MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Clean Air Assistance Program

Potential to Emit

A Practical Guide to Calculating and Evaluating Your Potential to Emit Air Pollutants

June 2024

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

The Potential to Emit Workbook – A Practical Guide to Calculating and Evaluating Your Potential to Emit Air Pollutants was developed by the Department of Environment, Great Lakes, and Energy (EGLE), Environmental Support Division, in conjunction with the Air Quality Division (AQD). The Workbook is designed to help you understand an important aspect of your business – your facility's *potential to emit* air pollutants. Your potential to emit (PTE) affects the regulatory status of your business, as well as compliance requirements with both federal and state regulations.

This workbook will help you understand why determining PTE is important and take you step by-step through calculating your facility's PTE. The workbook will also help you evaluate your PTE to determine if you are a major or minor source of air pollution under specific rules as well as which options will best lead you to compliance with the regulations.

Note: This publication was developed for guidance purposes only. Since every situation cannot be addressed in this book, EGLE, Air Quality Division may require that you use an alternative method to calculate your PTE. If you have specific questions related to calculating the PTE for your facility, it is recommended that you contact your AQD district office for guidance.

For more information about calculating PTE, including U.S. Environmental Protection Agency guidance and several PTE calculation worksheets, visit the Air Quality Division's Potential to Emit website: Michigan.gov/air (select "Permits" then "Permits to Install (PTI/New Source Review (NRS)" then "Potential to Emit").

Contents

Part 1: Introduction to Potential to Emit

How can this document help you?

The applicability of some air quality requirements is based upon a facility's PTE air pollutants. In order to determine whether or not your facility is subject to Air Quality rules and regulations, each facility must determine their PTE of air contaminants. The greater the PTE for your facility, the more likely you are subject to various Air Quality rules and regulations. This document will help you understand what PTE is, how it is calculated, and what air regulations may apply to you based on your facility's calculated PTE.

What is PTE?

The entire definition for PTE is contained in R 336.1116(n) or Rule 116(n) of the Michigan Air Pollution Control Rules.

To put it simply, PTE is the maximum amount of air contaminants that your facility could emit if all of the following is evaluated:

- each process is operated at 100% of its design capacity
- each process is operated 24 hours/day, 365 days/year
- the materials emitting the highest amount of air contaminants are used or processed
- air pollution control equipment either is not in use or is turned off.

When to calculate PTE?

There are several occasions when PTE should be calculated or re-calculated for a facility, or a project. These could include any of the following:

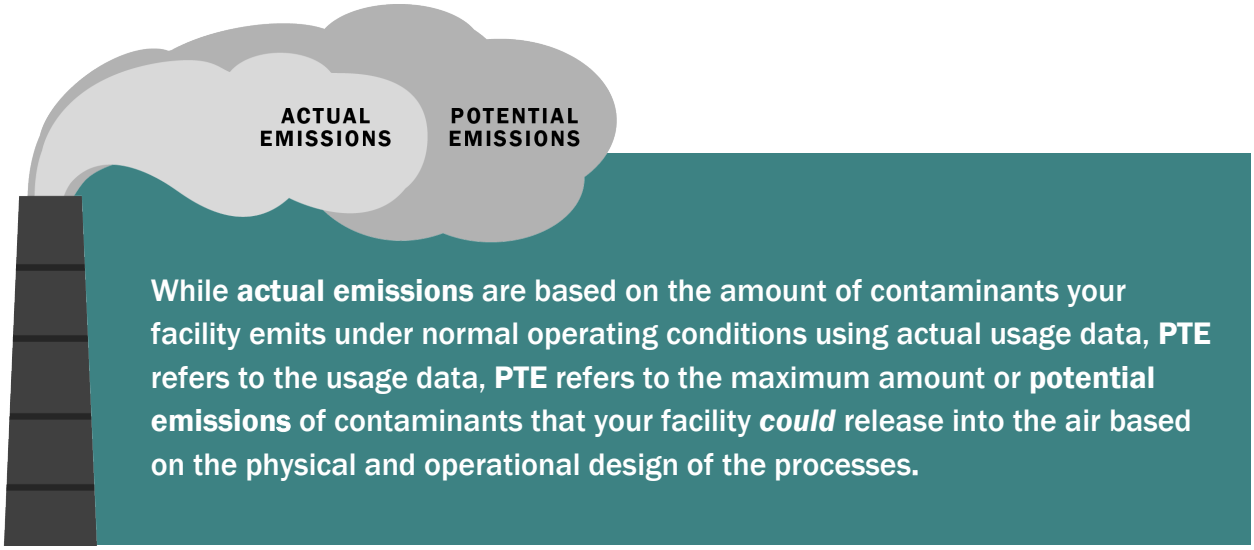
- Construction of a new facility to determine which Air Quality Rules and Regulations you are subject to
- Upon renewal of your Title V permit (Renewable Operating Permit)
- Upon installation of new equipment – this includes exempt equipment.

It is important to know your facility PTE when considering any new projects.

The PTE Equation

PTE refers to the amounts of air contaminants that the facility could release into the air while operating at the maximum design capacity, with the highest polluting materials and operating 100% of the time. The standard equation used in calculating PTE for each air contaminant emitted from each process is: **PTE = (maximum hourly emission rate of pollutant) x (8760 hours)**

However, as you will see in Part 2 of this workbook, process bottlenecks, permit conditions, air quality rules, and compliance/enforcement documents may legally restrict the ability your facility has to emit air contaminants.



Why is a facility's PTE used and not actual emissions when determining applicability?

Many state and federal rules governing air pollutants are based on a source's PTE, not their actual emissions. PTE is an impartial way to categorize and regulate facilities by using consistent criteria that does not change unless new equipment is added, or operational restrictions have changed. Actual emissions, on the other hand, can fluctuate from year-to-year due to changes in a facility's production rates. Using PTE to determine applicability levels the playing field for all companies.

Which air pollutants are considered?

The Clean Air Act (CAA) governs air pollutants based on whether the pollutants may have negative effects on human health and/or the environment. When calculating PTE, the focus is on three categories of pollutants:

1. Regulated Air Pollutants
    - Carbon Monoxide (CO)
    - Lead (Pb)
    - Ozone (O3), including Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx) - ozone precursors*
    - Nitrogen Oxides (NOx)
    - Particulate Matter (PM)
    - Particulate Matter < 10 microns in diameter (PM-10)
    - Particulate Matter < 2.5 microns in diameter (PM 2.5)
    - Sulfur Dioxide (SO2)
    - Green House Gases (GHGs)

2. Hazardous air pollutants

   Table 1-2 contains the list of hazardous air pollutants (HAPs). Some HAPs are also considered VOCs and should be included in PTE calculations for both. HAPs that are in particulate form should also be counted as PM, PM10 and PM2.5.

3. Other air pollutants

- **National Emission Standards for Hazardous Air Pollutants (NESHAP)**
  - Arsenic
  - Asbestos
  - Beryllium
  - Benzene
  - Mercury
  - Radionuclides
  - Vinyl chloride

- **New Source Performance Standard (NSPS) Pollutants**
  - Cadmium
  - Dioxin/furan
  - Fluorides**
  - Hydrogen chloride
  - Hydrogen sulfide**
  - Mercury
  - Nonmethane organic compounds
  - Reduced sulfur compounds
  - Sulfuric acid mist**
  - Total organic compounds
  - Total particulate matter
  - Total reduced sulfur**

  *Most facilities do not directly emit ozone. However, they may emit VOCs and NOx, which contribute to ground level ozone formation. A VOC is any compound of carbon or mixture of compounds of carbon that participates in photochemical reactions excluding the compounds listed in Table 1-5.

  **Also considered to be a regulated air pollutant under the Prevention of Significant Deterioration (PSD) Program.

- **Class I and Class II Pollutants**

  Title VI of the Clean Air Act Amendments of 1990 required the phase-out of chlorofluorocarbons (CFCs) that deplete the ozone layer in the upper atmosphere (this is the "good" ozone that protects us from the sun's harmful rays). These ozone depleting substances are divided into two classes, Class I and Class II air pollutants. Table 1-5 contains a list of these ozone depleting pollutants.

What does it mean to be a major source of an air contaminant?

There are several programs that apply to specific categories of major sources, such as the Renewable Operating Permit Program (ROP or Title V Program), National Emissions Standards for Hazardous Air Pollutants (NESHAP) and the Prevention of Significant Deterioration (PSD) Program. These programs have specific requirements that apply to sources that are considered major in that category. This workbook will focus specifically on the ROP or Title V program in which a major source would be defined as major under Title V. Table 1-2 lists some of the thresholds for determining whether your facility is a major or minor source of air contaminants and is subject to Title V, as well as some common processes that may generate those contaminants.

A facility with a calculated PTE at or above the thresholds listed in Table 1-2 is considered a **major** source of air contaminants under Title V. If the calculated PTE for the facility yields numbers below the thresholds, the facility would be considered a **minor** source of air contaminants. As a minor source, you may not have to meet certain requirements, or you may have requirements that are less stringent.

The requirements associated with being a major source under Title V are discussed in further detail in **Parts 3, 4 and 5** of this workbook. PSD sources are typically very large sources of air contaminants that have their own set of regulations. If, after you complete the steps to calculate your PTE in this workbook, your results indicate that you may be a major source under the PSD or another program, contact your District Office.

Table 1-1: Title V Major Source Emission Thresholds

Type of Pollutant	Major Source Threshold	Common Sources of Pollutant
PM	100 tons/year	Dusty activities such as grain handling, milling, sand and gravel operations
PM10	100 tons/year	Dusty activities such as grain handling, milling, sand and gravel operations
PM2.5	100 tons/year	Fuel burning activities
VOCs	100 tons/year	Solvent cleaning, painting, fuel storage and transfer
CO	100 tons/year	Fuel combustion
NOx	100 tons/year	Fuel combustion
SO_2	100 tons/year	Fuel combustion
Lead (Pb)*	100 tons/year	Wave soldering, lead smelting and recycling
HAPs	10 tons/year - any single HAP 25 tons/year - any combination of HAPs	Solvent cleaning, painting, fuel storage and transfer * Lead compounds are considered HAPs
GHGs	75,000 – 100,000 tons/year on a Carbon Dioxide Equivalent (CO_{2e}) basis	Fuel Combustion
Any other regulated air contaminant	100 tons/year	

A facility that has the potential to emit 10 tons/year of any one hazardous air pollutant (HAP), 25 tons/year of any combination of HAPs, or 100 tons/year of any regulated air contaminant is considered a **major** source and is subject to Title V of the Clean Air Act and are covered under the Renewable Operating Permit Program.

Table 1-2: Hazardous Air Pollutants (HAPs)

(Revised January 2022) This list may change. Check epa.gov/haps/initial-list-hazardous-air-pollutants-modifications for current listing.

CAS Number listed, followed by chemical name.

75070	Acetaldehyde	108907	Chlorobenzene	79447	Dimethyl carbarmoyl chloride
60355	Acetamide	510156	Chlorobenzilate	68122	Dimethyl formamide
75058	Acetonitrile	67663	Chloroform	57147	1,1 Dimethyl hydrazine
98862	Acetophenone	107302	Chloromethyl methyl ether	131113	Dimethyl phthalate
53963	2-Acetylaminofluorene	126998	Chloroprene	77781	Dimethyl sulfate
107028	Acrolein	1319773	Cresols/Cresylic acid (isomers and mixtures)	534521	4,6-Dintro-o-cresol, and salts
79061	Acrylamide	95487	o-Cresol	51285	2,4-Dinitrophenol
79107	Acrylic acid	108394	m-Cresol	121142	2,4-Dinitrotoluene
107131	Acrylonitrile	106445	p-Cresol	123911	1,4-Dioxane (1,4-Diethyleneoxide)
107051	Allyl chloride	98828	Cumene	122667	1,2-Diphenylhydrazine
92671	4-Aminobiphenyl	94757	2,4-D, salts and esters	106898	Epichlorohydin (1-Chloro-2,3-epozypropane)
62533	Aniline	3547044	DDE	106887	1,2-Epozybutane
90040	o-Anisdine	334883	Diazomethane	140885	Ethyl acrylate
1332214	Asbestos	132649	Dibenzofurans	100414	Ethyl benzene
71432	Benzene	96128	1,2-Dibromo-3-chloropropane	51796	Ethyl carbamate (Urethane)
92875	Benzidine	84742	Dibutylphthalate	75003	Ethyl chloride (Chloroethane)
98077	Benzotrichloride	106467	1,4-Dichlorobenzene(p)	106934	Ethylene dibromide) (Dibromoethane)
100447	Benzyl chloride	91941	3,3-ichlorobenzidene	107062	Ethylene dichloride (1,2-Dichloroethane)
92524	Biphenyl	111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)	107211	Ethylene glycol
117817	Bis (2-ethylhexyl) phthalate (DEHP)	542756	1,3-Dichloropropene	151564	Ethylene imine (Aziridine)
542881	Bis (chloromethyl) ether	62737	Dichlorvos	75218	Ethylene oxide
75252	Bromoform	111422	Diethanolamine	96457	Ethylene thiourea
106945	1-bromopropane	21697	N,N-Diethyl aniline (N,N-Dimethylaniline)	75343	Ethylidene dichloride (1,1-Dichloroethane)
106990	1,3-Butadiene	64675	Diethyl sulfate	50000	Formaldehyde
156627	Calcium cyanamide	119904	3,3-Dimethoxybenzidine	76448	Heptachlor
133062	Captan	60117	Dimethyl aminoazobenzene	118741	Hexachlorobenzene
63252	Carbaryl	119937	3,3-Dimethyl benzidine		
75150	Carbon disulfide				
56235	Carbon tetrachloride				
463581	Carbonyl sulfide				
120809	Catechol				
133904	Chloramben				
57749	Chlordane				
7782505	Chlorine				
79118	Chloroacetic acid				
532274	2-Chloroacetophenone				

87683	Hexachlorobutadiene
77474	Hexachlorocyclo pentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diisocyanate
680319	Hexamethyl phosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid
7664393	Hydrogen fluoride (hydrofluoric acid)
123319	Hydroquinone
78591	Isophorone
58899	Lindane (all isomers)
108316	Maleic anhydride
67561	Methanol
72435	Methozychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	4,4-Methylene bis (2-chloroaniline)
75092	Methylene chloride (Dichloromethane)
101688	Methlene diphenyl diisocyanate (MDI)
101779	4,4'-methylenedianiline
91203	Naphtalene
98953	Nitrobenzene
92933	4-Nitrobiphenyl
100027	4-Nitrophenol
79469	2-Nitropropane
684935	N-Nitroso-N-methylurea
62759	N-Nitrosodimethylamine
59892	N-Nitrosomorpholine
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polycholrinated biphenyls (Aroclors)
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
75569	Propylene oxide
78875	Propylene dichloride (1,2-Dichloropropane)
75558	1,2-Propylenimine (2-Methyl aziridine)
91225	Quinoline
106514	Quinone
100425	Styrene
96093	Styrene oxide
1746016	2,3,7,8-Tetrachlorodibenzo p-dioxin
79345	1,1,2,2-Tetrachloroethane
127184	Tetrachloroethylene (Perchloroethylene)
7550450	Titanium tetrachloride
108883	Toluene
95807	2,4-Toluene diamine
584849	2,4-Toluene diisocyanate
95534	o-Toluidine
8001352	Toxaphene (chlorinated camphene)
120821	1,2,4-Trichlorobenzene
79005	1,1,2-Trichloroethane
79016	Trichloroethylene
95954	2,4,5-Trichlorophenol
88062	2,4,6-Trichlorophenol
121448	Triethylamine
1582098	Trifluralin
540841	2,2,4-Trimethylpentane
108054	Vinyl acetate
593602	Vinyl bromide
75014	Vinyl chloride
75354	Vinylidene chloride (1,1 Dichloroethylene)
1330207	Xylenes (isomers and mixtures)
95476	o-Xylenes
108383	m-Xylenes
106423	p-Xylenes

COMPOUNDS

- Antimony compounds
- Arsenic compounds (inorganic including arsine)
- Beryllium compounds
- Cadmium compounds
- Chromium compounds
- Cobalt compounds
- Coke oven emissions
- Cyanide compounds
- Fine mineral fibers
- Glycol ethers*
- Lead compounds
- Manganese compounds
- Mercury compounds
- Nickel compounds
- Polycyclic organic matter
- Radionuclides (including radon)
- Selenium compounds

*Note: Ethylene glycol mono-butyl ether (EGBE) was removed from the HAP list in December 2004. Methyl ethyl ketone (MEK, 2-Butanone) was removed from the list in December 2005. 1-Bromopropane was added February 2022.

Table 1-3: Class I and Class II Ozone Depleting Substances

Class 1 Substances

Group I:

chlorofluorocarbon-11 (CFC-11)
chlorofluorocarbon-12 (CFC-12)
chlorofluorocarbon-113 (CFC-113)
chlorofluorocarbon-114 (CFC-114)
chlorofluorocarbon-115 (CFC-115)

Group II:

halon-1211
halon-1301
halon-2402

Group III:

chlorofluorocarbon-13 (CFC-13)
chlorofluorocarbon-111 (CFC-111)
chlorofluorocarbon-112 (CFC-112)
chlorofluorocarbon-211 (CFC-211)
chlorofluorocarbon-212 (CFC-212)
chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-217 (CFC-217)

Group IV:

carbon tetrachloride

Group V:

methyl chloroform

Class 2 Substances

hydrochlorofluorocarbon-21 (HCFC-21)
hydrochlorofluorocarbon-22 (HCFC-22)
hydrochlorofluorocarbon-31 (HCFC-31)
hydrochlorofluorocarbon-121 (HCFC-121)
hydrochlorofluorocarbon-122 (HCFC-122)
hydrochlorofluorocarbon-123 (HCFC-123)
hydrochlorofluorocarbon-124 (HCFC-124)
hydrochlorofluorocarbon-131 (HCFC-131)
hydrochlorofluorocarbon-132 (HCFC-132)
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hydrochlorofluorocarbon-251 (HCFC-251)
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hydrochlorofluorocarbon-253 (HCFC-253)
hydrochlorofluorocarbon-261 (HCFC-261)
hydrochlorofluorocarbon-262 (HCFC-262)
hydrochlorofluorocarbon-271 (HCFC-271)

Table 1-5: Compounds Not Considered VOCs

Carbon monoxide	1,1,1-trifluoro-2,2-dichloroethane (HCFC-123)	1,1,1,3,3-pentafluoropropane (HFC-245fa)
Carbon dioxide	2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	1,1,1,2,3,3-hexafluoropropane (HFC-236ea)
Carbonic acid	Trifluoromethane (HFC-23)	1,1,1,3,3-pentafluorobutane (HFC365mfc)
Metallic carbides or carbonates	Pentafluoroethane (HFC-125)	Chlorofluoromethane (HCFC-31)
Boron carbide	1,1,2,2-tetrafluoroethane (HFC-134)	1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)
Silicon carbide	1,1,1,2-tetrafluoroethane (HFC-134a)	1-chlor-1-fluoroethane (HCFC-151a)
Ammonium carbonate	1,1,1-trifluoroethane (HFC-143a)	1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxybutane
Ammonium bicarbonate	1,1-difluoroethane (HFC-152a)	2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane
Methane	3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane
Ethane	1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane
Methyl chloroform*	1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee)	Methyl acetate*
Acetone	Difluoromethane (HFC-32)	Methylene chloride*
Cyclic, branched, or linear completely methylated siloxanes	Ethyl fluoride (HFC-161)	Perfluorocarbon compounds*
Parachlorobenzotrifluoride	1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	Tertiary butyl acetate
Perchloroethylene	1,1,2,2,3-pentafluoropropane (HFC-245ca)	Other compounds in materials other than surface coatings that have a vapor pressure $\leq$ 0.1 mm Hg at the temperature at which they are used.
Trichlorofluoromethane (CFC-11)	1,1,2,3,3-pentafluoropropane (HFC-245ea)	
Dichlorodifluoromethane (CFC-12)	1,1,1,2,3-pentafluoropropane (HFC-245eb)	
1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113)		
1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114)		
Chloropentafluoroethane (CFC-115)		
1,1-dichloro-1-fluoroethane (HCFC-141b)		
1 chloro-1,1-difluoroethane (HCFC-142b)		
Chlorodifluoromethane (HCFC-22)		

*Refer to Rule 122(f) for more information about this compound

Part 2: How to Calculate Potential to Emit

This part the workbook discusses how to determine your facility's potential to emit (PTE). The PTE calculation process is illustrated in steps using the example of **Small Business, Inc**. To see an example of how to complete a potential to emit demonstration just follow along with the callout boxes such as the one below.

The PTE process has been broken down into the steps and summarized below, but will be discussed in more detail in the following pages.

STEP 1: Conduct a facility inventory to identify process equipment.

STEP 2: Gather data for each emission source.

STEP 3: Categorize emission sources (permitted, grandfathered, or exempt).

STEP 4: Identify legally enforceable limitations.

STEP 5: Identify the emission calculation methods you will use.

STEP 6: Calculate the PTE for each emission source.

STEP 7: Calculate the PTE for the facility.

You can start the PTE process by using the *Potential to Emit Summary Worksheet* to enter information about your facility for Steps 1 - 5.

Step 1: Conduct a Facility Inventory

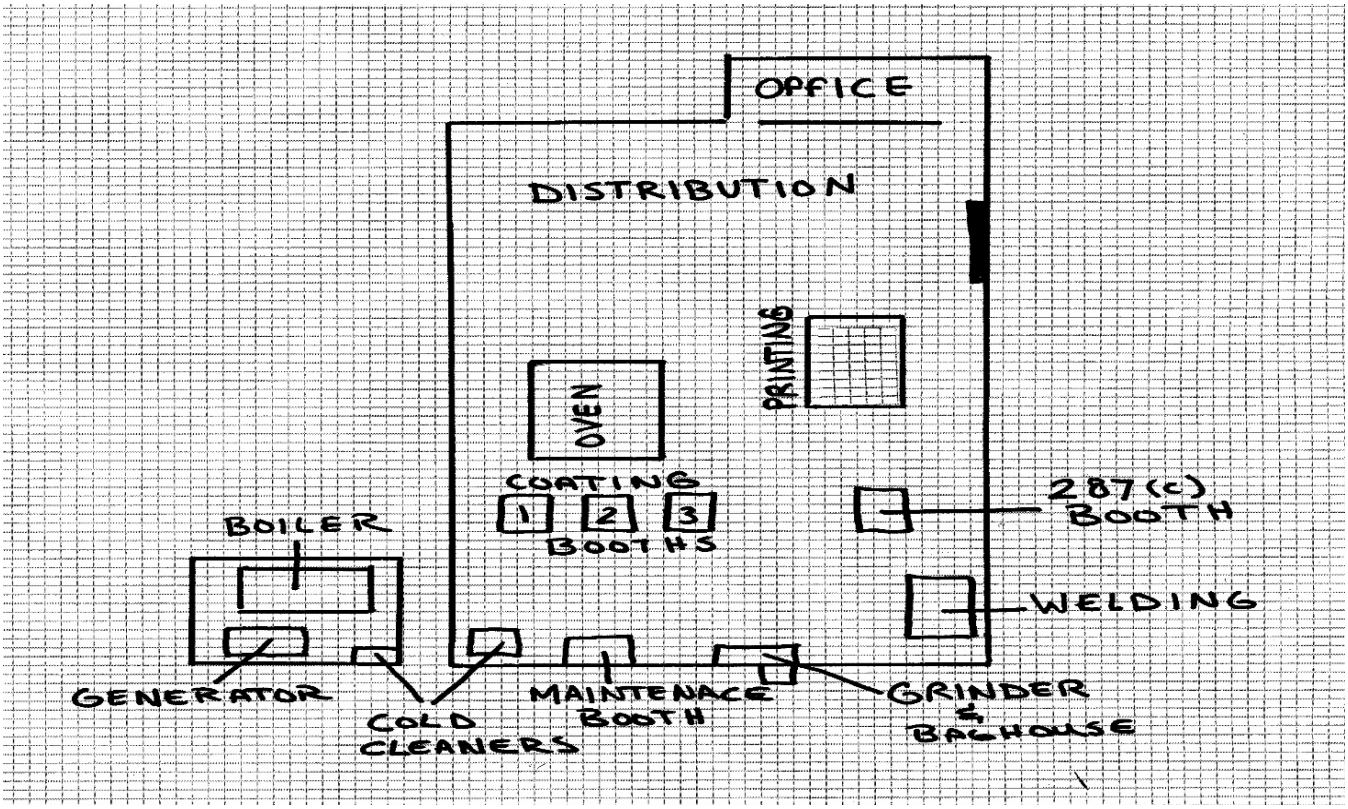
In this first step, you will conduct an inventory of all the processes at your facility or **stationary source**. Examine each piece of equipment or process and determine whether or not that process emits air contaminants.

EGLE, Air Quality Division Policy and Procedure AQD-011 provides guidance on determining what is considered a **stationary source** (i.e., a facility). This guidance is available at **Michigan.gov/Air** (select "Permits" then "Permits to Install (PTI/New Source Review (NRS)" then "Potential to Emit")

Small Business, Inc.

Site Diagram – Showing Emission Sources

Small Business, Inc.'s site diagram is below.



Next, identify the emission sources. These are the processes at the facility (such as boilers, spray paint booths, degreasers, generators, etc.) that generate air contaminants. If you have any air permits, use them to help identify your emission sources.

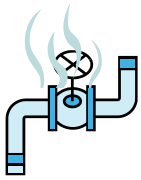
Even though some of your operations may not directly emit contaminants to the outside atmosphere through a stack or vent, the emissions will eventually exhaust into the atmosphere through building ventilation or escape through doors or windows. These types of emissions must be included in your calculations.

Be sure to include any processes not located in your main building. If you have an emergency generator, storage silo, or other equipment located within your stationary source, but away from the main building, it is still part of the facility. You may also have equipment that you do not operate anymore. If a process is still operable, it must be included in your PTE calculation.

As you identify emission sources, remember to include **all** sources of air contaminants, such as non-production units like welding or grinding. Also, be sure to include the emission of air contaminants resulting from all aspects of the operation of a process. Ancillary activities such as cleanup are often overlooked. Most paint application equipment is purged and cleaned with solvents that evaporate into the air. These emissions must be included in the PTE calculations for the process.

Do I Need to Include Fugitive Emissions?

Air contaminants that ***cannot*** reasonably passthrough a stack, vent, or functionally-equivalent opening are called **fugitive emissions**. Examples of fugitive emissions include dust blowing from rock or coal piles as well as dust kicked up by vehicles traveling on roadways. VOC emissions from outdoor leaking valves or flanges are also considered fugitive emissions.



You will include quantifiable fugitive emissions in your PTE calculation if:

1. The fugitive emissions are HAPs.

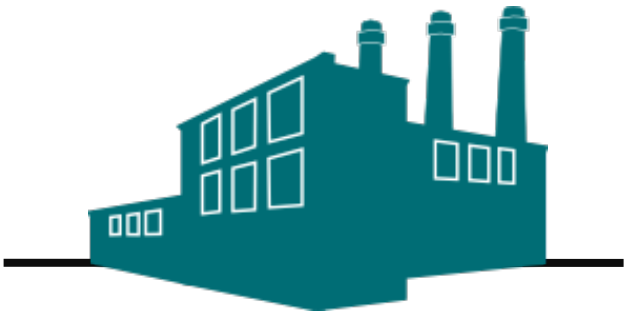
OR

2. Your facility is one of those source categories in the following list, in which case you will need to include the quantifiable fugitive emissions of all other regulated air pollutants (e.g., particulate matter, VOCs).

OR

3. Your facility is subject to a NSPS or NESHAP promulgated before August 7, 1980.

Some large facilities may have a source category listed below as well as other source categories that are not listed. The fugitive emissions of all regulated air pollutants, other than HAPs from the non-listed source, would not have to be considered in the facility's PTE calculation.



If you need to include fugitive emissions, identify them as a separate emission source or part of an already established emission

Taking a walk through your facility is a great way to identify the sources of air contaminants in your facility. Another way to locate all of your emission sources is to review documents such as air permits, Annual Emissions Reporting forms, and the Toxic Chemical Release Inventory Reporting Form (also known as Form R). The information contained in these reports will also be useful in completing your PTE calculations.

Types of Facilities that Must Include Fugitive Emissions PTE

- Coal cleaning plants - with thermal dryers
- Portland cement plants
- Iron and steel mills
- Primary copper smelters
- Hydrofluoric, sulfuric, or nitric acid plants
- Lime plants
- Coke oven batteries
- Carbon black plants
- Fuel conversion plants
- Secondary metal production plants
- Fossil-fuel boilers (or combination thereof) totaling more than 250 mmbtu/hr
- Taconite ore processing plants
- Charcoal production plants
- Asphalt concrete plants
- Secondary lead smelters and refineries
- Sewage treatment plants
- Ferro-alloy production plants
- Stationary gas turbines
- Kraft pulp mills
- Primary zinc smelters
- Primary aluminum ore reduction plants
- Municipal incinerators capable of charging more than 250 tons of refuse per day
- Petroleum refineries
- Phosphate rock processing plants
- Sulfur recovery plants
- Primary lead smelters
- Sintering plants*
- Chemical process plants- not including ethanol production by natural fermentation
- Petroleum storage and transfer units, total storage capacity over 300,000 barrels- or 40,000 gallons
- Glass fiber processing plants
- Fossil fuel-fired steam electric plants of more than 250 mmbtu/hr
- Phosphate fertilizer plants
- Grain elevators
- Stationary sources subject to NESHAP for asbestos, beryllium, mercury, vinyl chloride

*Processing of fine grain materials into coarser lumps (performed primarily on ores).

Insignificant Activities at a Stationary Source

Emissions from the insignificant activities listed below are excluded from PTE calculations, unless the facility-wide PTE is very close to the major source thresholds, in which case you may need to include the emissions from these sources.

- Repair and maintenance of grounds and structures and repair and maintenance of process and process equipment pursuant to Michigan Rule R336.1285(2)(a)-(c).
- Use of office supplies.
- Use of housekeeping and janitorial supplies.
- Sanitary plumbing and associated stacks or vents.
- Temporary activities related to the construction or dismantlement of buildings, utility lines, pipelines, wells, earthworks, or other structures.
- Storage and handling of drums or other transportable containers where the containers are sealed during storage and handling.
- Fire protection equipment, firefighting, and training in preparation for fighting fires.
- Use, servicing, and maintenance of motor vehicles including cars, trucks, lift trucks, locomotives, aircraft, or water craft, except where those activities are subject to an applicable requirement (e.g., requirement to have a fugitive dust control or operating program).
- Construction, repair, and maintenance of roads or other paved or unpaved areas, except where those activities are subject to an applicable requirement (e.g., requirement to have a fugitive dust control or operating program).

Small Business, Inc.

PTE Summary Table

Small Business, Inc. identified the emission sources and included these sources on the PTE Summary Sheet. Follow this example to complete the first two columns on your PTE Summary

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
COATING BOOTHS 1-3	3 spray booths	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
OVEN	2,500,000 Btu/hr natural gas fired	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
MAINTENANCE BOOTH	Booth used for touchup	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
PRINTING	Prints information on product	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
SPECIAL PROJECT BOOTH	Spray booth used for special projects	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
COLD CLEANERS	2 cold cleaners for parts washing	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
CLEANUP	Facility-wide cleanup solvents	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
GRINDER	Metal parts grinder connected to baghouse (29,000 cfm)	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
WELDING	Shielded metal arc welding	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
BOILER	10 million Btu/hr natural gas fired boiler	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
GENERATOR	Diesel fired emergency generator	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		

STEP 2: Gather Data for Each Emission Source

Before you begin calculating the PTE for each of your emission sources, you will want to gather process data that will help in determining the PTE.

Below is a list of items you should gather. This information will be used to calculate your PTE as well as the method of calculation. You may want to enter relevant capacity data on the PTE Summary Worksheet in the description column.

- ☐ **Air permits.** Look for any Permits to Install or Renewable Operating Permits issued to your company.
- ☐ **Safety Data Sheets (SDS) or technical data sheets, such as manufacturer's formulation data, for raw materials used in the processes.** This information will determine what pollutants may be emitted. For example, if the emission source is a boiler, gather information about the fuel(s) used. If the emission source is a coating line, gather SDS or manufacturer formulation data for the coatings used.

  If the emission source is a coating line that uses several different coatings per year, use an SDS that represents the worst-case coating i.e., the coating that has the highest VOC content and HAP content. (Note that this may be two different coatings).

- ☐ **Performance test results.** Collect data from stack tests that have been conducted or any other type of test conducted on the performance of the equipment, raw materials, or emissions.
- ☐ **Capture and control efficiency of pollution control equipment.** If you have an air pollution control device (e.g., baghouse, scrubber), the manufacturer should be able to provide you with documentation that shows the percentage of a particular pollutant the device will capture and/or control.
- ☐ **Vendor literature describing the process.**

  Air emissions data that shows what pollutants are emitted from a process and, in some cases, an emission rate.

  Maximum application rate of spray guns - gallons/hour or gallons/minute
  Maximum heat input capacity of boilers and ovens - Btu/hour
  Maximum capacity of fans that exhaust pollutants - cubic feet of air/minute
  Production rate - products/hour or product/minute
  Fuel usage rate of generators - gallons or cubic feet of fuel/hour

  This information can usually be found in the vendor literature for the equipment or by contacting the manufacturer.

STEP 3: Categorize Emission Sources (Permitted, Grandfathered, or Exempt)

In this step you will categorize each of the emission sources you identified in Step 1 as being permitted, grandfathered, or exempt from air permitting. Although an emission source may be exempt or grandfathered from permitting requirements, you will still need to include its emissions in your PTE calculation. The paragraphs below explain each of these categories.

Permitted

If the emission source is identified in a Permit to Install or a ROP then it is "permitted." Review all permits that have been issued to your facility by the Department of Environment, Great Lakes, and Energy (EGLE)Air Quality Division (AQD). These permits contain valuable information which will assist you in calculating your PTE. For example, limits contained in a permit may be used to restrict your PTE.

Grandfathered

To be considered grandfathered an emission unit must have been installed before August 15, 1967. Additionally, the emission unit must not have had any modifications or changes made to it since that date. There are very few processes that meet the grandfathered conditions; however, those that do are not required to have a Permit to Install. Emissions from grandfathered emission sources must still be included in your PTE calculation.

Exempt

The Michigan Air Pollution Control Rules exempt certain processes and equipment from the requirement to obtain a Permit to Install; however, an ROP has requirements to include some equipment that is exempt equipment. If the emission source is not included in a permit or grandfathered, it should be exempt from permitting pursuant to one of these rules. Identify the appropriate exemption for your emission source in R 336.1280 through R 336.1291 (Rules 280 - 291) . See the following summary of the exemption categories.

Be aware that R 336.1278 (Rule 278) excludes some emission sources from being exempt if emissions are considered significant. Review Rule 278 before determining whether the emission source is exempt. It is important to remember if there are no actual emissions yet available for calculating emission levels to compare to significance levels, the PTE for that piece of equipment should be used as a surrogate.

Exempt Categories

Examples of the broad categories where certain specific exemptions may be found are:

- Cooling and ventilating equipment (Rule 280)
- Cleaning, washing, and drying equipment (Rule 281)
- Furnaces, ovens, or heaters (Rule 282)
- Testing and inspection equipment (Rule 283)
- Containers, reservoirs, or tanks (Rule 284)
- Routine maintenance, parts replacement or repairs, and miscellaneous changes and operations (Rule 285)
- Plastic processing equipment (Rule 286)
- Surface coating equipment (Rule 287)
- Oil and gas processing equipment (Rule 288)
- Asphalt and concrete production equipment (Rule 289)
- Emission Units with limited emissions (Rule 290)
- Emission Units with "de minimis" emissions (Rule 291)

Note: The rules must be reviewed carefully to determine if a source really falls under an exemption category. If you determine that a process is exempt, keep a written record of how you arrived at that decision.

Small Business, Inc.

PTE Summary Table

Small Business, Inc. categorized all of its emission sources using the PTE Summary Worksheet. Use the PTE Summary Worksheet to categorize all your emission sources.

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
COATING BOOTHS 1-3	3 spray booths	☒ Permitted: PTI # 999-89 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
OVEN	2,500,000 Btu/hr natural gas fired	☒ Permitted: PTI # 999-89 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
MAINTENANCE BOOTH	Booth used for touchup	☒ Permitted: PTI # 825-82 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____		
PRINTING	Prints information on product	☐ Permitted: PTI #_____ ☒ Grandfathered: 10/15/1966 ☐ Exempt: R 336._____		
SPECIAL PROJECT BOOTH	Spray booth used for special projects	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1287(2)(c)**		
COLD CLEANERS	2 cold cleaners for parts washing	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1281(2)(h)**		
CLEANUP	Facility-wide cleanup solvents	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1290**		
GRINDER	Metal parts grinder connected to baghouse (29,000 cfm)	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(l)(vi)**		
WELDING	Shielded metal arc welding	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(i)**		
BOILER	10 million Btu/hr natural gas fired boiler	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1282(2)(b)(i)**		
GENERATOR	Diesel fired emergency generator	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(q**		

STEP 4: Identify Legally Enforceable Limitations

Before calculating your PTE, you need to identify any legally enforceable limits that can be used to restrict your PTE. Legally and practically enforceable limitations may be identified in various places, such as permit conditions or state and federal rules. Some examples of these defining limitations are production or operating limits, emission limits, operational limits on control equipment combined with specific and required monitoring/recordkeeping.

In this step you will identify limits that you may be able to take into consideration when calculating the PTE for each emission unit.

Permit Conditions

Special conditions in a Permit to Install may restrict an emission unit's potential emissions. Conditions that limit the emission of a pollutant to below a specific level or specify an operating capacity that is less than the maximum design capacity should be identified. The limits in these conditions should be taken into consideration when calculating PTE.

For a permit condition to be used as a means of restricting PTE, it must be legally and practically enforceable. If a permit was issued on or after **May 6, 1980** (the day the permit program was approved by U.S Environmental Protection Agency [EPA] and put into the Michigan State Implementation Plan), the condition would be considered legally enforceable, but may not be practically enforceable.

If your Permit to Install was issued prior to May 6, 1980, it must meet the criteria found in R 336.1209 before it can be used to limit PTE.

Do you have a permit limit that does not have a monitoring / recordkeeping requirement associated with it? Modify the existing permit by submitting a Permit to Install application requesting a federally enforceable condition.

If you have a question about whether your permit condition would meet the requirements of being legally and practically enforceable, contact the Environmental Assistance Center at 800-662-9278.

The following restrictions, found in permit conditions, are *examples* of legally and practically enforceable limits used to restrict PTE.

- Emission limits (typically expressed as pounds of air contaminant emitted per hour, tons per month or 12-month rolling average) and operational restrictions, combined with recordkeeping requirements
- Requirements to operate an air pollution control device (filter, scrubber, etc.) including operational requirements to address efficiency, combined with recordkeeping requirements

- Limits on the amount of material to be used combined with recordkeeping requirements
- Limits on the type of fuel that can be used combined with recordkeeping requirements
- Limits on the operating hours combined with recordkeeping requirements
- Limits on production (e.g., number of production pieces/day) combined with recordkeeping requirements

Be aware that the limit must also be enforceable in a practical manner, meaning the permit must contain a monitoring/recordkeeping requirement that can be used to demonstrate compliance with the limit. For example, if there is a VOC limit, there should also be a requirement in the permit that requires you to monitor and record your mass balance VOC emissions over a specified time period, such as pounds per calendar day, tons per month and 12-month rolling time period calculations and recordkeeping.

State and Federal Rules

State and federal rules may include requirements that can be used to restrict your PTE. If the process is permitted, these requirements should have already been incorporated into the conditions of the permit. If the requirements are not in Permit to Install or if the emission unit is exempt, review the state and federal air quality regulations. The Michigan Air Pollution Control Rules can be accessed on the Internet at Michigan.gov/air.

Restrictions found in state or federal rules should be identified so they can be used in the PTE calculation. Look for requirements from applicable state and federal rules that:

- Restrict the emission rates of air pollutants
- Limit the usage of raw materials
- Restrict operation
- Require specific control devices

Below are some examples of legally enforceable limitations contained in the Michigan Air Pollution Control Rules.

Emission Limits:

- **R 336.1290 (Rule 290)**: 1,000 pounds of noncarcinogenic VOCs per month (6 tons VOC/year). This may be used to limit potential as long as the required mass balance records are kept. See example on page 2-30.
- **R 336.1331 (Rule 331, Table 31):** The maximum allowable emission rate is 0.10 pounds of particulate matter (PM) per 1,000 pounds of gas from an exhaust system servicing material handling equipment.

- **R 336.1402 (Rule 402):** 1.7 pounds of SO_2 per million Btu's of heat input from the combustion of oil fuel or in excess of 2.4 pounds per million Btu of heat input for coal fuel. The required testing and recordkeeping in the rule must also be kept.

- **R 336.1621 (Rule 621):** 3.5 pounds of VOC per gallon of coating (minus water) as applied for air dried coatings from an existing metallic surface coating line. In order to use this rule to limit PTE, current information and records must also be kept in accordance with the rule.

Operation/Control Requirements:

- **R 336.1287(2)(c) (Rule 287(2)(c))** restricts coating usage to 200 gallons per month and may assume that 200 gallons of the worst-case coating is used per month, provided it is in compliance with the requirements of the rule and records are kept. See example on page 2-28. This limit applies to each emission unit that is exempt under Rule 287(2)(c).

- **R 336.1611(2) (Rule 611):** (a) A cover shall be installed and closed when parts are not being handled, (b) … the parts shall be drained not less than 15 seconds or until dripping ceases, (c) waste organic solvent shall be stored only in closed containers… See Example page 40.

- **R 336.1708 (Rule 708):** It is unlawful for a person to operate a new open top degreaser unless one of the following conditions is met… (b) the degreaser is equipped with a refrigerated freeboard device.

Small Business, Inc.

PTE Summary Table

Small Business, Inc. has Permits to Install and some of their emission sources are subject to specific state rules. Requirements have been identified that limit PTE and are included in the PTE Summary Worksheet. Identify any restrictions on your PTE Summary Worksheet.

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
COATING BOOTHS 1-3	**3 spray booths**	☒ Permitted: PTI # 999-89 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____	– Permit limit = 5.6 tons VOC/yr – Permit requires recordkeeping – Permit requires dry filter	
OVEN	**2,500,000 Btu/hr natural gas fired**	☒ Permitted: PTI # 999-89 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____	None	
MAINTENANCE BOOTH	**Booth used for touchup**	☒ Permitted: PTI # 825-82 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____	Permit requires dry filter	
PRINTING	**Prints information on product**	☐ Permitted: PTI #_____ ☒ Grandfathered: 10/15/1966 ☐ Exempt: R 336._____	None (grandfathered)	
SPECIAL PROJECT BOOTH	**Spray booth used for special projects**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1287(2)(c)**	Rule: R 336.1287(2)(c) – limits coating usage to 200 gal/month, requires recordkeeping	
COLD CLEANERS	**2 cold cleaners for parts washing**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1281(2)(h)**	Rule: R 336.1611(2) - Requires that cover be closed and that parts be drained	
CLEANUP	**Facility-wide cleanup solvents**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1290**	Rule: R 336.1290 – limits emission of non-carcinogenic VOCs to 1,000 lbs/month, recordkeeping required	
GRINDER	**Metal parts grinder connected to baghouse (29,000 cfm)**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(l)(vi)**	None	
WELDING	**Shielded metal arc welding**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(i)**	None	
BOILER	**10 million Btu/hr natural gas fired boiler**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1282(2)(b)(i)**	None	
GENERATOR	**Diesel fired emergency generator**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(g**	None	

STEP 5: Identify the Emission Calculation Methods You Will Use

There are a variety of methods available to calculate the emission of air contaminants. Four common methods used to calculate PTE are:

- Legally enforceable limitations
- Performance test data
- Mass balance calculations
- Emissions factors

Following is a discussion of each of these calculation methods as well as an example of each using **Small Business, Inc.**

Legally Enforceable Limitations

Regardless of what your process is physically capable of emitting, legally and practically enforceable limitations such as rules, conditions in an air permit, and compliance/enforcement documents cannot be exceeded. You can use these values to calculate your PTE. See Step 4 for a more in-depth discussion of legally enforceable limitations.

Example 1: **RULES** as Legally Enforceable Limitations

Small Business, Inc.

Small Business, Inc. operates a metal parts grinder that is ventilated. According to the manufacturer, the exhaust system servicing the grinder is rated at 29,000 standard cubic feet (scf) per minute. Table 31 of R 336.1331 limits PM emissions from the exhaust system to 0.10 pounds of PM per 1,000 pounds of exhaust gas.

- 1 scf air = 0.075 pounds
- Maximum operating hours/yr = 8,760

Annual Potential Emission of PM

(29,000 scf of air/min) x (60 min/hr) = 1,740,000 scf of air/hr

(1,740,000 scf of air/hr) x (0.075 lbs of air/1 scf of air) = 130,500 lbs of air/hr

(130,500 lbs of air/hr) x (0.10 lbs of PM/1,000 lbs of air) = 13.05 lbs of PM/hr

(13.05 lbs PM/hr) x (8,760 hrs/yr) = 114,318 lbs of PM/yr

(114,318 lbs PM/yr) x (1 ton/2,000 lbs) = *57 tons of PM/yr*

Example 2: **PERMIT CONDITIONS** as Legally Enforceable Limitations

Small Business, Inc.

Small Business, Inc. operates three coating booths. The booths were issued a Permit to Install for the coating line in 1989. One of the conditions of the permit limits VOC emissions to 5.6 tons per year and requires mass balance calculations and specific periodic recordkeeping. According to the SDS, the volatile portion of the coating is comprised of toluene and isopropyl alcohol.

Annual Potential Emission of VOCs

The company's legally enforceable permit condition limits its VOC emissions to 5.6 tons/year. Before using this number to limit your PTE, the company must review their recordkeeping and calculations to ensure that they are in compliance with the permitted limit.

Annual Potential Emission of HAPs

Toluene is the only HAP. However, since toluene is also a VOC and the permit limits VOC emissions to 5.6 tons per year, the potential emission of toluene cannot be greater than 5.6 tons/year. Therefore, the potential emission of toluene is 5.6 tons/year.

Performance Test Data

Performance test data which may include data from a stack test, continuous emission monitoring, or manufacturer testing can be used to estimate your potential emissions. This data must be revised to reflect the maximum hourly operating rate of your process if your equipment was not operating at that level during the performance test.

Performance test data may provide an emission rate as well as other data that is useful for calculating PTE. For example, stack test results could contain data about an air contaminant for which there are not applicable regulations in a permit or rule. Performance test data may also provide an air flow rate that could be used in conjunction with the particulate emission rate found in R 336.1331 (Rule 331) to calculate PTE.

It is **not** appropriate to use performance test results in place of an applicable requirement when calculating PTE. For example, if a stack test reveals an actual emission rate of 0.09 pounds of PM per 1,000 pounds of gas and the applicable limit in its Permit to Install is 0.10 pounds of PM per 1,000 pounds of gas, the facility should use the 0.10 limit in its PTE calculations.

Example: PTE Calculations Using **PERFORMANCE TEST DATA**

Small Business, Inc.

Data from a stack test at **Small Business, Inc.** indicates that the actual air flow rate of the exhaust fan on the unpermitted metal parts grinder is 29,000 scf per minute. The emission source is subject to Rule 331, which limits PM emissions to 0.10 pounds of PM per 1,000 pounds of exhaust gas.

- 1 scf air = 0.075 pounds.
- Maximum operating hours/yr = 8,760

Annual Potential Emission of PM

(29,000 scf of air/min) x (60 min/hr) x (0.075 lbs of air/1 scf of air) = 130,500 lbs of air/hr

(130,500 lbs of air/hr) x (0.10 lbs of PM/1,000 lbs of air) = 13.05 lbs of PM/hr

(13.05 lbs PM/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = 57.0 tons PM/yr

Mass Balance

When considering the mass balance approach, it is assumed the weight of all raw materials going into a process must equal the weight of the product and waste material leaving the process. In other words, all VOCs contained in the material are assumed to be emitted. Mass balance is usually the best way to calculate emissions from operations that involve solvent evaporation such as coating lines, printing lines, and clean-up activities. A benefit to using the mass balance approach to calculate your PTE, you do not need to separately calculate fugitive emissions. Fugitive emissions are automatically included in a mass balance calculation

Example: PTE Calculations Using **MASS BALANCE**

Small Business, Inc.

Small Business, Inc. has a maintenance booth with a single spray gun. The gun capacity is 5 gallons per hour. The coating contains 65 percent VOC by weight and its density is 11.2 lbs/gal.

Annual Potential Emission of VOCs

(5 gal coating/hr) x (7.28 lbs VOC/gal of coating) = 36.4 lbs of VOC/hr

(36.4 lbs VOC/hr) x (8,760 hrs/yr) = 318,864 lbs of VOC/yr

(318,864 lbs VOC/yr) x (1 ton/2,000 lbs) = ***159.4 tons of VOC/yr.***

Emission Factors

If you cannot calculate your emissions using any of the methods described above, you may want to consider using an emission factor. Emission factors exist for many types of processes. An emission factor is an average emission value derived from industry data. The factor relates an activity or process to the quantity of an air contaminant released into the atmosphere. Emission factors are usually expressed as the weight of air contaminant released per volume or weight of the activity. Such as "100 lbs/10^6 scf natural gas," which means 100 lbs of an air contaminant is emitted per million standard cubic feet of natural gas burned.

Be aware that emission factors **only provide an** estimate of your emissions. Using emission factors to calculate PTE may be subject to approval by the AQD.

You may need to know your process capacity or design rating to use an emission factor. Emission factors for air contaminants can be found in publications such as the EPA's *"AP-42, Compilation of Air Pollutant Emission Factors"* (see Figure 2-3). You can also access the EPA's Factor Information Retrieval (WebFIRE) database (**http://cfpub.epa.gov/webfire/**), which allows you to search all of the EPA emission factors.

If you use emission factors, make sure the factor you are using is appropriate for your process. For example, to select the right factor for a boiler, you need to know the size of your burner. Also, pay close attention to the units used with emission factor. Make sure your process data agrees with the units in the emission factor.

1.4-5 EMISSION COMBUSTION SOURCES

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b] Emission Factor (lb/10^6 scf)	NO_x[b] Emission Factor Rating	CO Emission Factor (lb/10^6 scf)	CO Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170		24	
Controlled - Flue gas recirculation	76		98	
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

Emission factor for NOx

Emission factor for CO

Figure 2-3: AP-42

Example: PTE Calculations using **EMISSION FACTORS**

Small Business, Inc.

Small Business, Inc. has a natural gas-fired boiler rated at 10 million Btu per hour. The NOx Emission Factor from Table 1.4-1 in Chapter 1.4 of AP-42 (see figure 2-3 above) is 100 pounds of NOx emitted per million scf of natural gas burned. In addition to NOx emissions the company would also use emission factors to calculate CO, SO_2, PM, and VOC

- 1 scf of natural gas = 1,020 Btu
- Maximum operating hours/yr = 8,760

Annual Potential Emission of VOCs

(10,000,000 Btu/hr) x (1 scf of fuel/1,020 Btu) = 9,803.9 scf of natural gas/hr

(9,803.9 scf natural gas/hr) x (8,760 hrs/yr) = 85,882,352.9 scf of natural gas/yr

(85,882,352.9 scf/yr) x (100 lbs of NOx/1,000,000 scf of fuel) = 8,588.2 lbs of NOx/yr

(8,588.2 lbs of NOx/yr) x (1 ton/2,000 lbs) = ***4.3 tons of NOx/yr***

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
COATING BOOTHS 1-3	**3 spray booths**	☒ Permitted: PTI # 999-89 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____	– Permit limit = 5.6 tons VOC/yr – Permit requires recordkeeping – Permit requires dry filter	**Permit condition**
OVEN	**2,500,000 Btu/hr natural gas fired**	☒ Permitted: PTI # 999-89 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____	None	**Emission factor**
MAINTENANCE BOOTH	**Booth used for touchup**	☒ Permitted: PTI # 825-82 ☐ Grandfathered: ___/___/__ ☐ Exempt: R 336._____	Permit requires dry filter	**Mass balance equation**
PRINTING	**Prints information on product**	☐ Permitted: PTI #_____ ☒ Grandfathered: 10/15/1966 ☐ Exempt: R 336._____	None (grandfathered)	**Mass balance equation**
SPECIAL PROJECT BOOTH	**Spray booth used for special projects**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1287(2)(c)**	Rule: R 336.1287(2)(c) – limits coating usage to 200 gal/month, requires recordkeeping	**Limitation in rule**

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
COLD CLEANERS	**2 cold cleaners for parts washing**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1281(2)(h)**	Rule: R 336.1611(2) - Requires that cover be closed and that parts be drained	**Emission factor**
CLEANUP	**Facility-wide cleanup solvents**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1290**	Rule: R 336.1290 – limits emission of non-carcinogenic VOCs to 1,000 lbs/month, recordkeeping required	**Limitation in rule**
GRINDER	**Metal parts grinder connected to baghouse (29,000 cfm)**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336.**1285(2)(l)(vi)**	None	**Emission factor**
WELDING	**Shielded metal arc welding**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(i)**	None	**Emission factor**
BOILER	**10 million Btu/hr natural gas fired boiler**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1282(2)(b)(i)**	None	**Emission factor**
GENERATOR	**Diesel fired emergency generator**	☐ Permitted: PTI #_____ ☐ Grandfathered: ___/___/__ ☒ Exempt: R 336. **1285(2)(g**	None	**Emission factor**

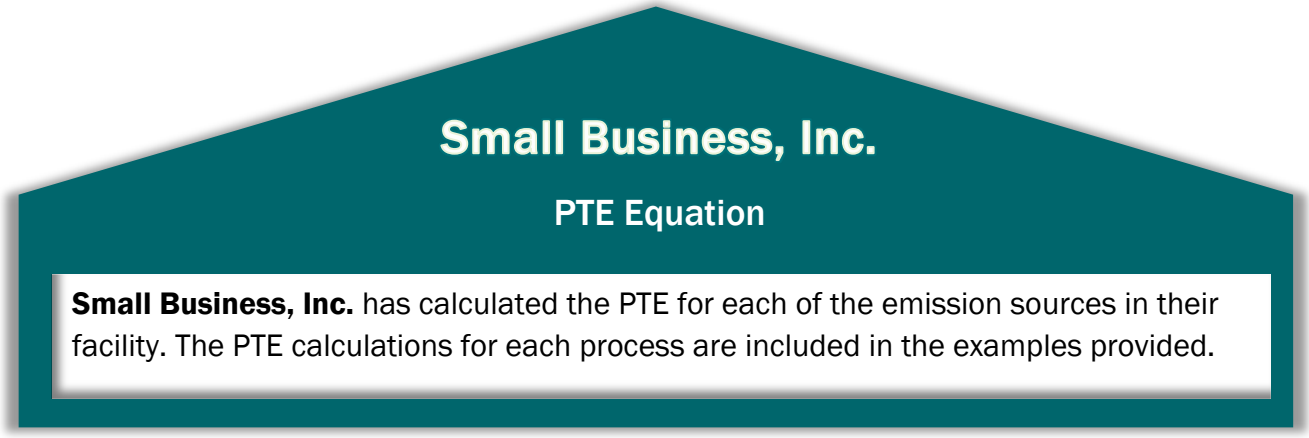
STEP 6: Calculate the PTE for Each Emission Source

In this step you will calculate the PTE for each of the emission units you identified in Step 1. You will use the information gathered in Steps 1 through 5 to help you perform the calculations. The guidance below explains the assumptions you should be making when calculating your PTE, how to deal with "bottlenecks," as well as how to identify the pollutants emitted.

PTE Calculation Worksheets for several processes can be found at Michigan.gov/air (select "Permits" then "Permits to Install (PTI/New Source Review (NRS)" then "Potential to Emit").

Calculating PTE for each pollutant emitted from each process will result in numerous calculations. Usually, more than one pollutant will be emitted from each process. Keep the calculations, data, and assumptions for each process separate. Spreadsheets are a good place to store data for each process as well as being useful to help you calculate your facility's PTE.

When calculating your facility's PTE be sure to **show your work**. When determining your applicability to certain regulations, the AQD will review how your PTE was calculated. If you use a computer spreadsheet, show a sample calculation or the formulas used. Identify all of the assumptions that were made and documents that were reviewed while completing the calculations.



The PTE Equation

PTE refers to the amounts of air contaminants that the facility could release into the air while operating at the maximum design capacity, with the highest polluting materials and operating 100% of the time. The standard equation used in calculating PTE for each regulated air contaminant emitted from each process is:

PTE = (maximum hourly emission rate of pollutant) x (8760 hours)

When calculating PTE, use the following assumptions:

The maximum hourly emission rate reflects the quantity of air pollutants generated if the emission unit was operating at its maximum design capacity.

Unless restricted as discussed in Step 4, assume the process operates continuously, 24 hours per day x 365 days per year. This amounts to 8,760 hours per year.

Any emission reduction attributed to an air pollution control device, such as a bag filter, scrubber, or afterburner, can be included in the calculation only if the operation of the control device is required by a legally and practically enforceable permit condition, rule, or compliance/enforcement document and only to the extent that is required to meet that requirement.

If a facility is required by a permit to operate a thermal oxidizer to meet a limit of 5.0 pounds per hour VOCs and the permitted control efficiency is 95%, based on the results of stack testing, the emission reductions from the control equipment could be applied after uncontrolled emissions were calculated.

The material containing the highest amount of air contaminants and thus air emissions are processed or used 100 percent of the time.

"Bottlenecks"

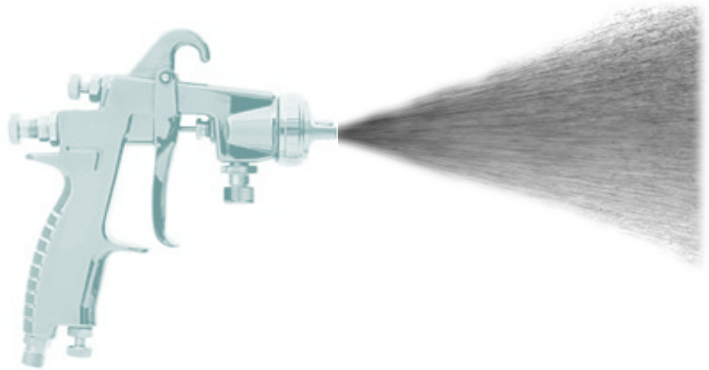
When calculating your PTE, be sure to take into consideration any inherent physical limitations in a process that would limit its PTE. When the output of a multi-step process is limited by the capacity of one emission unit or activity, that emission unit or activity is considered a bottleneck. If a process has a physical limitation that only allows it to operate during a certain season, such as an asphalt plant, the annual operating hours will be below the 8,760 hours/year that unrestricted processes are required to use for PTE calculations.

To make use of physical limitation or bottleneck when calculating your PTE, the limitation must be unavoidable, meaning it would be impossible to operate at a higher rate than you are using to calculate your PTE. You should be able to document that the inherent physical limitation exists and is unavoidable. If necessary, records (e.g., production records, operating hours, etc.) may be requested that demonstrate the inherent physical limitation is not exceeded. If you subsequently make a change that eliminates or changes the inherent limitation or bottleneck, you should recalculate your PTE to reflect the change in the process. An increase may be considered a modification to your facility.

If you are unsure as to whether a physical limitation may be used to limit your PTE, contact your AQD District Office.

Small Business, Inc.

Small Business, Inc. has three coating booths that use oven-dried coatings. All coated parts must go to a curing oven. There is only one conveyor to the oven and the conveyor can only be connected to one line at a time. Here, the conveyor is the **bottleneck**. The company would only have to include the emissions from one of the coating lines in their PTE calculation since it is impossible for more than one coating line to operate simultaneously.



Determining What Pollutants are Emitted

Determining what air contaminants are emitted from a process may take a little research. The examples provided in this document show the pollutants emitted from several common processes. Sometimes the equipment manufacturer will be able to give you information about the pollutants emitted and possibly an emission rate. Another potential place to look is in your permit to install application, if applicable.

SDS or manufacturer formulation data sheets can also be helpful in identifying pollutants that may be emitted. The information contained in these is particularly useful in determining emissions from sources of solvent evaporation (e.g., coating lines, cold cleaners, cleanup solvents). The manufacturer formulation data for coatings or solvents used will identify all the compounds that may be emitted, including VOCs and HAPs.

Publications such as the EPA's "*AP-42, Compilation of Air Pollutant Emission Factors*" and their Factor Information Retrieval (WebFIRE) database (**cfpub.epa.gov/webfire/**) may also be helpful.

Some pollutants fit the definition of more than one regulated air contaminant. For example, many VOCs are also considered to be HAPs (e.g., Xylene, Toluene). If a solvent you are using emits Xylene it must be reported as both a HAP and a VOC.

Small Business, Inc.

Coating Booths 1 - 3

This emission source consists of three spray booths. Each gun has a capacity of 5 gallons per hour. The booths are included in a Permit to Install. The permit has a condition that limits emission of VOCs to 5.6 tons/yr based on a 12-month rolling time period. The permit also has a condition that requires a dry filter. The regulated pollutants that are emitted are VOCs, HAPs, PM, PM10 and PM2.5. Because this is a non-heated source, one can assume that the PM10 emissions are less than or equal to the PM emissions. Additionally, one can conservatively assume PM = PM10=PM2.5. Therefore, since we assume they are all equal, we will only calculate PM. Of all the HAPs contained in the coatings used, Xylene is present in the highest concentration.

PTE of VOC

Permit to Install # 999-89 contains an emission limit of 5.6 tons of VOC/yr. Therefore, the PTE of VOC is **5.6 tons/yr.**

PTE of HAPs

All the VOCs contained in the coatings used are also HAPs; therefore, the 5.6 tons VOC/yr limit can also be used here to restrict the PTE of HAPs. If the coatings used contain several different HAPS, assume the HAP present in the highest concentration is the only HAP emitted. In this example, Xylene is present in the highest concentration; therefore, the PTE of Xylene would be **5.6 tons/yr.**

PTE of PM

To calculate the PTE of PM from coating, assume the highest solid content coating is used continuously. The permit requires a filter, so the control efficiency for the wall filter in the booths (95 percent based on manufacturer's specifications) can be used in calculating PTE. The transfer efficiency of the spray gun is 20 percent. This means 20 percent of the coating adheres to the part and 80 percent is overspray. Of the coatings used, the one with the highest solid content* contains 2.66 pounds of solids/gallon of coating.

(5 gal of coating/hr/spray gun) x (3 spray guns) = 15 gal of coating/hr
(15 gal coating/hr) x (2.66 lbs of solid/gal of coating) x (0.80 overspray) = 31.92 lbs of solids/hr
(31.92 lbs of solids/hr) x (8,760 hours/yr) x (1 ton/2,000 lbs) = 139.81 tons of solids/yr (uncontrolled)
(139.81 tons of solids/yr) x ([100-95]/100) = **7.0 tons of solid(PM)/yr (controlled)**

COATING BOOTHS 1-3 PTE SUMMARY (ton/yr)

VOC = 5.6
Xylene = 5.6
PM = 7.0 (assume PM emissions = PM10 and PM2.5 emissions)

* Contact the coating manufacturer if you are unable to determine the solid content of the coating.

Small Business, Inc.

Oven

This is a 2,500,000 Btu/hr natural gas fired oven used to cure parts that are coated in coating booths 1-3 or the maintenance booth. The emission factors for a small boiler will be used to calculate emissions from this oven (see below).

Pollutant	Emission Factor
NOx	100 lbs/1,000,000 cubic feet (ft^3) natural gas
CO	84 lbs/1,000,000 ft^3 natural gas
Lead (Pb)	0.0005 lbs/1,000,000 ft^3 natural gas
PM10=PM2.5	7.6 lbs/1,000,000 ft^3 natural gas
PM	1.9 lbs/1,000,000 ft^3 natural gas
SO_2	0.6 lbs/1,000,000 ft^3 natural gas
VOC	5.5 lbs/1,000,000 ft^3 natural gas
GHG (CO_2e)	Various (see below)

With the exception of GHG, emission factors from the EPA's AP-42 Manual, Chapter 1.4, Tables 1.4-1 and 1.4-2.

Note: *1 ft^3 of natural gas = 1,020 Btu*

Maximum cubic feet (cf) of natural gas used per hour:
(2,500,000 Btu/hr) x (1 ft^3 natural gas/1,020 Btu) = 2,451 ft^3 of natural gas/hr

PTE of regulated pollutants using emission factors:

NOx: (2,451 ft^3/hr) x (100 lbs NOx/1,000,000 ft^3) = 0.25 lbs of NOx/hr
(0.25 lbs NOx/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **1.10 tons of NOx/yr**

CO: (2,451 ft^3/hr) x (84 lbs CO/1,000,000 ft^3) = 0.21 lbs of CO/hr
(0.21 lbs CO/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.92 tons of CO/yr**

Pb: (2,451 ft^3/hr) x (0.0005 lbs Pb/1,000,000 ft^3) = 0.000001 lbs of Pb/hr
(0.000001 lbs Pb/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.000004 tons of Pb/yr**

PM10=PM2.5: (2,451 ft^3/hr) x (7.6 lbs PM/1,000,000 ft^3) = 0.02 lbs of PM/hr
(0.02 lbs PM/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.09 tons of PM10=PM2.5/yr**

PM: (2,451 ft^3/hr) x (1.9 lbs PM/1,000,000 ft^3) = 0.004 lbs of PM/hr
(0.004 lbs PM/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.02 tons of PM/yr**

SO_2: (2,451 ft^3/hr) x (0.6 lbs SO_2/1,000,000 ft^3) = 0.001 lbs of SO2/hr
(0.001 lbs SO_2/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.004 tons of SO_2/yr**

VOC: (2,451 ft^3/hr) x (5.5 lbs VOC/1,000,000 ft^3) = 0.01 lbs of VOC/hr
(0.01 lbs VOC/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.04 tons of VOC/yr**

PTE for GHG (CO_2e) pollutants using 40 CFR 98 Subparts A and C:

Total Heat Input Capacity x Emission Factor x Conversion Factor(s) x Global Warming Potential

Total Heat Input Capacity in MMBtu/yr: Total Btu/hr x (1×10^{-6}) x 8760 hrs/yr

2,500,000Btu/hr x (1×10^{-6}) x 8760 hrs/yr = 21,900 MMBtu/yr

CO_2: $\frac{21{,}900 \text{ MMBtu}}{1 \text{ year}} \times \frac{53.06 \text{ kg}}{1 \text{ MMBtu}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times 1 = 1{,}280$ tons/yr

CH_4: $\frac{21{,}900 \text{ MMBtu}}{1 \text{ year}} \times \frac{0.001 \text{ kg}}{1 \text{ MMBtu}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times 25 = 0.6$ tons/yr

N_2O: $\frac{21{,}900 \text{ MMBtu}}{1 \text{ year}} \times \frac{0.0001 \text{ kg}}{1 \text{ MMBtu}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times 298 = 0.72$ tons/yr

Total CO_2e tons/yr = CO_2 + CH_4 + N_2O

(1,280 tons CO_2/yr) + (0.6 tons CH_4/yr) + (0.72 tons N_2O/yr) = **1,281.32 tons CO_2e/yr**

OVEN PTE SUMMARY (ton/yr)

- NOx = 1.10
- CO = 0.92
- Lead (Pb) = negligible
- PM10/PM2.5 = 0.09
- PM = 0.02
- SO_2 = 0.004
- VOC = 0.04
- CO_2e = 1,282

Small Business, Inc.

Maintenance Booth

The maintenance booth consists of one spray gun, which is used for maintenance and touchup work. The gun capacity is 5 gallons per hour. This booth is included in a Permit to Install. The permit requires a dry filter but does not contain a VOC or HAP emission limit. The regulated pollutants that are emitted are VOCs, HAPs, PM, PM10 and PM2.5. Several different coatings are used in this booth; therefore, the company will need to choose a worst-case coating to use in the calculations. The worst-case coating will be the coating used with the highest VOC/HAP content. Information about the worst-case coating chosen is provided below.

Aspect	Content
Density	11.2 lbs/gal
Solids	2.31 lbs/gal
VOC	6.16 lbs/gal
Xylene	35% by weight
Toluene	17% by weight
Ethylene Glycol	3% by weight

PTE of VOC

- (5 gal of coating/hr) x (6.16 lbs of VOC/gal of coating) = 30.8 lbs of VOC/hr
- (30.8 lbs of VOC/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **134.9 tons of VOC/yr**

PTE of HAPs (Calculate the PTE of each HAP in the coating):

PTE of Xylene

- (0.35 lb Xylene/lb coating) x (11.2 lbs coating/gal coating) = 3.92 lbs Xylene/gal coating
- (5 gal of coating/hr) x (3.92 lbs Xylene/gal of coating) = 19.6 lbs of Xylene/hr
- (19.6 lbs Xylene/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **85.85 tons of Xylene/yr**

PTE of Toluene

- (0.17 lb Toluene/lb coating) x (11.2 lbs coating/gal coating) = 1.9 lbs Toluene/gal coating
- (5 gal of coating) x (1.9 lbs toluene/gal of coating) = 9.5 lbs of Toluene/hr
- (9.5 lbs Toluene/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **41.61 tons of Toluene/yr**

PTE of Ethylene Glycol

- (0.03 lb Ethylene glycol/lb coating) x (11.2 lbs coating/gal coating) = 0.34 lbs Ethylene glycol/gal coating
- (5 gal coating) x (0.34 lbs Ethylene glycol/gal coating) = 1.7 lbs of Ethylene glycol/hr
- (1.7 lbs Ethylene glycol/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **7.36 tons of Ethylene glycol/yr**

PTE of PM

The transfer efficiency of the spray gun is 20 percent. This means 20 percent of the coating adheres to the part and 80 percent is overspray. The permit requires a filter, so the control efficiency for the wall filter in the booths (95 percent) can be used in calculating PTE.

- (5 gal of coating/hr) x (2.31 lbs of solids/gal of coating) x (0.80 overspray) = 9.24 lbs of solids/hr
- (9.24 lbs of solids/hr) x (8,760 hours/yr) x (1 ton/2,000 lbs) = 40.47 tons of solids/yr
- (40.47 tons of solids/yr) x ([100 – 95]/100) = **2.02 tons solids (PM)/yr**

MAINTENANCE BOOTH PTE SUMMARY (ton/yr)

- **VOC = 134.9**
- **Xylene = 85.85**
- **Toluene = 41.61**
- **Ethylene glycol = 7.36**
- **PM = 2.02** (assume PM emissions = PM10 and PM2.5 emissions)

Small Business, Inc.

Printing

This is a grandfathered printing machine that prints the product information on each of the items manufactured by this facility. Once the ink is applied to the part, the parts are sent to the packaging machine which boxes the parts for shipment. The actual ink usage is very small; however, since this emission unit is grandfathered, no legal enforceable limits exist to limit its PTE. Each part requires the same information be printed so the ink usage is consistent for each part (0.01 ounces of ink per part). The machine can apply the ink at a rate of 20 parts per minute; however, the packaging apparatus which boxes the parts for shipment can only package the product at a rate of 800 parts per hour. This means that the parts must be run through the machine in batches instead of continuously. Therefore, the packaging operation serves as a bottleneck that limits the amount of parts that can be run through this process per hour.

The company uses several water-based inks that contain no HAPs. The ink with the highest VOC content is 0.8 pounds per gallon (minus water). The water content is 50 percent by volume. The only regulated pollutant emitted is VOCs.

Calculation hints: *1 gallon = 128 ounces*

When calculating VOC emissions for water based coatings, it is important that the water is subtracted from the usage data before multiplying by a "minus water" VOC content figure. Failure to subtract water from the usage data will result in an over estimation of VOC emissions.

PTE of VOC

- oz ink/part) x (1 gal/128 oz) = 0.0001 gal of ink/part
- gal ink/part) x (800 parts/hr) = 0.08 gal of ink/hr
- (0.08 gal ink/hr) x (1 - 0.5) = 0.04 gal of ink (minus water)/hr
- (0.04 gal ink [minus water])/hr) x (0.8 lbs VOC/gal ink [minus water]) = 0.032 lbs of VOC/hr
- (0.032 lbs VOC/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.14 tons of VOC/yr**

Don't forget to remove the percent H_2O. (50% = 0.5)

MAINTENANCE BOOTH PTE SUMMARY (ton/yr)

VOC = 0.14

If you want to use a new ink, your PTE should be re-evaluated!

Small Business, Inc.

Special Project Booth

This coating booth consists of one spray gun, which is only used for special projects. Coating usage is very low, so the booth is exempt from the requirement to obtain a Permit to Install under R 336.1287(2)(c) (Rule 287(2)(c)). Rule 287(2)(c) contains a restriction that only allows the emission unit to use no more than 200 gallons coating per month. Since several coatings are used at this booth, the company must choose a "worst-case" coating to calculate emissions. The worst-case coating should be the coating used with the highest VOC/HAP content. This is not always the same coating, but in this case we will assume it is. The information for the worst-case coating used at this booth is provided.

Aspect	Content
Density	10.5 lbs/gal
Solids	3.68 lbs/gal
VOC	6.83 lbs/gal
Xylene	45% by weight
Toluene	18% by weight
MIBK	2% by weight

PTE of VOC

- (6.83 lbs VOC/gal coating) x (200 gal/month) = 1,366 lbs VOC/month
- (1,366 lbs VOC/month) x (12 month/yr) x (1 ton/2,000 lbs) = **8.2 tons VOC/yr**

PTE of HAPs (Calculate the PTE of each HAP in the coating):

PTE of Xylene

- (0.45 lb Xylene/lb coating) x (10.5 lbs coating/gal coating) = 4.73 lbs Xylene/gal
- (4.73 lbs Xylene/gal) x (200 gal/month) = 946 lbs Xylene/month
- (946 lbs Xylene/month) x (12 month/yr) x (1 ton/2,000 lbs) = **5.68 tons Xylene/yr**

PTE of Toluene

- (0.18 lb Toluene/lb coating) x (10.5 lbs coating/gal coating) = 1.89 lbs Toluene/gal
- (1.89 lbs Toluene/gal) x (200 gal/month) = 378 lbs Toluene/month
- (378 lbs Toluene/month) x (12 month/yr) x (1 ton/2,000 lbs) = **2.27 tons Toluene/yr**

PTE of MIBK

- (0.02 lb MIBK/lb coating) x (10.5 lbs coating/gal coating) = 0.21 lbs MIBK/gal
- (0.21 lbs MIBK/gal) x (200 gal/month) = 42 lbs MIBK/month
- (42 lbs MIBK/month) x (12 month/yr) x (1 ton/2,000 lbs) = **0.25 tons MIBK/yr**

PTE of PM

The transfer efficiency of the spray gun is 25 percent. This means 25 percent of the coating adheres to the part and 75 percent is overspray.

- (3.68 lbs solids/gal coating) x (200 gal coating/month) x (0.75 overspray) = 552 lbs solids/month
- (552 lbs solids/month) x (12 months/yr) x (1 ton/2,000 lbs) = **3.31 tons of solids (PM)/yr**

SPECIAL PROJECT PTE SUMMARY (ton/yr)

- **VOC = 8.2**
- **Xylene = 5.68**
- **Toluene = 2.27**
- **MIBK = 0.25**
- **PM = 3.31**
  (assume PM emissions = PM10 and PM2.5 emissions)

Small Business, Inc.

Cold Cleaners

There are two cold cleaners at this facility that use SuperClean cleaning solvent. The SDS for the solvent shows that it contains 100 percent Stoddard solvent, which is a VOC. The cold cleaners are subject to R 336.1611 (Rule 611). Rule 611 requires that certain operating practices be adhered to, which serve as legally enforceable operational restrictions that may contribute to reduced emissions.

PTE of VOC

PTE (uncontrolled) is based on emission factors from Chapter 4.6 of the EPA's AP-42.

(0.33 ton VOC/yr/unit) x (2 units) = **0.66 ton VOC/yr (uncontrolled)**

Type Of Degreasing	Activity Measure	Uncontrolled Organic Emission Factor[a]	
All[b]	Solvent consumed	1,000 kg/Mg	2,000 lb/ton
Cold cleaner			
Entire unit[c]	Units in operation	0.30 Mg/yr/unit	0.33 tons/yr/unit
Waste solvent loss		0.165 Mg/yr/unit	0.18 tons/yr/unit
Solvent carryout		0.075 Mg/yr/unit	0.08 tons/yr/unit
Bath and spray evaporation		0.06 Mg/yr/unit	0.07 tons/yr/unit
Entire unit	Surface area and duty cycle[d]	0.4 kg/hr/m^2	0.08 lb/hr/ft^2

Emission Factor = 0.33 tons/yr/unit

Table 4.6-2 form Chapter 4.6 of AP-42

Since these cold cleaners are complying with the operational requirements in Rule 611, we can take into consideration emission reductions from control devices and operating procedures. Table 6-3 from Chapter 4.6 of AP-42 provides an emission reduction of 28 percent for cold cleaners.

(0.66 ton VOC/yr) x [(100 – 28)/100] total emission reduction) = **0.475 ton VOC/yr (controlled)**

Emission reduction = 28 percent (use the lowest number in range unless you can prove that a higher emission reduction is applicable.)

System	Cold Cleaner		Vapor Degreaser		Conveyorized Degreaser	
	A	B	A	B	A	B
Control devices						
Cover or enclosed design	X	X	X	X	X	X
Drainage facility	X	X	X			X
Water cover, refrigerated chiller, carbon adsorption or high freeboard[b]		X		X		X
Solid, fluid spray stream[c]		X		X		
Safety switches and thermostats				X		X
Emission reduction from control devices (%)	13-38	NA[d]	20-40	30-60		40-60
Operating procedures						
[illegible] of equipment	X	X	X	X	X	X
[illegible] reclamation	X	X	X	X	X	X
Reduc[illegible] lation			X	X	X	X
Reduced conveyor [illegible] ed			X	X	X	X
Emission reduction from operating proce[illegible] (%)	15-45	NA[d]	15-35	20-40	20-30	20-30
Total emission reduction (%)	28-83[e]	55-69[f]	30-60	45-75	20-30	50-70

MAINTENANCE BOOTH PTE SUMMARY (ton/yr)

VOC = 0.475

Small Business, Inc.

Cleanup

This emission unit consists of the cleanup all activities that occur throughout the facility using "MaxClean" cleanup solvent. The SDS for the solvent shows that it contains 90 percent Toluene, which is a VOC and a HAP. This activity is exempt from permitting under R336.1290(2)(a)(i) or Rule 290(2)(a)(i) of the Michigan Air Pollution Control Rules, and the company has conducted all the necessary recordkeeping as required under the rule.

If the pollutant is a carcinogen then additional calculations and restrictions would apply according to Rule 290.

PTE of VOC

Rule 290(2)(a)(i) limits the emission of non-carcinogenic VOCs to 1,000 lbs VOC per month. Since this activity is exempt under Rule 290(2)(a)(i), we are allowed to assume that the **PTE VOCs is 1,000 lbs/month or 6 tons/yr**.

PTE Toluene

Since Toluene is also considered a HAP the **PTE of Toluene is also 6 tons/yr.**

MAINTENANCE BOOTH PTE SUMMARY (ton/yr)

- VOC = 134.9
- Toluene = 41.61

Small Business, Inc.

Grinder

The metal grinder is connected to a baghouse that operates at 29,000 cubic feet/min. The grinder is exempt from having to obtain a Permit to Install under R 336.1285(2)(l)(vi) of the Michigan Air Pollution Control Rules. The only regulated pollutants emitted from this process are PM2.5, PM10 and PM.

WebFire has an emission factor for grinding for PM 17 lbs/ton of grey iron and PM10/PM2.5 or 1.7 lbs/ton of grey iron. Since no permit is associated with the grinder, the control efficiency of the baghouse cannot be taken into account when calculating PTE. The grinder is capable of processing 500 tons per year of grey iron. This is a very conservative number.

PTE of PM

- 17 lbs/ton x 500 tons/year = 8500 lbs/year
- 8500 lbs/yr x 1/2000 lbs = **4.25 tons of PM/yr**

PTE of PM10/PM2.5

- 1.7 lbs/ton x 500 tons/year = 850 lbs/year
- 850 lbs/yr x 1/2000 lbs = **0.425 tons of PM/yr**

GRINDER PTE SUMMARY (ton/yr)

- **PM = 4.25**
- **PM10/PM2.5 = 0.425**

Small Business, Inc.

Welding

This is a shielded metal arc welding booth. The welding operation is exempt from the requirement to obtain a Permit to Install under R 336.1285(2)(i) of the Michigan Air Pollution Control Rules. Emission factors will be used to calculate emissions from this operation (see below). To use the emission factor you must know the pounds of electrode consumed. There is no rated capacity available for this welding machine; however, facility data shows that the most electrode material the company has ever used over a 24 hour period is 15 pounds. The potential pounds of electrode used for the year will have to be calculated based upon 15 lbs/day. The electrode type used is E308.

1. Calculate the hourly electrode usage rate.

   (15 lbs of E308/day) x (365 days/1 yr) = **5,475 lbs of E308/yr**

2. Identify the emission factors that will be used to calculate emission of regulated pollutants (see AP-42, Chapter 12.19, Tables 12.19-1 and 12.19-2).

Pollutant	Emission Factor
PM	10.8 lb/10^3 lb electrode used
Chromium (Cr)	3.93 lb 10^{-1} /10^3 lb electrode used
Cr (VI)	3.59 lb 10^{-1} /10^3 lb electrode used
Cobalt (Co)	0.01 lb 10^{-1} /10^3 lb electrode used
Mn	2.52 lb 10^{-1} /10^3 lb electrode used
Ni	0.43 lb 10^{-1} /10^3 lb electrode used

3. Calculate emission of regulated pollutants using emission factors.

PTE of PM

(5,475 lbs E308/yr) x (10.8 lbs PM/1,000 lbs E308) x (1 ton/2,000 lbs) = **0.03 ton of PM/yr**

PTE of HAPS

Cr: (5,475 lbs E308/yr) x (0.393 lbs Cr/1,000 lbs E308) x (1 ton/2,000 lbs) = **0.001 ton of Cr/yr**

Cr(VI): (5,475 lbs E308/yr) x (0.359 lbs Cr(IV)/1,000 lbs E308) x (1 ton/2,000 lbs) = **0.001 ton of Cr(VI)/yr**

Co: (5,475 lbs E308/yr) x (0.001 lbs Co/1,000 lbs E308) = **0.01 lbs of Co/yr**

Mn: (5,475 lbs E308/yr) x (0.252 lbs Mn/1,000 lbs E308) x (1 ton/2,000 lbs) = **0.001 ton of Mn/yr**

Ni: (5,475 lbs E308/yr) x (0.043 lbs Ni/1,000 lbs E308) = **0.24 lbs of Ni/yr**

SPECIAL PROJECT PTE SUMMARY (ton/yr)

- PM = 0.03
- Cr = 0.001
- Cr(VI) = 0.001
- Co = 0.01 lbs
- Mn = 0.001
- Ni = 0.24 lbs

Small Business, Inc.

Boiler

The boiler is natural gas-fired only with a burner capacity of 10 million Btu/hr. The emission factors that will be used to calculate PTE are provided below. These emission factors come from the EPA's AP-42 Manual, Chapter 1.4, Tables 1.4-1 and 1.4-2.

Pollutant	Emission Factor
NOx	100 lbs/1,000,000 cubic feet (ft^3) natural gas
CO	84 lbs/1,000,000 ft^3 natural gas
Lead (Pb)	0.0005 lbs/1,000,000 ft^3 natural gas
PM10=PM2.5	7.6 lbs/1,000,000 ft^3 natural gas
PM	1.9 lbs/1,000,000 ft^3 natural gas
SO_2	0.6 lbs/1,000,000 ft^3 natural gas
VOC	5.5 lbs/1,000,000 ft^3 natural gas
GHG (CO_2e)	Various (see below)

Note: 1 ft^3 of gas = 1,020Btu

1. **Calculate the maximum cubic feet of natural gas used per hour:**

   (10,000,000 Btu/hr) x (1 ft^3 natural gas/1,020 Btu) = **9,803.92 ft^3 of natural gas/hr**

2. **Calculate the PTE of regulated pollutants using emission factors.**

NOx: (9,803.92 ft^3/hr) x (100 lbs NOx/1,000,000 ft^3) = 0.98 lbs of NOx/hr
(0.98 lbs NOx/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **4.29 tons of NOx/yr**

CO: (9,803.92 ft^3/hr) x (84 lbs CO/1,000,000 ft^3) = 0.82 lbs of CO/hr
(0.82 lbs CO/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **3.61 tons of CO/yr**

Pb: (9,803.92 ft^3/hr) x (0.0005 lbs Pb/1,000,000 ft^3) = 0.000005 lbs of Pb/hr
(0.000005 lbs Pb/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.00002 tons of Pb/yr**

PM10/PM2.5: (9,803.92 ft^3/hr) x (7.6 lbs PM/1,000,000 ft^3) = 0.07 lbs of PM/hr
(0.07 lbs PM/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.33 tons of PM10/PM2.5/yr**

PM: (9,803.92 ft^3/hr) x (1.9 lbs PM/1,000,000 ft^3) = 0.02 lbs of PM/hr
(0.02 lbs PM/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.08 tons of PM/yr**

SO_2: (9,803.92 ft^3/hr) x (0.6 lbs SO_2/1,000,000 ft^3) = 0.006 lbs of SO2/hr
(0.006 lbs SO_2/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.03 tons of SO_2/yr**

VOC: (9,803.92 ft^3/hr) x (5.5 lbs VOC/1,000,000 ft^3) = 0.05 lbs of VOC/hr
(0.05 lbs VOC/hr) x (8,760 hrs/yr) x (1 ton/2,000 lbs) = **0.24 tons of VOC/yr**

GHG (CO_2e) pollutants using 40 CFR 98 Subparts A and C:

Total Heat Input Capacity x Emission Factor x Conversion Factor(s) x Global Warming Potential

Total Heat Input Capacity in MMBtu/yr:

Total Btu/hr x (1×10^{-6}) x 8760 hrs/yr

10,000,000Btu/hr x (1×10^{-6}) x 8760 hrs/yr = 87,600 MMBtu/yr

CO_2: $\frac{87{,}600 \text{ MMBtu}}{1 \text{ year}} \times \frac{53.06 \text{ kg}}{1 \text{ MMBtu}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times 1 = 5{,}124 \text{ tons/yr}$

CH_4: $\frac{87{,}600 \text{ MMBtu}}{1 \text{ year}} \times \frac{0.001 \text{ kg}}{1 \text{ MMBtu}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times 25 = 2.41 \text{ tons/yr}$

N_2O: $\frac{87{,}600 \text{ MMBtu}}{1 \text{ year}} \times \frac{0.0001 \text{ kg}}{1 \text{ MMBtu}} \times \frac{2.2046 \text{ lbs}}{1 \text{ kg}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times 298 = 2.88 \text{ tons/yr}$

Total CO_2e tons/yr = CO_2 + CH_4 + N_2O

(5,124 tons CO_2/yr) + (2.41 tons CH_4/yr) + (2.88 tons N_2O/yr) = **5,130 tons CO_2e/yr**

SPECIAL PROJECT PTE SUMMARY (ton/yr)

- **NOx = 4.29**
- **CO = 3.61**
- **Lead (Pb) = 0.00002**
- **PM10/PM2.5 = 0.33**
- **PM = 0.08**
- **SO2 = 0.03**
- **VOC = 0.24**
- **CO2e = 5,130**

Small Business, Inc.

Generator

The generator is a 5 million Btu/hr diesel fired emergency unit. It is exempt from having to obtain a Permit to Install under R 336.1285(2)(g) of the Michigan Air Pollution Control Rules. Emission factors from the EPA's AP-42 manual will be used to calculate the PTE. The emission factors require that you know the amount of diesel fuel the generator can burn per hour. The maximum fuel usage for this generator is 100 gallons of fuel/hr.

The EPA has determined that if a generator's sole function is to provide backup power when electric power from the local utility is interrupted, then the worst-case operating hours should be 500 hours per year. The EPA's emergency generator PTE guidance is available at Michigan.gov/air (select the "Permits" tab then "Potential to Emit").

1. Identify the emission factors that will be used to calculate emission of regulated pollutants these emission factors come from the Web FIRE emission factor database using the SCC 2-01-001-02).

Pollutant	Emission Factor
CO	130 lbs per 1000 gals diesel burned
NOx	604 lbs per 1000 gals diesel burned
SOx	39.7 lbs per 1000 gals diesel burned
PM10=PM2.5	42.5 lbs per 1000 gals diesel burned
PM*	42.5 lbs per 1000 gals diesel burned
VOC	116 lbs per 1000 gals diesel burned
GHG (COee)	Various (see below)

*The emission factor for PM in this case is very conservative. The engine manufacture is likely to be able to provide a specific emission factor for your generator which should be used in the place of the emission factor above.

2. Calculate the potential amount of diesel fuel burned per year.
   (100 gal fuel/hr) x (500 hrs/yr) = 50,000 gallons of fuel/yr

3. Calculate emission of regulated pollutants using emission factors.

CO: (50,000 gal fuel/yr) x (130 lbs CO/1,000 gal fuel) x (1 ton/2,000 lbs) = 3.25 tons/yr

NOx: (50,000 gal fuel/yr) x (604 lbs NOx/1,000 gal fuel) x (1 ton/2,000 lbs) = 15.1 tons/yr

SOx: (50,000 gal fuel/yr) x (39.7 lbs SOx/1,000 gal fuel) x (1 ton/2,000 lbs) = 1 ton/yr

PM10= PM2.5: (50,000 gal fuel/yr) x (42.5 lbs PM/1,000 gal fuel) x (1 ton/2,000 lbs) = 1.06 tons/yr

PM: (50,000 gal fuel/yr) x (42.5 lbs PM/1,000 gal fuel) x (1 ton/2,000 lbs) = 1.06 ton/yr*

VOC: (50,000 gal fuel/yr) x (116 lbs PM/1,000 gal fuel) x (1 ton/2,000 lbs) = 2.9 tons/yr

GHG (CO2e) pollutants using 40 CFR 98 Subparts A and C:

Total Heat Input Capacity x Emission Factor x Conversion Factor(s) x Global Warming Potential

Total Heat Input Capacity in MMBtu/yr: Total Btu/hr x (1 x 10-6) x 8760 hrs/yr
7,200,000Btu/hr x (1 x 10-6) x 8760 hrs/yr = 63,072 MMBtu/yr

CO_2: $\frac{63{,}072\ \text{MMBtu}}{1\ \text{year}} \times \frac{73.96\ \text{kg}}{1\ \text{MMBtu}} \times \frac{2.2046\ \text{lbs}}{1\ \text{kg}} \times \frac{1\ \text{ton}}{2000\ \text{lbs}} \times 1 = 5{,}142\ \text{tons/yr}$

CH_4: $\frac{63{,}072\ \text{MMBtu}}{1\ \text{year}} \times \frac{0.003\ \text{kg}}{1\ \text{MMBtu}} \times \frac{2.2046\ \text{lbs}}{1\ \text{kg}} \times \frac{1\ \text{ton}}{2000\ \text{lbs}} \times 25 = 5.21\ \text{tons/yr}$

N_2O: $\frac{63{,}072\ \text{MMBtu}}{1\ \text{year}} \times \frac{0.0006\ \text{kg}}{1\ \text{MMBtu}} \times \frac{2.2046\ \text{lbs}}{1\ \text{kg}} \times \frac{1\ \text{ton}}{2000\ \text{lbs}} \times 298 = 12.43\ \text{tons/yr}$

Total CO_2e tons/yr = CO_2 + CH_4 + N_2O
(5,142 tons CO_2/yr) + (5.21 tons CH4/yr) + (12.43 tons N20/yr) = **5,160 tons CO_2e/yr**

GENERATOR PTE SUMMARY (ton/yr)

- **CO = 3.25**
- **NOx = 15.1**
- **SOx = 1.0**
- **PM10=PM2.5 = 1.06**
- **PM = 1.06**
- **CO_2e = 5,160**

STEP 7: Calculate the PTE for the Facility

Once you have calculated the PTE from each individual process, calculate the total PTE for each air contaminant emitted by your facility by summing up the PTE from all of the processes. Organize your PTE totals into spreadsheets like the ones shown below for **Small Business Inc**.

Part 3 of this workbook uses the PTE that has been calculated in the previous steps to determine whether your facility is a "major" or "minor" source and also explains what that means.

Small Business, Inc.

EMISSION TOTALS – CRITERIA POLLUTANTS

Emission Unit	CO (TON/YR)	NOx (TON/YR)	SOx (TON/YR)	PM (TON/YR)	PM10/ PM2.5 (TON/YR)	VOC (TON/YR)	LEAD (TON/YR)	GHG CO_2e (TON/YR)
COATING BOOTHS 1-3				7.0		5.6		
OVEN	0.90	1.10	0.006	0.02	0.09	0.06	0.000005	1,282
MAINTENANCE BOOTH				2.02		134.9		
PRINTING						0.11		
287(C) BOOTH				3.31		8.2		
COLD CLEANERS						0.475		
CLEANUP						6.0		
GRINDER				57.16	5.72			
WELDING				0.03				
BOILER	3.59	4.29	0.03	0.08	0.31	0.22	0.0002	5,130
GENERATOR	3.25	15.1	1.0	1.06	1.06	2.9		5,160
TOTAL	**7.74**	**20.49**	**1.036**	**70.68**	**7.18**	**158.5**	**0.000205**	**11,572**

Small Business, Inc.

EMISSION TOTALS – HAPs

Emission Unit	Xylene	Toluene	Ethylene glycol	Chromium	Chromium (VI)	manganese	MIBK	Total
COATING BOOTHS 1-3	5.6							5.6
OVEN								0
MAINTENANCE BOOTH	85.85	41.70	7.36					134.91
PRINTING								0
SPECIAL PROJECT	5.68	2.27					0.25	0.25
COLD CLEANERS								0
CLEANUP		6.0						6
GRINDER								0
WELDING				0.001	0.001	0.001		0.003
BOILER								0
GENERATOR								0
								0
								0
								0
								0
								0
TOTAL	**97.13**	**49.97**	**7.36**	**0.001**	**0.001**	**0.001**	**0.25**	**154.71**

Part 3: Major or Minor Source

Once you have calculated your facility's potential to emit (PTE), you can determine whether you are a "major" or "minor" source of air pollution. Major sources are subject to more regulations than minor sources. Compare your facility's PTE to the thresholds listed in Table 3-1 below:

Table 3-1: Major Source Thresholds

Type of Pollutant	Title V Major Source tons/year	NESHAP Major Source tons/year	PSD Major[1,2] tons/year	Major Non-attainment[3] tons/year
Particulate Matter (PM)			100/250	
PM ≤ 10 microns in diameter (PM10)	100		100/250	Moderate: 100 Serious: 70
PM ≤ 2.5 microns in diameter (PM2.5)	100		100/250	
Volatile Organic Compounds (VOCs)	100		100/250	Marginal: 100 Moderate: 100 Serious: 50 Severe: 25 Extreme: 10
Carbon Monoxide (CO)	100		100/250	Moderate: 100 Serious: 50
Nitrogen Oxides (NOx)	100		100/250	Marginal: 100 Moderate: 100 Serious: 50 Severe: 25 Extreme: 10
Sulfur Dioxide (SO_2)	100		100/250	100
Lead (Pb)*	100		100/250	100
Hazardous Air Pollutants (HAPs)* • Any single HAP • Any combination of HAPs	• 10 • 25	*Lead compounds are HAPs • 10 • 25		
Greenhouse Gases (GHG)	100,000 on a CO2e basis, and 100 GHGs mass basis		100,000 on a CO2e basis	
Any other regulated air contaminant	100			

[1]100 tpy for 28 specific categories, 250 tpy for all other source categories. Requirements associated with PSD Major sources are not discussed in detail in this workbook.

[2] A PSD permit is required before a "major" new source constructs or before "major" or "significant" changes or modifications are made at an existing "major" source of air pollution. PSD sources are large sources of air contaminants.

[3] Lower major source thresholds for non-attainment areas only apply to the pollutant for which an area is in non-attainment.

If your facility's PTE is *below* all the emission thresholds in Table 3-1, you may be considered to be a true minor source not subject to the Renewable Operating Permit Program or any of the other major source requirements. You should keep records showing your calculations and all assumptions.

Recalculate your PTE whenever new processes are added or changes are made that may increase your PTE.

If your facility's PTE *exceeds* any of the thresholds in Table 3-1, you are considered a major source. If you have determined that you are a major PSD or major source non-attainment, call 800-662-9278 for further guidance.

If you are a Title V Major source or a NESHAP Major source, you have two options:

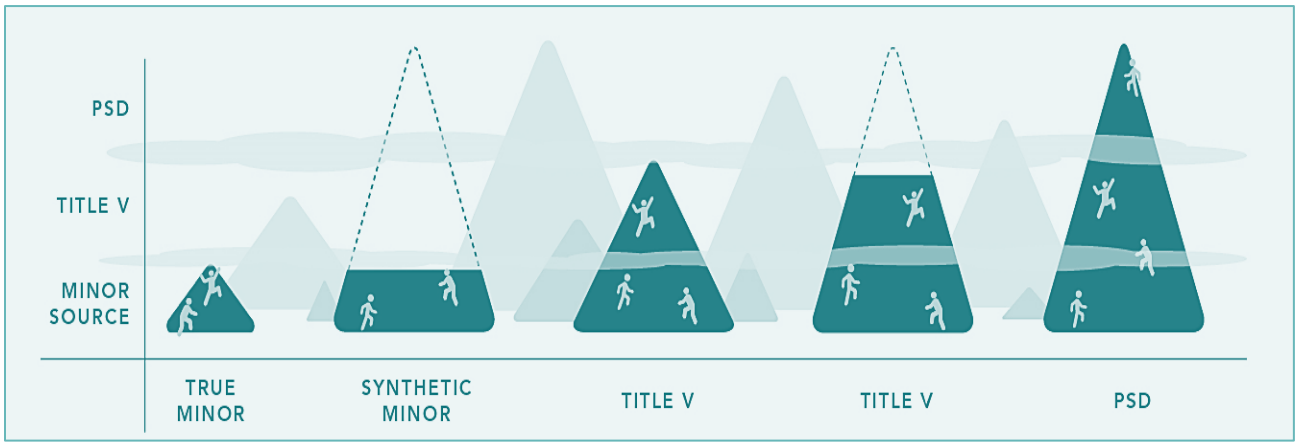
1. Comply with the major source requirements discussed on the following page.

or

2. Limit your PTE using one of the mechanisms described in Part 4 to avoid being a major source. Smaller companies that have ***actual*** emissions well below the major source thresholds should consider this option.

Small Business, Inc.

Small Business, Inc.'s PTE calculations in Part 2 of this workbook indicate that the major source threshold for VOC, individual HAPs (Xylene and Toluene), and total HAPs (see pages 2-38 and 2-39) have been exceeded. However, **Small Business Inc.'s** *actual* emissions are well below any of the major source thresholds. It would be a good idea for this company to limit PTE rather than apply for a Renewable Operating Permit and become subject to other major source requirements, such as NESHAPs. Part 4 discusses how **Small Business Inc.** will limit their PTE.



☐ **Renewable Operating Permit (ROP) Program.** All major sources of air pollution are subject to the ROP Program. You must apply for an ROP within 12 months of becoming a major source under Title V. To apply for an ROP you will need to complete an ROP application packet.

The ROP must be renewed every five years. In addition, sources subject to the ROP Program must submit annual and semi-annual certification reports indicating that the facility is complying with each permit condition of the ROP.

Learn more about the ROP Program on the Internet at Michigan.gov/air (select "Permits" then "Renewable Operating Permits (ROP/Title V.

☐ **Emissions Reporting.** All major sources under Title V and sources that opt-out of the ROP Program are required to report emissions, annually. Major sources must submit an emissions reportreport to the AQD annually in the MiEnviro Portal System. Subject facilities will receive an emissions reportingnotification every January that will outline their reporting requirements. Additional information about emissions reporting can be found at Michigan.gov/EGLEAirEmissions.

☐ **Annual Air Emissions Fees.** Major sources are subject to annual emissions fees. The fee amount is assessed based upon the emissions reported in MiEnviro Portal. A fee invoice is mailed to the subject facility in January and the payment is due within 90 days. More information about annual air emissions fees can be found on the Internet at.

☐ **National Emission Standards for Hazardous Air Pollutants NESHAPs (also known as MACT Standards).**

Certain industrial categories that exceed the major source thresholds for HAPs may be subject to a federal NESHAP. The NESHAP will usually be incorporated into a ROP. A listing of the source categories that may be subject to a NESHAP are provided in Table 3-2. Visit epa.gov/compliance/national-emission-standards-hazardous-air-pollutants-compliance-monitoring to learn more about specific NESHAPs

Table 3-2: NESHAP - Source Categories Affected

- Aerospace
- Acrylic/Modacrylic Fiber(area sources)
- Asbestos
- Asphalt Processing and
- Asphalt Roofing Manufacturing
- Auto & Light Duty Truck
- (surface coating)
- Auto Body Refinishing (area sources)
- Benzene Waste Operations
- Boat Manufacturing
- Brick and Structural Clay Products Manufacturing
- Clay Ceramics Manufacturing
- Carbon Black Production (area sources)
- Cellulose Products Manufacturing
- Miscellaneous Viscose Processes
  - Cellulose Food Casing
  - Rayon
  - Cellulosic Sponge
  - Cellophane

  Cellulose Ethers Production
  - Caroxymethyl Cellulose
  - Methyl Cellulose
  - Cellulose Ethers
- Chemical Manufacturing Industry (area sources):CMAS
- Chemical Preparations Industry (area sources)
- Chromium Electroplating
  - Chromic Acid Anodizing
  - Decorative Chromium Electroplating
  - Hard Chromium Electroplating
- Chromium Compounds (area sources)
- Clay Ceramics Manufacturing (area sources)
- Coke Ovens: Pushing, Quenching,& Battery Stacks
- Coke Ovens (Charging, Top Side, and Door Leaks)
- Combustion Sources at Kraft, Soda,and Sulfite Pulp & Paper Mills (Pulp and Paper MACT II)
- Commercial Sterilizers
  - Commercial Sterilization Facilities
- Degreasing Organic Cleaners
  - Halogenated Solvent Cleaners
- Dry Cleaning
  - Commercial drycleaning dry-to-dry
  - Commercial drycleaning transfer machines
  - Industrial drycleaning dry-to-dry
  - Industrial drycleaning transfer machines
- Electric Arc Furnace Steelmaking Facilities(Area Sources)
- Engine Test Cells/Stands (Combined with Rocket Testing Facilities)
- Fabric Printing, Coating & Dyeing
- Ferroalloys Production (Major Sources)
- Ferroalloys Production (Area Sources)
- Flexible Polyurethane Foam Fabrication Operation
- Flexible Polyurethane Foam Production
- and Fabrication (area sources)
- Flexible Polyurethane Foam Production
- Friction Products Manufacturing
- Gasoline Dispensing Facilities (Area Sources)
- Gasoline Distribution (Stage 1)
- Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities (Area Sources)
- Generic MACT I-Acetal Resins
- Generic MACT I-Hydrogen Floride
- Generic MACT I-Polycarbonates Production
- Generic MACT I-Acrylic/Modacrylic Fibers
- Generic MACT II-Spandex Production
- Generic MACT II-Carbon Black Production
- Generic MACT II-Ethylene Processes
- Glass Manufacturing (area sources)

- Glass Manufacturing Plants -Inorganic Arsenic Emissions
- Gold Mine Ore Processing and Production (area sources)
- Hazardous Waste Combustion
  - Hazardous Waste Incinerators (A)
  - Hazardous Waste Incinerators (M)
- Hazardous Organic NESHAP (Synthetic Organic Chemical Manufacturing Industry)
- Hospitals: Ethylene Oxide Sterilizers (area sources)
- Hydrochloric Acid Production
- Fumed Silica Production
- Industrial, Commercial and Institutional Boilers and Process Heaters - Major Sources
- Industrial, Commercial and Institutional - Boilers - Area Sources
- Industrial Cooling Towers
- Integrated Iron and Steel
- Iron and Steel Foundries (Major Sources)
- Iron and Steel Foundries (area sources)
- Large Appliances (surface coating)
- Lead Acid Battery Mfg.(area sources)
- Leather Finishing Operations
- Lime Manufacturing
- Magnetic Tape (surface coating)
- Manufacturing Nutritional Yeast (formerly Bakers Yeast)
- Marine Vessel Loading Operations
- Mercury Cell Chlor-Alkali Plants
- Metal Can (surface coating)
- Metal Coil (surface coating)
- Metal Fabrication and Finishing
- Source Nine Categories(area sources)
- Metal Furniture (surface coating)
- Mineral Wool Production
- Misc. Coating Manufacturing
- Misc. Metal Parts and Products (surface coating)
  - Asphalt/Coal Tar Application to Metal Pipes
- Misc. Organic Chemical Production and Processes (MON)
  - Alkyd Resins Production
  - Ammonium Sulfate Production
  - Benzyltrimethylammonium Chloride Prod.
  - Carbonyl Sulfide Production
  - Chelating Agents Production
- Misc. Organic Chemical Production and Processes (MON) cont.
  - Chlorinated Paraffins Production
  - Ethyllidene Norbomene Production
  - Explosives Production
  - Hydrazine Production
  - Maleic Anhydride Copolymers Production
  - Manufacture of Paints, Coatings, &
  - Adhesives
  - OBPA/1, 3-diisocyanate Production
  - Photographic Chemicals Production
  - Phthalate Plasticizers Production
  - Polyester Resins Production
  - Polymerized Vinylidene Chloride Prod.
  - Polymethyl Methacrylate Resins Prod.
  - Polyvinyl Acetate Emulsions Prod.
  - Polyvinyl Alcohol Production
  - Polyvinyl Butyral Production
  - Quaternary Ammonium Comp. Prod.
  - Rubber Chemicals Production
  - Symmetrical Tetrachloropyridine Production
- Municipal Solid Waste Landfills
- Natural Gas Transmission and Storage
- Nonferrous Foundries: Aluminum, Copper, and Other (area sources)
- Off-Site Waste Recovery Operations
- Oil & Natural Gas Production includes Area Sources
- Organic Liquids Distribution (non-gasoline)
- Paint Stripping and Miscellaneous Surface Coating Operations - (Area Sources)
- Paper and Other Web (surface coating)

- Pesticide Active Ingredient Production
  - 4-Chlror-2-Methyl Acid Production
  - 2,4 Salts & Esters Production
  - 4,6-dinitro-o-cresol Production
  - Butadiene Furfural Cotrimer
  - Captafol Production
  - Captan Production
  - Chloroneb Production
  - Chlorothalonil Production
  - Dacthal (tm) production
  - Sodium Pentachlorophenate Production
  - Tordon (tm) Acid Production
- Petroleum Refineries
  - Catalytic Cracking
  - Catalytic Reforming
  - Sulfur Plant Units
  - Associated Bypass Lines
- Pharmaceuticals Production
- Phosphoric Acid
- Phosphate Fertilizers
- Plastic Parts (surface coating)
- Plating and Polishing Operations (area sources)
- Plywood and Composite Wood Products (formerly Plywood and Particle Board
- Manufacturing)
- Polyether Polyols Production
- Polymers & Resins I
  - Butyl Rubber
  - Epichlorohydrin Elastomers
  - Ethylene Propylene Rubber
  - Hypalon (TM) Production
  - Neoprene Production
  - Nitrile Butadiene Rubber
  - Polybutadiene Rubber
  - Polysulfide Rubber
  - Styrene-Butadiene Rubber & Latex
- Polymers & Resins II
  - Epoxy Resins Production
  - Non-Nylon Polyamides Production
- Polymers & Resins III
  - Amino Resins
  - Phenolic Resins
- Polymers & Resins IV
  - Acrylonitrile-Butadiene-Styrene
  - Methyl Methacrylate-Acrylonitrile+
  - Methyl Methacrylate-Butadiene++
  - Polystrene
  - Styrene Acrylonitrile
  - Polyethylene Terephthalate
  - Nitrile Resins
- Polyvinyl Chloride and Copolymers Production
- Polyvinyl Chloride and Copolymers Production (area sources)
- Portland Cement Manufacturing
- Primary Aluminum
- Primary Copper
- Primary Copper Smelting (area sources)
- Primary Lead Smelting
- Primary Magnesium Refining
- Primary Nonferrous Metals-Zinc,
- Cadmium, and Beryllium (area sources)
- Printing and Publishing (surface coating)
- Publicly Owned Treatment Works (POTW)
- Pulp & Paper (non-combust)MACT
- Reciprocating Internal Combustion Engines (RICE) includes area sources
- Refractory Products Manufacturing
- Reinforced Plastic Composites Production
- Rubber Tire Manufacturing
- Secondary Aluminum
- Secondary Copper Smelting (area sources)
- Secondary Lead Smelters
- Secondary Nonferrous Metals Processing (Brass, Bronze, Magnesium and Zinc)(Area Sources)
- Semiconductor Manufacturing
- Shipbuilding & Ship Repair (surface coating)
- Site Remediation

- Solvent Extraction for Vegetable Oil Production
- Stationary Combustion Turbines
- Steel Pickling-HCL Process
- Taconite Iron Ore Processing
- Tetrahydrobenzaldehyde Manufacture (Formerly Butadiene Dimers Production)
- Utility NESHAP
- Wet Formed Fiberglass Mat Production
- Wood Building Products (surface coating)
- Wood Furniture(surface coating)
- Wood Preserving (area sources)
- Wool Fiberglass Manufacturing