-	-	-	1.2E-03
Total VOC	0.59	0.58	6.5E-02	6.6E-02
Total HAP	-	3.2E-03	6.5E-02	6.5E-02

Table A.34 - 200,000 Gallons HCl Tank - T-195 (T032) Potential Emissions

TANKESP™ INPUT PARAMETERS

Ohio EPA EU ID	T032	Maximum total HCl production from 2017-2021 with a 2x safety factor
Tank Type	VFR	
Chemical Name	32% HCl	
Maximum Throughput	5,500,000 gallons/yr	
Shell Height	38 ft	
Shell Diameter	30 ft	
Is the Tank Underground?	No	
Is the Tank Insulated?	No	
Is the Tank Heated?	No	
Meteorological Data	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	NIST SP1038
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TANKESP™ PROGRAM OUTPUT INFORMATION

Month	Month Calendar Days (days/month)	Standing Losses (lb) ^a	Working Losses (lb) ^a	Total Losses (lb) ^b	Total Losses (lb/day) ^c
January	31	5.31	39.62	44.94	1.45
February	28	6.28	39.70	45.99	1.64
March	31	12.72	63.35	76.06	2.45
April	30	23.73	99.32	123.05	4.10
May	31	36.01	147.14	183.15	5.91
June	30	47.06	198.49	245.55	8.19
July	31	54.07	231.24	285.31	9.20
August	31	48.70	220.16	268.86	8.67
September	30	34.33	161.72	196.05	6.54
October	31	20.19	107.96	128.15	4.13
November	30	9.68	68.62	78.30	2.61
December	31	5.49	46.50	51.99	1.68
Annual	365	303.58	1424	1727	N/A

^a Standing and Working Losses (lb) from TankESP™

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Total Losses (lb/day) = Total Losses (lb/month) / Month Calendar Days (days/month)

POTENTIAL EMISSIONS

Pollutant	Potential Emissions	
	(lb/day) ^a	(tpy) ^b
HCl	9.20	0.86
Total HAP	9.20	0.86

^a Potential HCl and Total HAP Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential HCl and Total HAP Emissions (tpy) = Σ [Total Losses (lb/month_i)] / 2000 (lb/ton)

Table A.35 - 200,000 Gallons HCl Tank - T-194 (T033) Potential Emissions

TANKESP™ INPUT PARAMETERS

Ohio EPA EU ID	T033	Maximum total HCl production from 2017-2021 with a 2x safety factor
Tank Type	VFR	
Chemical Name	32% HCl	
Maximum Throughput	5,500,000 gallons/yr	
Shell Height	38 ft	
Shell Diameter	30 ft	
Is the Tank Underground?	No	
Is the Tank Insulated?	No	
Is the Tank Heated?	No	
Meteorological Data	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	NIST SP1038
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TANKESP™ PROGRAM OUTPUT INFORMATION

Month	Month Calendar Days (days/month)	Standing Losses (lb) ^a	Working Losses (lb) ^a	Total Losses (lb) ^b	Total Losses (lb/day) ^c
January	31	5.31	39.62	44.94	1.45
February	28	6.28	39.70	45.99	1.64
March	31	12.72	63.35	76.06	2.45
April	30	23.73	99.32	123.05	4.10
May	31	36.01	147.14	183.15	5.91
June	30	47.06	198.49	245.55	8.19
July	31	54.07	231.24	285.31	9.20
August	31	48.70	220.16	268.86	8.67
September	30	34.33	161.72	196.05	6.54
October	31	20.19	107.96	128.15	4.13
November	30	9.68	68.62	78.30	2.61
December	31	5.49	46.50	51.99	1.68
Annual	365	303.58	1424	1727	N/A

^a Standing and Working Losses (lb) from TankESP™

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Total Losses (lb/day) = Total Losses (lb/month) / Month Calendar Days (days/month)

POTENTIAL EMISSIONS

Pollutant	Potential Emissions	
	(lb/day) ^a	(tpy) ^b
HCl	9.20	0.86
Total HAP	9.20	0.86

^a Potential HCl and Total HAP Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential HCl and Total HAP Emissions (tpy) = Σ [Total Losses (lb/month_i)] / 2000 (lb/ton)

Table A.36 - Ethylene Glycol Coolant Tank - T-193 (T079) Potential Emissions

TANKESP™ INPUT PARAMETERS

Ohio EPA EU ID	T079	Conservatively assumes 1 complete turnover per day
Tank Type	VFR	
Chemical Name	Ethylene Glycol	
Maximum Throughput	4,380,000 gallons/yr	
Shell Height	19.5 ft	
Shell Diameter	10 ft	
Is the Tank Underground?	No	
Is the Tank Insulated?	No	
Is the Tank Heated?	No	
Meteorological Data	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	NIST SP1038
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TANKESP™ PROGRAM OUTPUT INFORMATION

Month	Month Calendar Days (days/month)	Standing Losses (lb) ^a	Working Losses (lb) ^a	Total Losses (lb) ^b	Total Losses (lb/day) ^c
January	31	6.1E-04	1.5E-02	1.6E-02	5.1E-04
February	28	7.6E-04	1.6E-02	1.7E-02	6.0E-04
March	31	1.9E-03	3.0E-02	3.2E-02	1.0E-03
April	30	4.4E-03	5.9E-02	6.4E-02	2.1E-03
May	31	8.1E-03	0.10	0.11	3.6E-03
June	30	1.2E-02	0.16	0.17	5.8E-03
July	31	1.5E-02	0.20	0.21	6.9E-03
August	31	1.3E-02	0.18	0.20	6.4E-03
September	30	8.2E-03	0.12	0.13	4.3E-03
October	31	3.9E-03	6.6E-02	7.0E-02	2.2E-03
November	30	1.5E-03	3.4E-02	3.6E-02	1.2E-03
December	31	6.8E-04	1.9E-02	2.0E-02	6.4E-04
Annual	365	7.1E-02	1.01	1.08	N/A

^a Standing and Working Losses (lb) from TankESP™

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Total Losses (lb/day) = Total Losses (lb/month) / Month Calendar Days (days/month)

POTENTIAL EMISSIONS

Pollutant	Potential Emissions	
	(lb/day) ^a	(tpy) ^b
VOC	6.9E-03	5.4E-04

^a Potential VOC Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential VOC Emissions (tpy) = Σ[Total Losses (lb/month_i)] / 2000 (lb/ton)

TESLIN PLANT TITLE V PERMIT RENEWAL PTE CALCULATIONS

Table A.1 Summary of Teslin Plant Potential Emissions

Emission Unit ID	Unit Description	Title V Emission Unit Classification	Exemption Status	Potential Emissions (tpy)												
				CO (tpy)	NO _x (tpy)	PM (tpy)	Filterable PM ₁₀ (tpy)	PM ₁₀ (tpy)	Filterable PM _{2.5} (tpy)	PM _{2.5} (tpy)	Pb (tpy)	SO ₂ (tpy)	VOC (tpy)	TCE (tpy)	Total HAP (tpy)	CO ₂ e
B019	#1 Teslin Boiler	Insignificant	Permit Exempt	2.27	2.70	0.05	0.05	0.20	0.05	0.20	1.3E-05	1.6E-02	0.15	-	0.05	3,221
B020	#2 Teslin Boiler	Insignificant	Permit Exempt	2.27	2.70	0.05	0.05	0.20	0.05	0.20	1.3E-05	1.6E-02	0.15	-	0.05	3,221
B021	#3 Teslin Boiler	Insignificant	Permit Exempt	2.27	2.70	0.05	0.05	0.20	0.05	0.20	1.3E-05	1.6E-02	0.15	-	0.05	3,221
B022	#4 Teslin Boiler	Insignificant	Permit Exempt	2.27	2.70	0.05	0.05	0.20	0.05	0.20	1.3E-05	1.6E-02	0.15	-	0.05	3,221
B023	#5 Teslin Boiler	Insignificant	Permit Exempt	2.27	2.70	0.05	0.05	0.20	0.05	0.20	1.3E-05	1.6E-02	0.15	-	0.05	3,221
B024	#6 Teslin Boiler	Insignificant	Permit Exempt	2.27	2.70	0.05	0.05	0.20	0.05	0.20	1.3E-05	1.6E-02	0.15	-	0.05	3,221
P110	Teslin Line 2 ^a	Significant	NA	-	-	10.90	10.90	10.90	10.90	10.90	-	-	37.30	37.30	37.30	-
P111	Teslin Bulk Unloading & Storage ^b	Insignificant	NA	-	-	4.40	4.40	4.40	4.40	4.40	-	-	-	-	-	-
P114	Teslin Line 3 ^a	Significant	NA	-	-	2.20	2.20	2.20	2.20	2.20	-	-	39.40	39.40	39.40	-
P115	Teslin Line 4 ^a	Significant	NA	-	-	9.90	9.90	9.90	9.90	9.90	-	-	39.40	39.40	39.40	-
P125	Cooling Water system	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	0.21	0.21	0.21	0.21	0.21	-	-	-	-	-	-
P126	T-392 Polyolefin Silo	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	0.45	0.45	0.45	0.45	0.45	-	-	-	-	-	-
P127	T-391 Polyolefin Silo	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	0.45	0.45	0.45	0.45	0.45	-	-	-	-	-	-
P128	T-393 Polyolefin Silo	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	0.45	0.45	0.45	0.45	0.45	-	-	-	-	-	-
P915	Trim Recycle Line	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	1.39	0.77	0.77	0.13	0.13	-	-	-	-	-	-
T044	T-403 Storage Tank	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	-	-	-	-	-	-	-	0.23	-	-	-
T045	T-404 Storage Tank	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	-	-	-	-	-	-	-	1.5E-02	-	-	-
T080	L2 & L3 Coolant Storage Tank	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	-	-	-	-	-	-	-	1.5E-04	-	-	-
T081	L4 Coolant Storage Tank	Insignificant (No App. Reqs.)	<i>De minimis</i>	-	-	-	-	-	-	-	-	-	1.0E-04	-	-	-
Teslin Plant Total:				13.59	16.18	30.66	30.04	30.97	29.40	30.32	8.1E-05	0.10	117.24	116.10	116.41	19,326

^a Allowable emissions for P110, P114, and P115 are from PTI P0125044 (effective 10/3/2018), PTI 16-01955 (effective 1/29/2002), and PTI P0106569 (effective 7/26/2010), respectively. Conservatively assumes all VOC is TCE and that all PM is PM₁₀/PM_{2.5}.

^b Allowable PM emissions for P111 are from PTI 16-818 (effective 10/4/1989). Conservatively assumes that all PM is PM₁₀/PM_{2.5}.

Table A.2 North Plant Boilers (B019-B024) Potential Emissions

POTENTIAL PROCESS DATA

Individual B019-B024 Hourly Heat Input Capacity	6.28 MMBtu/hr
Individual B019-B024 Annual Heat Input Capacity	55,013 MMBtu/yr
Individual B019-B024 Hourly Natural Gas Use	6.2E-03 MMscf/hr
Individual B019-B024 Annual Natural Gas Use	53.93 MMscf/yr
Natural Gas Higher Heating Value (HHV)	1,020 MMBtu/MMscf
Total Number of Boilers	6
Maximum Operating Hours	8,760 hr/yr

$\text{Hourly Heat Input Capacity (MMBtu/hr)} \times \text{Potential Operating Hours (hr/yr)}$
 $\text{Hourly Heat Input Capacity (MMBtu/hr)} / \text{Natural Gas HHV (MMBtu/MMscf)}$
 $\text{Annual Heat Input Capacity (MMBtu/yr)} / \text{Natural Gas HHV (MMBtu/MMscf)}$
AP-42, Section 1.4, Table 1.4-1 (7/98), footnote a

DIMENSIONAL ANALYSIS

Mass Conversion	0.454 kg/lb
Mass Conversion	2,000 lb/ton

NIST SP1038
NIST SP1038

EMISSION FACTORS

AP-42 Section 1.4 - Natural Gas Combustion

NO _x	100 lb/MMscf
CO	84 lb/MMscf
SO ₂	0.6 lb/MMscf
Filterable PM/PM ₁₀ /PM _{2.5}	1.9 lb/MMscf
Condensable PM	5.7 lb/MMscf
Total PM ₁₀ /PM _{2.5}	7.6 lb/MMscf
VOC	5.5 lb/MMscf
Lead (Pb)	5.0E-04 lb/MMscf
Hexane	1.80 lb/MMscf
Total Combustion HAP	1.89 lb/MMscf

AP-42, Section 1.4, Table 1.4-1 (7/98)
AP-42, Section 1.4, Table 1.4-1 (7/98)
AP-42, Section 1.4, Table 1.4-2 (7/98)
AP-42, Section 1.4, Table 1.4-2 (7/98)
AP-42, Section 1.4, Table 1.4-2 (7/98)
AP-42, Section 1.4, Table 1.4-2 (7/98)
AP-42, Section 1.4, Table 1.4-2 (7/98)
AP-42, Section 1.4, Table 1.4-2 (7/98)
AP-42, Section 1.4, Table 1.4-3 (7/98)
AP-42 Section 1.4, Tables 1.4-3 and 1.4-4 (7/98)

40 CFR 98, Subparts A and C - GHG

CO ₂	53.06 kg/MMBtu
CH ₄	1.0E-03 kg/MMBtu
N ₂ O	1.0E-04 kg/MMBtu
CO ₂	116.98 lb/MMBtu
CH ₄	2.2E-03 lb/MMBtu
N ₂ O	2.2E-04 lb/MMBtu
CO ₂ - GWP	1 GWP
CH ₄ - GWP	25 GWP
N ₂ O - GWP	298 GWP

40 CFR 98, Subpart C, Table C-1 for natural gas
40 CFR 98, Subpart C, Table C-2 for natural gas
40 CFR 98, Subpart C, Table C-2 for natural gas
40 CFR 98, Subpart C, Table C-1 for natural gas (converted using NIST SP1038)
40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
40 CFR 98, Subpart C, Table C-2 for natural gas (converted using NIST SP1038)
40 CFR 98, Subpart A, Table A-1
40 CFR 98, Subpart A, Table A-1
40 CFR 98, Subpart A, Table A-1

Table A.2 North Plant Boilers (B019-B024) Potential Emissions

INDIVIDUAL B019-B024 POTENTIAL EMISSIONS

Pollutant	Potential Emissions	
	(lb/hr)^a	(tpy)^b
NO _x	0.62	2.70
CO	0.52	2.27
SO ₂	3.7E-03	1.6E-02
Filterable PM/PM ₁₀ /PM _{2.5}	1.2E-02	5.1E-02
Condensable PM	3.5E-02	0.15
Total PM ₁₀ /PM _{2.5}	4.7E-02	0.20
VOC	3.4E-02	0.15
Lead (Pb)	3.1E-06	1.3E-05
Hexane	1.1E-02	4.9E-02
Total HAP	1.2E-02	5.1E-02
CO ₂		3,218
CH ₄		6.1E-02
N ₂ O		6.1E-03
CO ₂ e ^c		3,221

^a Potential Emissions (lb/hr) = Maximum Hourly Natural Gas Use (MMscf/hr) x Pollutant EF (lb/MMscf)

^b GHG Potential Emissions (tpy) = Maximum Annual Heat Input Capacity (MMBtu/yr) x Pollutant EF (lb/MMBtu) / 2,000 (lb/ton)

All Other Pollutant Potential Emissions (tpy) = Maximum Annual Natural Gas Use (MMscf/yr) x Pollutant EF (lb/MMscf) / 2,000 (lb/ton)

^c CO₂e Emissions (tpy) = CO₂ Emissions (tpy) x CO₂ GWP + CH₄ Emissions (tpy) x CH₄ GWP + N₂O Emissions (tpy) x N₂O GWP

TOTAL B019-B024 POTENTIAL EMISSIONS

Pollutant	Potential Emissions^a	
	(lb/hr)	(tpy)
NO _x	3.69	16.18
CO	3.10	13.59
SO ₂	2.2E-02	9.7E-02
Filterable PM/PM ₁₀ /PM _{2.5}	7.0E-02	0.31
Condensable PM	0.21	0.92
Total PM ₁₀ /PM _{2.5}	0.28	1.23
VOC	0.20	0.89
Lead (Pb)	1.8E-05	8.1E-05
Hexane	6.6E-02	0.29
Total HAP	7.0E-02	0.31
CO ₂		19,306
CH ₄		0.36
N ₂ O		3.6E-02
CO ₂ e ^c		19,326

^a Total B019-B24 Potential Emissions (lb/hr or tpy) = Individual B019-B024 Potential Emissions (lb/hr or tpy) x Number of Boilers

Table A.3 - North Plant Cooling Tower (P125) Potential Emissions

PROCESS DATA

Circulation Rate	1,750 gal/min	<i>Operating TDS for cooling towers at the Barberton Plant = TDS (mg/L) / 1,000 (mg/g) / 453.59 (g/lb) x 3.785 (L/gal)</i>
Total Dissolved Solids (TDS) Concentration	550 ppm (mg/L)	
Total Dissolved Solids (TDS) Concentration	4.6E-03 lb/gal	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST1038</i>
Mass Conversion	1,000 mg/g	
Mass Conversion	453.59 g/lb	
Volume Conversion	3.785 L/gal	
Time Conversion	365 day/yr	
Time Conversion	60 min/hr	
Time Conversion	24 hr/day	
Density of Water	8.35 lb/gal	

DRIFT LOSS FACTORS

Drift Loss Without Eliminator	1.7 lb/1,000 gal	<i>AP-42, Section 13.4, Table 13.4-1 (pounds of water lost per 1,000 gallons of circulation flow) Drift loss provided by manufacturer</i>
Drift Loss With Eliminator	0.01%	

POTENTIAL EMISSIONS

Potential Emissions (Without Eliminator)

<i>Pollutant</i>	<i>Potential Emissions</i>	
	<i>(lb/day)^a</i>	<i>(tpy)^b</i>
PM	2.36	0.43
PM ₁₀ ^c	2.36	0.43
PM _{2.5} ^c	2.36	0.43

^a Uncontrolled PM Emissions (lb/day) = Total Flow Rate (gpm) x TDS (lb/gal) x [Drift Loss Without Eliminator (lb/1,000 gal) / Density of water (8.345 lb/gal) / 1,000 (gal/1,000 gal)] x 60 (min/hr) x 24 (hr/day)

^b Uncontrolled PM Emissions (tpy) = Uncontrolled PM Emissions (lb/day) x 365 (day/yr) / 2000 (lb/ton)

^c Assumes all PM is PM₁₀/PM_{2.5}.

Potential Emissions (With Eliminator)

<i>Pollutant</i>	<i>Potential Emissions</i>	
	<i>(lb/day)^a</i>	<i>(tpy)^b</i>
PM	1.16	0.21
PM ₁₀ ^c	1.16	0.21
PM _{2.5} ^c	1.16	0.21

^a Uncontrolled PM Emissions (lb/day) = Total Flow Rate (gpm) x TDS (lb/gal) x Drift Loss With Eliminator (%) x 60 (min/hr) x 24 (hr/day)

^b Controlled PM Emissions (tpy) = Controlled PM Emissions (lb/day) x 365 (day/yr) / 2000 (lb/ton)

^c Assumes all PM is PM₁₀/PM_{2.5}.

Table A.4 - P126 Polyolefin Handling Potential Emissions

POTENTIAL PROCESS DATA

Pneumatic Transfer Blow Capacity	600 cfm	<i>Conservative estimate for bin vent filters</i>
Silo Bin Vent Filter Outlet Grain Loading	0.02 gr/dscf	
Potential Operating Hours	8,760 hr/yr	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Mass Conversion	7,000 gr/lb	
Time Conversion	24 hr/day	
Time Conversion	60 min/hr	

EMISSION FACTORS

PM ₁₀ /PM _{2.5} Emission Factor ^a	0.10 lb/hr	$= \text{Outlet Grain Loading (gr/dscf)} / 7,000 \text{ (gr/lb)} \times \text{Exhaust Flow Rate (cfm)} \times 60 \text{ (min/hr)}$
--	------------	--

^a Assumes all PM is also PM₁₀/PM_{2.5}.

POTENTIAL EMISSIONS

PM ₁₀ /PM _{2.5}	2.47 lb/day	$= \text{PM}_{10}/\text{PM}_{2.5} \text{ Emission Factor (lb/hr)} \times 24 \text{ (hr/day)}$
PM ₁₀ /PM _{2.5}	0.45 tpy	$= \text{PM}_{10}/\text{PM}_{2.5} \text{ Emission Factor (lb/hr)} \times \text{Potential Operating Hours (hr/yr)} / 2,000 \text{ (lb/ton)}$

Table A.5 - P127 Polyolefin Handling Potential Emissions

POTENTIAL PROCESS DATA

Pneumatic Transfer Blow Capacity	600 cfm	<i>Conservative estimate for bin vent filters</i>
Silo Bin Vent Filter Outlet Grain Loading	0.02 gr/dscf	
Potential Operating Hours	8,760 hr/yr	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Mass Conversion	7,000 gr/lb	
Time Conversion	24 hr/day	
Time Conversion	60 min/hr	

EMISSION FACTORS

PM ₁₀ /PM _{2.5} Emission Factor ^a	0.10 lb/hr	<i>= Outlet Grain Loading (gr/dscf) / 7,000 (gr/lb) x Exhaust Flow Rate (cfm) x 60 (min/hr)</i>
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^a Assumes all PM is also PM₁₀/PM_{2.5}.

POTENTIAL EMISSIONS

PM ₁₀ /PM _{2.5}	2.47 lb/day	<i>= PM₁₀/PM_{2.5} Emission Factor (lb/hr) x 24 (hr/day)</i>
PM ₁₀ /PM _{2.5}	0.45 tpy	<i>= PM₁₀/PM_{2.5} Emission Factor (lb/hr) x Potential Operating Hours (hr/yr) / 2,000 (lb/ton)</i>

Table A.6 - P128 Silica Handling Potential Emissions

POTENTIAL PROCESS DATA

Pneumatic Transfer Blow Capacity	600 cfm	<i>Conservative estimate for bin vent filters</i>
Silo Bin Vent Filter Outlet Grain Loading	0.02 gr/dscf	
Potential Operating Hours	8,760 hr/yr	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Mass Conversion	7,000 gr/lb	
Time Conversion	24 hr/day	
Time Conversion	60 min/hr	

EMISSION FACTORS

PM ₁₀ /PM _{2.5} Emission Factor ^a	0.10 lb/hr	<i>= Outlet Grain Loading (gr/dscf) / 7,000 (gr/lb) x Exhaust Flow Rate (cfm) x 60 (min/hr)</i>
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^a Assumes all PM is also PM₁₀/PM_{2.5}.

POTENTIAL EMISSIONS

PM ₁₀ /PM _{2.5}	2.47 lb/day	<i>= PM₁₀/PM_{2.5} Emission Factor (lb/hr) x 24 (hr/day)</i>
PM ₁₀ /PM _{2.5}	0.45 tpy	<i>= PM₁₀/PM_{2.5} Emission Factor (lb/hr) x Potential Operating Hours (hr/yr) / 2,000 (lb/ton)</i>

Table A.7 - Trim Recycle Line (P915) Potential Emissions

OPERATIONAL PARAMETERS

New Dry Trim Storage Bin Throughput	925 lb/hr
New Dry Trim Storage Bin Target Cyclone Throughput	1,800 lb/hr
New High Intensity Mixer Throughput	3,228 lb/hr
New Calender Trim Storage Bin Throughput	1,226 lb/hr
New Re-Oiled Trim Take Away Hopper Throughput	3,228 lb/hr
Max Combined Teslin Throughput	10,407 lb/hr
Max Combined Teslin Throughput	5.20 ton/hr
Max Combined Teslin Throughput	45,583 ton/yr
Potential Operating Hours	8,760 hr/yr

= Sum of Process Throughputs (lb/hr)

= Maximum Throughput (ton/hr) x Potential Operating Hours (hr/yr)

DIMENSIONAL ANALYSIS

Time Conversion	24 hr/day
Time Conversion	365 day/year
Mass Conversion	2,000 lb/ton

NIST SP1038

EMISSION FACTORS

PM	0.061 lb/ton Teslin
PM-10	0.034 lb/ton Teslin
PM-2.5	0.0058 lb/ton Teslin

AP-42 Section 9.9.1, Table 9.9.1-1 for Grain Elevators - "Headhouse and grain handling"

AP-42 Section 9.9.1, Table 9.9.1-1 for Grain Elevators - "Headhouse and grain handling"

AP-42 Section 9.9.1, Table 9.9.1-1 for Grain Elevators - "Headhouse and grain handling"

POTENTIAL EMISSIONS

Pollutant	Potential Emissions	
	(lb/day) ^a	(tpy) ^b
PM	7.62	1.39
PM ₁₀	4.25	0.77
PM _{2.5}	0.72	0.13

^a Potential Emissions (lb/day) = Pollutant Emission Factor (lb/ton Teslin) x Max Combined Teslin Throughput (ton/hr) x 24 (hr/yr)

^b Potential Emissions (tpy) = Pollutant Potential Emissions (lb/day) x 365 (days/yr) / 2,000 (lb/ton)

Table A.8 - T-403 Storage Tank (T044) Potential Emissions

TANKESP™ PROGRAM INPUT PARAMETERS

Tank Type	VFR	<i>Assumes one complete turnover per day</i>
Chemical Name Input	White Mineral Oil	
Tank Capacity	32,901 gallons	
Net Throughput	12,008,881 gallons/yr	
Shell Height	20 ft	
Shell Diameter	14 ft	
Is the Tank Underground?	No	
Nearest Major City	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Time Conversion	365 days/yr	

TANKESP™ PROGRAM OUTPUT INFORMATION

<i>Month</i>	<i>Month Calendar Days (days/month)</i>	<i>Standing Losses (lb)^a</i>	<i>Working Losses (lb)^a</i>	<i>Total Losses (lb)^b</i>	<i>Daily VOC Emissions (lb/day)^c</i>	<i>Total HAP Emissions (lb)^a</i>
January	31	4.43	34.84	39.27	1.27	0.00
February	28	4.98	31.23	36.22	1.29	0.00
March	31	6.65	33.77	40.42	1.30	0.00
April	30	7.75	31.91	39.66	1.32	0.00
May	31	8.66	32.24	40.90	1.32	0.00
June	30	8.64	30.65	39.29	1.31	0.00
July	31	8.61	31.43	40.04	1.29	0.00
August	31	7.88	31.59	39.46	1.27	0.00
September	30	6.74	31.03	37.77	1.26	0.00
October	31	5.89	32.87	38.75	1.25	0.00
November	30	4.03	32.56	36.59	1.22	0.00
December	31	3.66	34.46	38.11	1.23	0.00
Annual	365	78	389	466	N/A	0.00

^a Standing and Working Losses (lb) and speciated HAP emissions (lb) calculated using TankESP™.

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Daily VOC Emissions (lb/day) = Total Losses for the Month (lb) / Days in the Month

POTENTIAL EMISSIONS

<i>Pollutant</i>	<i>Potential Emissions</i>	
	<i>(lb/day)^a</i>	<i>(tpy)^b</i>
VOC	1.32	0.23
Total HAP		0

^a Potential VOC Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential Emissions (tpy) = Annual Losses (lb/yr) / 2,000 (lb/ton)

Table A.9 - T-404 Storage Tank (T045) Potential Emissions

TANKESP™ PROGRAM INPUT PARAMETERS

Tank Type	VFR	<i>Assumes one complete turnover per day</i>
Chemical Name Input	White Mineral Oil	
Tank Capacity	2,115 gallons	
Net Throughput	771,999 gallons/yr	
Shell Height	6 ft	
Shell Diameter	10 ft	
Is the Tank Underground?	No	
Nearest Major City	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Time Conversion	365 days/yr	

TANKESP™ PROGRAM OUTPUT INFORMATION

<i>Month</i>	<i>Month Calendar Days (days/month)</i>	<i>Standing Losses (lb)^a</i>	<i>Working Losses (lb)^a</i>	<i>Total Losses (lb)^b</i>	<i>Daily VOC Emissions (lb/day)^c</i>	<i>Total HAP Emissions (lb)^a</i>
January	31	0.28	2.21	2.49	8.0E-02	0.00
February	28	0.31	1.98	2.30	8.2E-02	0.00
March	31	0.42	2.15	2.56	8.3E-02	0.00
April	30	0.48	2.03	2.51	8.4E-02	0.00
May	31	0.54	2.05	2.59	8.4E-02	0.00
June	30	0.54	1.95	2.49	8.3E-02	0.00
July	31	0.54	2.00	2.53	8.2E-02	0.00
August	31	0.49	2.01	2.50	8.1E-02	0.00
September	30	0.42	1.97	2.39	8.0E-02	0.00
October	31	0.37	2.09	2.46	7.9E-02	0.00
November	30	0.25	2.07	2.32	7.7E-02	0.00
December	31	0.23	2.19	2.42	7.8E-02	0.00
Annual	365	5	25	30	N/A	0.00

^a Standing and Working Losses (lb) and speciated HAP emissions (lb) calculated using TankESP™.

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Daily VOC Emissions (lb/day) = Total Losses for the Month (lb) / Days in the Month

POTENTIAL EMISSIONS

<i>Pollutant</i>	<i>Potential Emissions</i>	
	<i>(lb/day)^a</i>	<i>(tpy)^b</i>
VOC	8.4E-02	1.5E-02
Total HAP		0

^a Potential VOC Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential Emissions (tpy) = Annual Losses (lb/yr) / 2,000 (lb/ton)

Table A.10 - L2 & L3 Coolant Storage Tank (T080) Potential Emissions

TANKESP™ PROGRAM INPUT PARAMETERS

Tank Type	VFR	<i>Assumes one complete turnover per day</i>
Chemical Name Input	Propylene Glycol	
Tank Capacity	1,777 gallons	
Net Throughput	648,694 gallons/yr	
Shell Height	10 ft	
Shell Diameter	6 ft	
Is the Tank Underground?	No	
Nearest Major City	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Time Conversion	365 days/yr	

TANKESP™ PROGRAM OUTPUT INFORMATION

<i>Month</i>	<i>Month Calendar Days (days/month)</i>	<i>Standing Losses (lb)^a</i>	<i>Working Losses (lb)^a</i>	<i>Total Losses (lb)^b</i>	<i>Daily VOC Emissions (lb/day)^c</i>	<i>Total HAP Emissions (lb)^a</i>
January	31	2.0E-04	3.1E-03	3.4E-03	1.1E-04	0.00
February	28	2.8E-04	3.5E-03	3.8E-03	1.4E-04	0.00
March	31	7.5E-04	7.8E-03	8.6E-03	2.8E-04	0.00
April	30	1.7E-03	1.5E-02	1.6E-02	5.5E-04	0.00
May	31	3.5E-03	2.8E-02	3.1E-02	1.0E-03	0.00
June	30	5.7E-03	4.3E-02	4.9E-02	1.6E-03	0.00
July	31	7.0E-03	5.5E-02	6.2E-02	2.0E-03	0.00
August	31	5.8E-03	4.9E-02	5.5E-02	1.8E-03	0.00
September	30	3.4E-03	3.2E-02	3.6E-02	1.2E-03	0.00
October	31	1.5E-03	1.7E-02	1.9E-02	6.1E-04	0.00
November	30	5.5E-04	8.8E-03	9.3E-03	3.1E-04	0.00
December	31	2.5E-04	4.5E-03	4.7E-03	1.5E-04	0.00
Annual	365	3.1E-02	0.27	0.30	N/A	0.00

^a Standing and Working Losses (lb) and speciated HAP emissions (lb) calculated using TankESP™.

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Daily VOC Emissions (lb/day) = Total Losses for the Month (lb) / Days in the Month

POTENTIAL EMISSIONS

<i>Pollutant</i>	<i>Potential Emissions</i>	
	<i>(lb/day)^a</i>	<i>(tpy)^b</i>
VOC	2.0E-03	1.5E-04
Total HAP		0

^a Potential VOC Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential Emissions (tpy) = Annual Losses (lb/yr) / 2,000 (lb/ton)

Table A.11 - L4 Coolant Storage Tank (T081) Potential Emissions

TANKESP™ PROGRAM INPUT PARAMETERS

Tank Type	VFR	<i>Assumes one complete turnover per day</i>
Chemical Name Input	Propylene Glycol	
Tank Capacity	1,269 gallons	
Net Throughput	463,200 gallons/yr	
Shell Height	6 ft	
Shell Diameter	6 ft	
Is the Tank Underground?	No	
Nearest Major City	Akron, OH	

DIMENSIONAL ANALYSIS

Mass Conversion	2,000 lb/ton	<i>NIST SP1038</i>
Time Conversion	365 days/yr	

TANKESP™ PROGRAM OUTPUT INFORMATION

<i>Month</i>	<i>Month Calendar Days (days/month)</i>	<i>Standing Losses (lb)^a</i>	<i>Working Losses (lb)^a</i>	<i>Total Losses (lb)^b</i>	<i>Daily VOC Emissions (lb/day)^c</i>	<i>Total HAP Emissions (lb)^a</i>
January	31	1.5E-04	2.1E-03	2.3E-03	7.4E-05	0.00
February	28	2.0E-04	2.4E-03	2.6E-03	9.3E-05	0.00
March	31	5.4E-04	5.3E-03	5.9E-03	1.9E-04	0.00
April	30	1.2E-03	1.0E-02	1.1E-02	3.7E-04	0.00
May	31	2.5E-03	1.9E-02	2.2E-02	6.9E-04	0.00
June	30	4.1E-03	3.0E-02	3.4E-02	1.1E-03	0.00
July	31	5.1E-03	3.7E-02	4.2E-02	1.4E-03	0.00
August	31	4.2E-03	3.3E-02	3.8E-02	1.2E-03	0.00
September	30	2.4E-03	2.2E-02	2.5E-02	8.2E-04	0.00
October	31	1.1E-03	1.2E-02	1.3E-02	4.2E-04	0.00
November	30	4.0E-04	6.0E-03	6.4E-03	2.1E-04	0.00
December	31	1.8E-04	3.1E-03	3.2E-03	1.0E-04	0.00
Annual	365	2.2E-02	0.18	0.20	N/A	0.00

^a Standing and Working Losses (lb) and speciated HAP emissions (lb) calculated using TankESP™.

^b Total Losses (lb) = Standing Losses (lb) + Working Losses (lb)

^c Daily VOC Emissions (lb/day) = Total Losses for the Month (lb) / Days in the Month

POTENTIAL EMISSIONS

<i>Pollutant</i>	<i>Potential Emissions</i>	
	<i>(lb/day)^a</i>	<i>(tpy)^b</i>
VOC	1.4E-03	1.0E-04
Total HAP		0

^a Potential VOC Emissions (lb/day) = Maximum of [Total Losses (lb/month_i) / Month Calendar Days (days/month_i)]

^b Potential Emissions (tpy) = Annual Losses (lb/yr) / 2,000 (lb/ton)

APPENDIX B. RECENT STACK TEST REPORTS

P080

August 2006

June 2007

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October 2025

October 2018

P099

January 2018

September 2005

P110, P114, P115

February 2016

APPENDIX C. SOURCE INFORMATION

General Source Information

Emission Unit ID	Location of Emission Unit	EU Description	Installation Date Month & year	Operating Schedule (hr/day, day, week, wk/yr)	Control Equipment	Control device installation date
P098	South	Chloroformate plant	6/1/1974	24/7/52	Thermal Oxidizer Scrubber Wet Scrubber	6/1/1982
P099	South	CR-39 Process	7/1/1978	24/7/52	Process and Air Scrubbers	6/1/1978
P117	South	Fire Pump Diesel Engine (#1); West: 220 HP; South Plant - B034	3/20/2011	24/7/52	N/A	N/A
P118	South	Fire Pump Diesel Engine (#2); East: 260 HP; South Plant - B035	3/20/2011	24/7/52	N/A	N/A
T015	South	10,000 gallon storage tank containing d-Limonene - T- 231	6/1/1955	24/7/52	N/A	N/A
T025	South	10,000 gallon storage tank containing Polycaprolactone Diol - T-166	8/5/1993	24/7/52	N/A	N/A
T026	South	5,000 gallon storage tank containing Allyl Chloroformate - T-145	6/1/1973	24/7/52	N/A	N/A
T027	South	7,600 gallon storage tank containing Allyl Chloroformate - T-144	6/1/1973	24/7/52	N/A	N/A
T028	South	5,000 gallon storage tank containing Isopropyl Chloroformate - T-147	6/1/1961	24/7/52	N/A	N/A
T029	South	7,500 gallon storage tank containing Isopropyl Chloroformate - T-149	6/1/1973	24/7/52	N/A	N/A
T034	South	7,500 gallon storage tank containing Chloroformate (2- EHCF) - T-146	6/1/1974	24/7/52	N/A	N/A
T046	South	10,000 gallon storage tank containing Dynalene (heat transfer fluid) - T-230	6/1/1979	24/7/52	N/A	N/A
T055	South	150,000 gallon storage tank containing wastewater - T- 339	6/1/1972	24/7/52	N/A	N/A
T056	South	150,000 gallon storage tank containing wastewater - T- 422	6/1/1972	24/7/52	N/A	N/A
T064	South	T-570, PPG ID# 39010 No. 22 Storage Tank MECF - T570, PPG ID# 39010	1/1/2001	24/7/52	N/A	N/A
B011	North	OLED Generator Kohler 150REOZJF	5/7/2014	24/7/52	N/A	N/A
P135	North	OLED Generator #2	8/1/2017	24/7/52	N/A	N/A
J001	North	32% HCl Loading Rack	1/1/2001	24/7/52	N/A	N/A
P070	North	Process Unit Cell #1	11/22/2013	24/7/52	Condenser	11/22/2013
P071	North	OLED Cell 1	10/15/2017	24/7/52		
P123	North	OLED Cell #3	11/1/2017	24/7/52		
P080	North	North Multipurpose Plant ^a	6/1/1982	24/7/52	Flare	8/12/1992
P104	North	#1 LoVel 27 Unit	6/1/1973	24/7/52	N/A	N/A
P105	North	LoVel Feed System	9/1/1984	24/7/52	N/A	N/A
P125	North	Sublimation Process	6/23/2020	24/7/52	N/A	N/A
P914	North	Tote Mixing Operations	9/1/2012	24/7/52	N/A	N/A
T032	North	200,000 Gallons HCl Tank - T-195	6/1/1953	24/7/52	N/A	N/A
T033	North	200,000 Gallons HCl Tank - T-194	6/1/1955	24/7/52	N/A	N/A
P110	Teslin	Teslin Line 2	6/1/1990	24/7/52	Carbon Adsorption Unit	6/1/1990
P111	Teslin	Teslin Bulk Unloading & Storage	6/1/1990	24/7/52	N/A	N/A
P114	Teslin	Teslin Line 3	8/1/2000	24/7/52	Carbon Adsorption Unit	6/1/1990
P115	Teslin	Teslin Line 4	12/2/2008	24/7/52	Carbon Adsorption Unit	6/1/1990

OPERATING SCHEDULE SUMMARY

EUID	Operating Hours (hr/yr)			Operating Days (days/yr)			Average Daily Operating Hours (hr/day)		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
P098	5,159	5,258	4,618	238	237	220	21.68	22.19	20.99
P099	6,141	6,805	6,129	298	328	308	20.61	20.75	19.90
P070	8,760	8,760	8,760	365	365	365	24.00	24.00	24.00
P071									
P123									
P080	1,968	3,336	2,304	82	139	96	24.00	24.00	24.00
P110	6,949	6,207	6,304	329	306	320	21.12	20.28	19.70
P114	5,515	6,597	7,257	262	312	337	21.05	21.14	21.53
P115	6,064	6,310	6,680	284	301	333	21.35	20.96	20.06

PRODUCTION SUMMARY

EUID	Annual Production (ton/yr)			Average Daily Production Rates (ton/day)			Maximum Daily Production Rates (ton/day)		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
P098	8,629	9,263	8,351	36.26	39.08	37.96	87.00	77.45	54.36
P099	9,055	9,730	8,737	30.39	29.66	28.37	37.52	36.84	37.99
P070	3.65	3.95	3.72	N/A ^a	N/A ^a	N/A ^a	N/A ^a	N/A ^a	N/A ^a
P071									
P123									
P080	311	521	360	3.79	3.75	3.75	3.79	3.75	3.75
P110	1,821	1,854	1,778	5.53	6.06	5.56	10.06	7.63	7.07
P114	1,445	1,971	2,047	5.52	6.32	6.07	9.97	10.17	10.78
P115	1,589	1,885	1,884	5.60	6.26	5.66	9.77	10.57	9.41

^a Because batches can occur over several days and consist of a broad range of products, average and maximum daily production rates are not meaningful metrics for the OLED process. Referto the OLED calculations for batch production information.

MPP (P080) Actual Emission Calculations

OPERATING PARAMETERS

Maximum/Average Daily Batches	1 batch/day
Annual Batches (2023)	72 batches/yr
Annual Batches (2024)	139 batches/yr
Annual Batches (2025)	96 batches/yr

VOC EMISSION FACTORS

CR39ELS VOC Emission Factor ^a	4.0 lb/batch
CR39PT VOC Emission Factor ^a	4.0 lb/batch
CR424NPL Emission Factor ^b	0.1 lb/batch

^a CR39ELS and CR39PT VOC emission factors from August 2006 stack test.

^b CR424NPL VOC emission factor from June 2007 stack test.

AVERAGE DAILY VOC EMISSIONS^a

VOC Emissions (2023-2025)	4.00 lb/day
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^a Average Emissions (lb/day) = Average Daily Production (batches/day) x Maximum VOC Emission Factor (lb/batch)

MAXIMUM DAILY VOC EMISSIONS^a

VOC Emissions (2023-2025)	4.00 lb/day
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^a Maximum Emissions (lb/day) = Maximum Daily Production (batches/day) x Maximum VOC Emission Factor (lb/batch)

ANNUAL VOC EMISSIONS^a

Total VOC Emissions (2023)	0.14 tpy
Total VOC Emissions (2024)	0.28 tpy
Total VOC Emissions (2025)	0.19 tpy

^a Maximum annual VOC Emissions (tpy) = Maximum Annual Production (batches/yr) x Maximum VOC Emission Factor (lb/batch) / 2,000 (lb/ton)

Chloroformates (P098) Actual Emission Calculations

OPERATING PARAMETERS

Annual Operating Hours (P098) (2023)	5,159 hr/yr
Annual Operating Hours (P098) (2024)	5,258 hr/yr
Annual Operating Hours (P098) (2025)	4,618 hr/yr
Annual Operating Hours (E-Scrubber)(2023) ^a	8.40 hr/yr
Annual Operating Hours (E-Scrubber)(2024) ^a	7.94 hr/yr
Annual Operating Hours (E-Scrubber)(2025) ^a	20.03 hr/yr
Annual Operating Hours (Tails Scrubber)(2023) ^b	5,151 hr/yr
Annual Operating Hours (Tails Scrubber)(2024) ^b	5,250 hr/yr
Annual Operating Hours (Tails Scrubber)(2025) ^b	4,598 hr/yr
Average Daily Operating Hours (Tails Scrubber) (2023)	21.68 hr/day
Average Daily Operating Hours (Tails Scrubber) (2024)	22.19 hr/day
Average Daily Operating Hours (Tails Scrubber) (2025)	20.99 hr/day
Average Daily Operating Hours (E-Scrubber)(2023)	0.04 hr/day
Average Daily Operating Hours (E-Scrubber)(2024)	0.03 hr/day
Average Daily Operating Hours (E-Scrubber)(2025)	0.09 hr/day
Maximum Daily Operating Hours (P098)	24 hr/day
Maximum Daily Operating Hours (E-Scrubber)(2023)	3.66 hr/day
Maximum Daily Operating Hours (E-Scrubber)(2024)	2.51 hr/day
Maximum Daily Operating Hours (E-Scrubber)(2025)	3.02 hr/day
Maximum Daily Operating Hours (Tails Scrubber)(2023) ^b	20.34 hr/day
Maximum Daily Operating Hours (Tails Scrubber)(2024) ^b	21.49 hr/day
Maximum Daily Operating Hours (Tails Scrubber)(2025) ^b	20.98 hr/day

^a The Emergency Scrubber (E-Scrubber) is an approved control device under the MON.
Values represent total hours where the E-Scrubber was used to treat process waste gas.

^b For the purpose of calculating emissions for both control devices, the hours where waste gas was diverted to the E-Scrubber are subtracted from the total P098 operating hours.

VOC EMISSION FACTORS^a

Tails Scrubber VOC Emission Factor	0.098 lb/hr
Emergency Scrubber VOC Emission Factor	0.652 lb/hr

^a VOC emission factors from October 30, 2025 stack test for the tails scrubber and E-Scrubber.

FUGITIVE (LDAR) VOC EMISSIONS^a

Annual VOC Emissions (2023) ^a	0.44 tpy
Annual VOC Emissions (2024) ^a	0.44 tpy
Annual VOC Emissions (2025) ^a	0.44 tpy
Average LDAR VOC Emissions (2023) ^b	2.41 lb/day
Average LDAR VOC Emissions (2024) ^b	2.41 lb/day
Average LDAR VOC Emissions (2025) ^b	2.41 lb/day

^a Annual LDAR emissions are calculated based on US EPA's guidance document, "Protocol for Equipment Leak Emission Estimates" (November 1995), Table 2-5 in combination LDAR monitoring data.

^b Average LDAR Emissions (lb/day) = Annual LDAR VOC Emissions (tpy) x 2,000 (lb/ton) / 365 (days/yr)

AVERAGE DAILY VOC EMISSIONS^a

Tails Scrubber VOC Emissions (2023)	2.12 lb/day
Tails Scrubber VOC Emissions (2024)	2.17 lb/day
Tails Scrubber VOC Emissions (2025)	2.05 lb/day
Emergency Scrubber VOC Emissions (2023)	0.02 lb/day
Emergency Scrubber VOC Emissions (2024)	0.02 lb/day
Emergency Scrubber VOC Emissions (2025)	0.06 lb/day
Fugitive (LDAR) VOC Emissions (2023)	2.41 lb/day
Fugitive (LDAR) VOC Emissions (2024)	2.41 lb/day
Fugitive (LDAR) VOC Emissions (2025)	2.41 lb/day
Total P098 VOC Emissions (2023)	4.55 lb/day
Total P098 VOC Emissions (2024)	4.60 lb/day
Total P098 VOC Emissions (2025)	4.52 lb/day

^a Tails Scrubber VOC Emissions (lb/day) = Tails Scrubber VOC Emission Factor (lb/hr) x Tails Scrubber Operating Hours (hr/day)

E-Scrubber VOC Emissions (lb/day) = E-Scrubber VOC Emission Factor (lb/hr) x E-Scrubber Operating Hours (hr/day)

Total P098 VOC Emissions (lb/day) = Tails Scrubber VOC Emissions (lb/day) + E-Scrubber VOC Emissions (lb/day) + Fugitive Emissions (lb/day)

MAXIMUM DAILY VOC EMISSIONS^a

Tails Scrubber VOC Emissions (2023)	1.99 lb/day
Tails Scrubber VOC Emissions (2024)	2.10 lb/day
Tails Scrubber VOC Emissions (2025)	2.05 lb/day
Emergency Scrubber VOC Emissions (2023)	2.38 lb/day
Emergency Scrubber VOC Emissions (2024)	1.64 lb/day
Emergency Scrubber VOC Emissions (2025)	1.97 lb/day
Fugitive (LDAR) VOC Emissions (2023)	2.41 lb/day
Fugitive (LDAR) VOC Emissions (2024)	2.41 lb/day
Fugitive (LDAR) VOC Emissions (2025)	2.41 lb/day
Total P098 VOC Emissions (2023)	6.78 lb/day
Total P098 VOC Emissions (2024)	6.15 lb/day
Total P098 VOC Emissions (2025)	6.42 lb/day

^a *Tails Scrubber VOC Emissions (lb/day) = Tails Scrubber VOC Emission Factor (lb/hr) x Tails Scrubber Operating Hours (hr/day)*

E-Scrubber VOC Emissions (lb/day) = E-Scrubber VOC Emission Factor (lb/hr) x E-Scrubber Operating Hours (hr/day)

Total P098 VOC Emissions (lb/day) = Tails Scrubber VOC Emissions (lb/day) + E-Scrubber VOC Emissions (lb/day) + Fugitive Emissions (lb/day)

ANNUAL VOC EMISSIONS^{a, b}

Tails Scrubber VOC Emissions (2023)	0.25 tpy
Tails Scrubber VOC Emissions (2024)	0.26 tpy
Tails Scrubber VOC Emissions (2025)	0.22 tpy
Emergency Scrubber VOC Emissions (2023)	2.7E-03 tpy
Emergency Scrubber VOC Emissions (2024)	2.6E-03 tpy
Emergency Scrubber VOC Emissions (2025)	6.5E-03 tpy
Fugitive (LDAR) VOC Emissions (2023)	0.44 tpy
Fugitive (LDAR) VOC Emissions (2024)	0.44 tpy
Fugitive (LDAR) VOC Emissions (2025)	0.44 tpy
Total P098 VOC Emissions (2023)	0.69 tpy
Total P098 VOC Emissions (2024)	0.70 tpy
Total P098 VOC Emissions (2025)	0.67 tpy

^a *Tails Scrubber VOC Emissions (tpy) = Tails Scrubber VOC Emission Factor (lb/hr) x Tails Scrubber Operating Hours (hr/yr) / 2,000 (lb/ton)*

E-Scrubber VOC Emissions (tpy) = E-Scrubber VOC Emission Factor (lb/hr) x E-Scrubber Operating Hours (hr/yr) / 2,000 (lb/ton)

Total P098 VOC Emissions (tpy) = Tails Scrubber VOC Emissions (tpy) + E-Scrubber VOC Emissions (tpy) + Fugitive Emissions (tpy)

^b *Note: the stack test emission factor was updated as part of the 2025 reporting year fee emission report (FER). As such, the maximum calculated annual emissions are less than what was reported in the 2023-2024 FERs, which used higher stack test results from October 2018.*

CR-39 (P099) Actual Emission Calculations

OPERATING PARAMETERS

2023 Average Daily Operating Hours (P099)	20.61 hr/day
2024 Average Daily Operating Hours (P099)	20.75 hr/day
2025 Average Daily Operating Hours (P099)	19.90 hr/day
2023 Maximum Daily Operating Hours (P099)	24 hr/day
2024 Maximum Daily Operating Hours (P099)	24 hr/day
2025 Maximum Daily Operating Hours (P099)	24 hr/day
2023 Annual Operating Hours (P099)	6,141 hr/yr
2024 Annual Operating Hours (P099)	6,805 hr/yr
2025 Annual Operating Hours (P099)	6,129 hr/yr
2023 OM-600 Operating Hours	366 hr/yr
2024 OM-600 Operating Hours	336 hr/yr
2025 OM-600 Operating Hours	285 hr/yr
2023 CR-39 Operating Hours	5,775 hr/yr
2024 CR-39 Operating Hours	6,469 hr/yr
2025 CR-39 Operating Hours	5,844 hr/yr

VOC EMISSION FACTORS^a

VOC Emission Factor (CR-39 Production) ^a	0.618 lb/hr
VOC Emission Factor (OM-600 Production) ^b	0.190 lb/hr

^a CR-39 VOC emission factors from January 2018 stack test.

^b OM-600 VOC emission factors from September 2005 stack test.

FUGITIVE (LDAR) VOC EMISSIONS^a

2023 Annual VOC Emissions ^a	1.60 tpy
2024 Annual VOC Emissions ^a	1.77 tpy
2025 Annual VOC Emissions ^a	1.60 tpy
2023 Average LDAR VOC Emissions ^b	8.77 lb/day
2024 Average LDAR VOC Emissions ^b	9.71 lb/day
2025 Average LDAR VOC Emissions ^b	8.75 lb/day

^a Annual LDAR emissions are calculated based on US EPA's guidance document, "Protocol for Equipment Leak Emission Estimates" (November 1995), Table 2-5 in combination LDAR monitoring data.

^b Average LDAR Emissions (lb/day) = Annual LDAR VOC Emissions (tpy) x 2,000 (lb/ton) / 365 (days/yr)

AVERAGE DAILY VOC EMISSIONS^a

2023 CR-39 VOC Emissions	12.74 lb/day
2024 CR-39 VOC Emissions	12.82 lb/day
2025 CR-39 VOC Emissions	12.30 lb/day
2023 OM-600 VOC Emissions ^b	0 lb/day
2024 OM-600 VOC Emissions ^b	0 lb/day
2025 OM-600 VOC Emissions ^b	0 lb/day
2023 Fugitive (LDAR) VOC Emissions	8.77 lb/day
2024 Fugitive (LDAR) VOC Emissions	9.71 lb/day
2025 Fugitive (LDAR) VOC Emissions	8.75 lb/day
2023 Total P099 VOC Emissions	21.50 lb/day
2024 Total P099 VOC Emissions	22.53 lb/day
2025 Total P099 VOC Emissions	21.04 lb/day

^a CR-39 VOC Emissions (lb/day) = CR-39 VOC Emission Factor (lb/hr) x P099 Operating Hours (hr/day)

Total P099 VOC Emissions (lb/day) = CR-39 VOC Emissions (lb/day) + CR-600 VOC Emissions (lb/day) + Fugitive Emissions (lb/day)

^b All operating hours are attributed to CR-39 production for these calculations as they represent the majority of production and has higher VOC emissions.

MAXIMUM DAILY VOC EMISSIONS^a

2023 CR-39 VOC Emissions	14.83 lb/day
2024 CR-39 VOC Emissions	14.83 lb/day
2025 CR-39 VOC Emissions	14.83 lb/day
2023 OM-600 VOC Emissions ^b	0 lb/day
2024 OM-600 VOC Emissions ^b	0 lb/day
2025 OM-600 VOC Emissions ^b	0 lb/day
2023 Fugitive (LDAR) VOC Emissions	8.77 lb/day
2024 Fugitive (LDAR) VOC Emissions	9.71 lb/day
2025 Fugitive (LDAR) VOC Emissions	8.75 lb/day
2023 Total P099 VOC Emissions	23.60 lb/day
2024 Total P099 VOC Emissions	24.54 lb/day
2025 Total P099 VOC Emissions	23.58 lb/day

^a CR-39 VOC Emissions (lb/day) = CR-39 VOC Emission Factor (lb/hr) x P099 Operating Hours (hr/day)

Total P099 VOC Emissions (lb/day) = CR-39 VOC Emissions (lb/day) + CR-600 VOC Emissions (lb/day) + Fugitive Emissions (lb/day)

^b All operating hours are attributed to CR-39 production for these calculations as they represent the majority of production and has higher VOC emissions.

ANNUAL VOC EMISSIONS^{a, b}

2023 CR-39 VOC Emissions	1.78 tpy
2024 CR-39 VOC Emissions	2.00 tpy
2025 CR-39 VOC Emissions	1.81 tpy
2023 OM-600 VOC Emissions	0.03 tpy
2024 OM-600 VOC Emissions	0.03 tpy
2025 OM-600 VOC Emissions	0.03 tpy
2023 Fugitive (LDAR) VOC Emissions	1.60 tpy
2024 Fugitive (LDAR) VOC Emissions	1.77 tpy
2025 Fugitive (LDAR) VOC Emissions	1.60 tpy
2023 Total P099 VOC Emissions	3.42 tpy
2024 Total P099 VOC Emissions	3.80 tpy
2025 Total P099 VOC Emissions	3.43 tpy

^a CR-39 VOC Emissions (tpy) = CR-39 VOC Emission Factor (lb/hr) x CR-39 Operating Hours (hr/yr) / 2,000 (lb/ton)

OM-600 VOC Emissions (tpy) = OM-600 VOC Emission Factor (lb/hr) x OM-600 Operating Hours (hr/yr) / 2,000 (lb/ton)

Total P099 VOC Emissions (tpy) = CR-39 VOC Emissions (tpy) + OM-600 VOC Emissions (tpy) + Fugitive Emissions (tpy)

OLED Process Unit (P070, P071, and P123) Actual Emission Calculations

BATCH EMISSIONS

Year	Month	Operating Days ^a	OLED Production (batch/month) ^b	OLED Batch VOC Emissions (lb/month) ^c	Average Daily Batch VOC Emissions (lb/day) ^d
2023	Jan	31	21	866	27.94
	Feb	28	16	840	30.01
	Mar	31	22	976	31.50
	Apr	30	17	987	32.90
	May	31	17	952	30.70
	Jun	30	15	877	29.25
	Jul	31	20	1,321	42.60
	Aug	31	21	1,125	36.28
	Sep	30	29	1,162	38.72
	Oct	31	16	647	20.88
	Nov	30	27	1,313	43.78
	Dec	31	21	1,495	48.22
2024	Jan	31	20	772	24.90
	Feb	29	22	881	30.37
	Mar	31	28	1,409	45.47
	Apr	30	31	1,543	51.44
	May	31	23	1,031	33.26
	Jun	30	33	2,687	89.57
	Jul	31	27	1,577	50.86
	Aug	31	41	2,079	67.07
	Sep	30	27	1,595	53.17
	Oct	31	19	694	22.40
	Nov	30	19	1,001	33.35
	Dec	31	20	1,864	60.12
2025	Jan	31	18	1,917	61.82
	Feb	28	16	439	15.69
	Mar	31	23	1,312	42.33
	Apr	30	24	1,295	43.17
	May	31	31	1,468	47.34
	Jun	30	22	1,486	49.54
	Jul	31	25	1,290	41.62
	Aug	31	25	1,929	62.21
	Sep	30	32	1,661	55.38
	Oct	31	24	1,843	59.46
	Nov	30	23	1,342	44.73
	Dec	31	18	1,248	40.24

^a Assumes that at least one OLED process vessel is operating at all times.

^b Values represent the number of batches that were started during each month. Because batch can take several days to complete, emissions from a batch can carry over into the following month.

^c PPG calculates batch VOC emissions for the OLED processes using the results of Emission Master® product models.

^d Average Daily Batch VOC Emissions (lb/day) = Monthly Batch Voc Emissions (lb/month) / Operating Days (days/month)

PRODUCTION DATA^a

Average Production Rate (2023)	20.2 batches/month
Average Production Rate (2024)	25.8 batches/month
Average Production Rate (2025)	23.4 batches/month
Maximum Average Production Rate	25.8 batches/month
Maximum Actual Production Rate	41 batches/month

^a Because batches can occur over several days, average and maximum daily production rates are not meaningful metrics for the OLED process.

BATCH VOC EMISSIONS

Average Batch VOC Emissions (2023)	34.4 lb/day
Average Batch VOC Emissions (2024)	46.8 lb/day
Average Batch VOC Emissions (2025)	47.0 lb/day
Maximum Daily VOC Emissions (2023)	48.2 lb/day
Maximum Daily VOC Emissions (2024)	89.6 lb/day
Maximum Daily VOC Emissions (2025)	62.2 lb/day

FUGITIVE (LDAR) VOC EMISSIONS^a

Maximum Annual VOC Emissions (2023) ^a	14.92 tpy
Maximum Annual VOC Emissions (2024) ^a	18.53 tpy
Maximum Annual VOC Emissions (2025) ^a	18.58 tpy
Average LDAR VOC Emissions (2023) ^b	81.75 lb/day
Average LDAR VOC Emissions (2024) ^b	101.56 lb/day
Average LDAR VOC Emissions (2025) ^b	101.79 lb/day

^a Annual LDAR emissions are calculated based on US EPA's guidance document, "Protocol for Equipment Leak Emission Estimates" (November 1995), Table 2-5 in combination LDAR monitoring data.

^b Average LDAR Emissions (lb/day) = Annual LDAR VOC Emissions (tpy) x 2,000 (lb/ton) / 365 (days/yr)

AVERAGE DAILY VOC EMISSIONS

OLED Batch VOC Emissions (2023)	34.40 lb/day
OLED Batch VOC Emissions (2024)	46.83 lb/day
OLED Batch VOC Emissions (2025)	46.96 lb/day
OLED Fugitive (LDAR) VOC Emissions (2023)	81.75 lb/day
OLED Fugitive (LDAR) VOC Emissions (2024)	101.56 lb/day
OLED Fugitive (LDAR) VOC Emissions (2025)	101.79 lb/day
Total OLED VOC Emissions (2023)	116.15 lb/day
Total OLED VOC Emissions (2024)	148.39 lb/day
Total OLED VOC Emissions (2025)	148.75 lb/day

MAXIMUM DAILY VOC EMISSIONS

OLED Batch VOC Emissions (2023)	48.22 lb/day
OLED Batch VOC Emissions (2024)	89.57 lb/day
OLED Batch VOC Emissions (2025)	62.21 lb/day
OLED Fugitive (LDAR) VOC Emissions (2023)	81.75 lb/day
OLED Fugitive (LDAR) VOC Emissions (2024)	101.56 lb/day
OLED Fugitive (LDAR) VOC Emissions (2025)	101.79 lb/day
Total OLED VOC Emissions (2023)	129.98 lb/day
Total OLED VOC Emissions (2024)	191.13 lb/day
Total OLED VOC Emissions (2025)	164.00 lb/day

ANNUAL VOC EMISSIONS

OLED Batch VOC Emissions (2023)	6.28 tpy
OLED Batch VOC Emissions (2024)	8.57 tpy
OLED Batch VOC Emissions (2025)	8.62 tpy
OLED Fugitive (LDAR) VOC Emissions (2023)	14.92 tpy
OLED Fugitive (LDAR) VOC Emissions (2024)	18.53 tpy
OLED Fugitive (LDAR) VOC Emissions (2025)	18.58 tpy
Total OLED VOC Emissions (2023)	21.20 tpy
Total OLED VOC Emissions (2024)	27.10 tpy
Total OLED VOC Emissions (2025)	27.19 tpy

Teslin Line #2 (P110) Actual Emission Calculations

OPERATING PARAMETERS

2023 Average Daily Operating Hours	21.12 hr/day
2024 Average Daily Operating Hours	20.28 hr/day
2025 Average Daily Operating Hours	19.70 hr/day
2023 Maximum Daily Operating Hours	24 hr/day
2024 Maximum Daily Operating Hours	24 hr/day
2025 Maximum Daily Operating Hours	24 hr/day
2023 Annual Operating Hours	6,949 hr/yr
2024 Annual Operating Hours	6,207 hr/yr
2025 Annual Operating Hours	6,304 hr/yr

VOC EMISSION FACTORS^a

Average Fugitive VOC Emission Factor ^b	3.985 lb/hr
Maximum Fugitive VOC Emission Factor ^c	5.524 lb/hr
Stack VOC Emission Factor ^d	0.107 lb/hr

^a PPG calculates actual emissions from the Teslin operations based on a mass balance of organics for the system over a rolling, 30-day period.

^b The average fugitive VOC emission factor is calculated based on the total fugitive VOC emissions from 2023-2025 divided by the total operating hours of the Teslin lines during this time.

^c Maximum fugitive VOC emission factor is calculated based on the maximum average daily VOC emissions factor from each rolling, 12-month period between 2023-2025.

^d Stack VOC emission factor is derived from February 2016 stack test data (0.32 lb/hr) equally distributed between the three (3) Teslin Lines.

AVERAGE DAILY VOC EMISSIONS^a

2023 Fugitive VOC Emissions	84.17 lb/day
2024 Fugitive VOC Emissions	80.83 lb/day
2025 Fugitive VOC Emissions	78.51 lb/day
2023 Stack VOC Emissions	2.25 lb/day
2024 Stack VOC Emissions	2.16 lb/day
2025 Stack VOC Emissions	2.10 lb/day
2023 Total VOC Emissions	86.42 lb/day
2024 Total VOC Emissions	83.00 lb/day
2025 Total VOC Emissions	80.61 lb/day

^a Average Fugitive VOC Emissions (lb/day) = Highest Average Daily Operating Hours (hr/day) x Average Fugitive VOC Emission Factor (lb/hr)

Average Stack VOC Emissions (lb/day) = Highest Average Daily Operating Hours (hr/day) x Stack VOC Emission Factor (lb/hr)

Total Average VOC Emissions (lb/day) = Average Fugitive VOC Emissions (lb/day) + Average Stack Emissions (lb/day)

MAXIMUM DAILY VOC EMISSIONS^a

2023 Fugitive VOC Emissions	132.58 lb/day
2024 Fugitive VOC Emissions	132.58 lb/day
2025 Fugitive VOC Emissions	132.58 lb/day
2023 Stack VOC Emissions	2.56 lb/day
2024 Stack VOC Emissions	2.56 lb/day
2025 Stack VOC Emissions	2.56 lb/day
2023 Total VOC Emissions	135.14 lb/day
2024 Total VOC Emissions	135.14 lb/day
2025 Total VOC Emissions	135.14 lb/day

^a Maximum Fugitive VOC Emissions (lb/day) = Maximum Daily Operating Hours (hr/day) x Maximum Fugitive VOC Emission Factor (lb/hr)

Maximum Stack VOC Emissions (lb/day) = Maximum Daily Operating Hours (hr/day) x Stack VOC Emission Factor (lb/hr)

Total Maximum VOC Emissions (lb/day) = Maximum Fugitive VOC Emissions (lb/day) + Maximum Stack Emissions (lb/day)

ANNUAL VOC EMISSIONS^a

2023 Fugitive Emissions	12.74 tpy
2024 Fugitive Emissions	11.61 tpy
2025 Fugitive Emissions	14.91 tpy
2023 Stack Emissions	0.37 tpy
2024 Stack Emissions	0.33 tpy
2025 Stack Emissions	0.34 tpy
2023 Total Emissions	13.11 tpy
2024 Total Emissions	11.94 tpy
2025 Total Emissions	15.25 tpy

^a Maximum annual VOC emissions from 2023-2025 Fee Emission Reports.

Teslin Line #3 (P114) Actual Emission Calculations

OPERATING PARAMETERS

2023 Average Daily Operating Hours	21.05 hr/day
2024 Average Daily Operating Hours	21.14 hr/day
2025 Average Daily Operating Hours	21.53 hr/day
2023 Maximum Daily Operating Hours	24 hr/day
2024 Maximum Daily Operating Hours	24 hr/day
2025 Maximum Daily Operating Hours	24 hr/day
2023 Annual Operating Hours	5,515 hr/yr
2024 Annual Operating Hours	6,597 hr/yr
2025 Annual Operating Hours	7,257 hr/yr

VOC EMISSION FACTORS^a

Average Fugitive VOC Emission Factor ^b	3.985 lb/hr
Maximum Fugitive VOC Emission Factor ^c	5.524 lb/hr
Stack VOC Emission Factor ^d	0.107 lb/hr

^a PPG calculates actual emissions from the Teslin operations based on a mass balance of organics for the system over a rolling, 30-day period.

^b The average fugitive VOC emission factor is calculated based on the total fugitive VOC emissions from 2023-2025 divided by the total operating hours of the Teslin lines during this time.

^c Maximum fugitive VOC emission factor is calculated based on the maximum average daily VOC emissions factor from each rolling, 12-month period between 2023-2025.

^d Stack VOC emission factor is derived from February 2016 stack test data (0.32 lb/hr) equally distributed between the three (3) Teslin Lines.

AVERAGE DAILY VOC EMISSIONS^a

2023 Fugitive VOC Emissions	83.88 lb/day
2024 Fugitive VOC Emissions	84.26 lb/day
2025 Fugitive VOC Emissions	85.82 lb/day
2023 Stack VOC Emissions	2.25 lb/day
2024 Stack VOC Emissions	2.26 lb/day
2025 Stack VOC Emissions	2.30 lb/day
2023 Total VOC Emissions	86.13 lb/day
2024 Total VOC Emissions	86.52 lb/day
2025 Total VOC Emissions	88.11 lb/day

^a Average Fugitive VOC Emissions (lb/day) = Highest Average Daily Operating Hours (hr/day) x Average Fugitive VOC Emission Factor (lb/hr)

Average Stack VOC Emissions (lb/day) = Highest Average Daily Operating Hours (hr/day) x Stack VOC Emission Factor (lb/hr)

Total Average VOC Emissions (lb/day) = Average Fugitive VOC Emissions (lb/day) + Average Stack Emissions (lb/day)

MAXIMUM DAILY VOC EMISSIONS^a

2023 Fugitive VOC Emissions	132.58 lb/day
2024 Fugitive VOC Emissions	132.58 lb/day
2025 Fugitive VOC Emissions	132.58 lb/day
2023 Stack VOC Emissions	2.56 lb/day
2024 Stack VOC Emissions	2.56 lb/day
2025 Stack VOC Emissions	2.56 lb/day
2023 Total VOC Emissions	135.14 lb/day
2024 Total VOC Emissions	135.14 lb/day
2025 Total VOC Emissions	135.14 lb/day

^a Maximum Fugitive VOC Emissions (lb/day) = Maximum Daily Operating Hours (hr/day) x Maximum Fugitive VOC Emission Factor (lb/hr)

Maximum Stack VOC Emissions (lb/day) = Maximum Daily Operating Hours (hr/day) x Stack VOC Emission Factor (lb/hr)

Total Maximum VOC Emissions (lb/day) = Maximum Fugitive VOC Emissions (lb/day) + Maximum Stack Emissions (lb/day)

ANNUAL VOC EMISSIONS^a

2023 Fugitive Emissions	12.25 tpy
2024 Fugitive Emissions	11.61 tpy
2025 Fugitive Emissions	14.91 tpy
2023 Stack Emissions	0.29 tpy
2024 Stack Emissions	0.35 tpy
2025 Stack Emissions	0.39 tpy
2023 Total Emissions	12.54 tpy
2024 Total Emissions	11.96 tpy
2025 Total Emissions	15.30 tpy

^a Maximum annual VOC emissions from 2023-2025 Fee Emission Reports.

Teslin Line #4 (P115) Actual Emission Calculations

OPERATING PARAMETERS

2023 Average Daily Operating Hours	21.35 hr/day
2024 Average Daily Operating Hours	20.96 hr/day
2025 Average Daily Operating Hours	20.06 hr/day
2023 Maximum Daily Operating Hours	24 hr/day
2024 Maximum Daily Operating Hours	24 hr/day
2025 Maximum Daily Operating Hours	24 hr/day
2023 Annual Operating Hours	6,064 hr/yr
2024 Annual Operating Hours	6,310 hr/yr
2025 Annual Operating Hours	6,680 hr/yr

VOC EMISSION FACTORS^a

Average Fugitive VOC Emission Factor ^b	3.985 lb/hr
Maximum Fugitive VOC Emission Factor ^c	5.524 lb/hr
Stack VOC Emission Factor ^d	0.107 lb/hr

^a PPG calculates actual emissions from the Teslin operations based on a mass balance of organics for the system over a rolling, 30-day period.

^b The average fugitive VOC emission factor is calculated based on the total fugitive VOC emissions from 2023-2025 divided by the total operating hours of the Teslin lines during this time.

^c Maximum fugitive VOC emission factor is calculated based on the maximum average daily VOC emissions factor from each rolling, 12-month period between 2023-2025.

^d Stack VOC emission factor is derived from February 2016 stack test data (0.32 lb/hr) equally distributed between the three (3) Teslin Lines.

AVERAGE DAILY VOC EMISSIONS^a

2023 Fugitive VOC Emissions	85.09 lb/day
2024 Fugitive VOC Emissions	83.54 lb/day
2025 Fugitive VOC Emissions	79.94 lb/day
2023 Stack VOC Emissions	2.28 lb/day
2024 Stack VOC Emissions	2.24 lb/day
2025 Stack VOC Emissions	2.14 lb/day
2023 Total VOC Emissions	87.37 lb/day
2024 Total VOC Emissions	85.78 lb/day
2025 Total VOC Emissions	82.08 lb/day

^a Average Fugitive VOC Emissions (lb/day) = Highest Average Daily Operating Hours (hr/day) x Average Fugitive VOC Emission Factor (lb/hr)

Average Stack VOC Emissions (lb/day) = Highest Average Daily Operating Hours (hr/day) x Stack VOC Emission Factor (lb/hr)

Total Average VOC Emissions (lb/day) = Average Fugitive VOC Emissions (lb/day) + Average Stack Emissions (lb/day)

MAXIMUM DAILY VOC EMISSIONS^a

2023 Fugitive VOC Emissions	132.58 lb/day
2024 Fugitive VOC Emissions	132.58 lb/day
2025 Fugitive VOC Emissions	132.58 lb/day
2023 Stack VOC Emissions	2.56 lb/day
2024 Stack VOC Emissions	2.56 lb/day
2025 Stack VOC Emissions	2.56 lb/day
2023 Total VOC Emissions	135.14 lb/day
2024 Total VOC Emissions	135.14 lb/day
2025 Total VOC Emissions	135.14 lb/day

^a Maximum Fugitive VOC Emissions (lb/day) = Maximum Daily Operating Hours (hr/day) x Maximum Fugitive VOC Emission Factor (lb/hr)

Maximum Stack VOC Emissions (lb/day) = Maximum Daily Operating Hours (hr/day) x Stack VOC Emission Factor (lb/hr)

Total Maximum VOC Emissions (lb/day) = Maximum Fugitive VOC Emissions (lb/day) + Maximum Stack Emissions (lb/day)

ANNUAL VOC EMISSIONS^a

2023 Fugitive Emissions	12.75 tpy
2024 Fugitive Emissions	11.61 tpy
2025 Fugitive Emissions	14.91 tpy
2023 Stack Emissions	0.32 tpy
2024 Stack Emissions	0.34 tpy
2025 Stack Emissions	0.36 tpy
2023 Total Emissions	13.07 tpy
2024 Total Emissions	11.95 tpy
2025 Total Emissions	15.27 tpy

^a Maximum annual VOC emissions from 2023-2025 Fee Emission Reports.

Public Notice
Ohio Environmental Protection Agency
Draft State Implementation Plan
VOC Reasonably Available Control Technology (RACT)
for PPG – North Plant (Facility ID 1677020163), PPG – South Plant (Facility ID
1677020162) and PPG – Teslin (Facility ID 1677020164)

Summit County

Notice is hereby given that the Director of the Ohio Environmental Protection Agency, (Ohio EPA) is submitting to the United States Environmental Protection Agency (U.S. EPA) Reasonably Available Control Technology (RACT) for PPG – North Plant (Facility ID 1677020163), PPG – South Plant (Facility ID 1677020162) and PPG – Teslin (Facility ID 1677020164) for approval into Ohio's state implementation plan (SIP) for the 2015 ozone National Ambient Air Quality Standard (NAAQS).

On March 17, 2025, Ohio submitted a revision to Ohio's SIP to address RACT requirements for the 2015 8-hour ozone NAAQS. As noted in this submittal, OAC rule 3745-21-11(B) requires facilities that have the potential to emit of fifty tons per year or more, but less than one hundred tons per year of volatile organic compounds (VOC) and are located in nonattainment counties to submit a RACT study for sources not controlled by Ohio's CTG regulations in OAC Chapter 3745-21 or by categorical non-CTG RACT in OAC rules 3745-21-12, 3745-21-14, 3745-21-16, 3745-21-21 and 3745-21-25.

Ohio is now submitting source-specific VOC RACT for PPG – North Plant (Facility ID 1677020163), PPG – South Plant (Facility ID 1677020162) and PPG – Teslin (Facility ID 1677020164) for approval into Ohio's SIP. This facility is located in the Cleveland 2015 ozone maintenance area and has no prior existing source-specific RACT established in OAC rule 3745-21-09.

The updated RACT Study was submitted per OAC rule 3745-21-11(B). Ohio has determined that the updated RACT study, along with supplemental information submitted subsequently, is sufficient to justify implementing a combination of controls ranging from 85% to 90% control efficiency, leak detection and repair and a series of limitations to reduce VOC emissions proposed by the facility to act as RACT under the 2015 ozone standard.

Ohio EPA is now requesting approval of the proposed RACT for PPG – North Plant, PPG – South Plant and PPG – Teslin into Ohio's SIP.

Ohio EPA is seeking public comment to satisfy U.S. EPA requirements for public involvement in SIP related activities in accordance with 40 CFR 51.102.

The public comment period will run until November 2, 2026. Written comments should be submitted at: <https://ohioepa.commentinput.com> - Search by entering the permit # (P0140925 for PPG – North Plant, P0140927 for PPG – South Plant, and P0140922 for PPG - Teslin) in the "Search Projects" search box.

A public hearing on this action may be requested by contacting Kathryn Jobe at 614-728-0671 or kathryn.jobe@epa.ohio.gov no later than 30 days from the draft public notice. If a public hearing is requested, a new notification will be published to identify the time and location of the public hearing. The public hearing will be held at least 30 days after the date of the new notification.

All interested persons are entitled to comment on these changes. All comments submitted to the above address by the close of business 30 days from when the draft public notice is issued will be considered by Ohio EPA prior to final action on this action. Written statements submitted after this time period may be considered as time and circumstances permit but will not be part of the official record.

Questions or comments about this document should be directed to Kathryn Jobe at 614-728-0671 or kathryn.jobe@epa.ohio.gov.



DATE

Ms. Anne Vogel
Regional Administrator
U.S. EPA, Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604

Re: Revision to Ohio's Reasonably Available Control Technology (RACT) State Implementation Plan for the 2015 Ozone National Ambient Air Quality Standards – Source-Specific Volatile Organic Compounds (VOC) RACT for PPG – North Plant (Facility ID 1677020163), PPG – South Plant (Facility ID 1677020162) and PPG – Teslin (Facility ID 1677020164)

Dear Administrator Vogel:

On March 17, 2025, Ohio submitted a revision to Ohio's State Implementation Plan (SIP) to address Reasonably Available Control Technology (RACT) requirements for the 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS) for areas classified as serious. As noted in this submittal, Ohio EPA adopted requirements in OAC rule 3745-21-11 for facilities in the nonattainment areas that emit fifty tons per year or more, but less than one hundred tons per year of VOC from sources not controlled by Ohio's CTG regulations in OAC Chapter 3745-21 or by categorical non-CTG RACT in OAC rules 3745-21-12, 3745-21-14, 3745-21-16, 3745-21-21 and 3745-21-25. Upon review of the RACT study, Ohio EPA evaluated if the RACT proposed by the facility is appropriate to satisfy RACT requirements under the 2015 ozone standard.

Ohio is now submitting source-specific VOC RACT for PPG – North Plant (Facility ID 1677020163), PPG – South Plant (Facility ID 1677020162) and PPG – Teslin (Facility ID 1677020164) for approval into Ohio's SIP. This facility is located in the Cleveland 2015 ozone maintenance area and has no prior existing source-specific RACT established in OAC rule 3745-21-09.

The updated VOC RACT Study was submitted per OAC rule 3745-21-11. Ohio has determined that the updated RACT study, along with supplemental information submitted subsequently, is sufficient to justify implementing a combination of controls ranging from 85% to 90% control efficiency, leak detection and repair and a series of limitations to reduce VOC emissions proposed by the facility to act as RACT under the 2015 ozone standard. The RACT study is provided in Appendix A, and the permit that incorporated RACT is provided as Appendix B. Within the permit, we have highlighted the

terms and conditions associated with RACT and request only those provisions are subject to this SIP revision request. Appendix C provides the permit strategy write-up for the permit.

Ohio held a public comment period on Ohio's RACT determination from October 1 to November 2, 2026. Appendix D contains the public notice. ***[Ohio's response to comments received during the public comment period is in Appendix E/No comments were received during the public comment period].***

This SIP does not include the relaxation of any existing requirements and therefore will not interfere with the attainment or maintenance of the NAAQS in accordance with section 110(l) of the CAA.

Ohio EPA is now requesting approval of the proposed RACT for PPG – North Plant, PPG – South Plant and PPG – Teslin into Ohio's SIP.

Ohio EPA is submitting this SIP via U.S. EPA's State Planning Electronic Collaboration System (SPeCS). If you have questions, please contact Jennifer Van Vlerah in our Division of Air Pollution Control at (614) 644-3696.

Sincerely,

John Logue
Director

Cc: Bob Hodanbosi, Chief, Division of Air Pollution Control, Ohio EPA

Enclosures