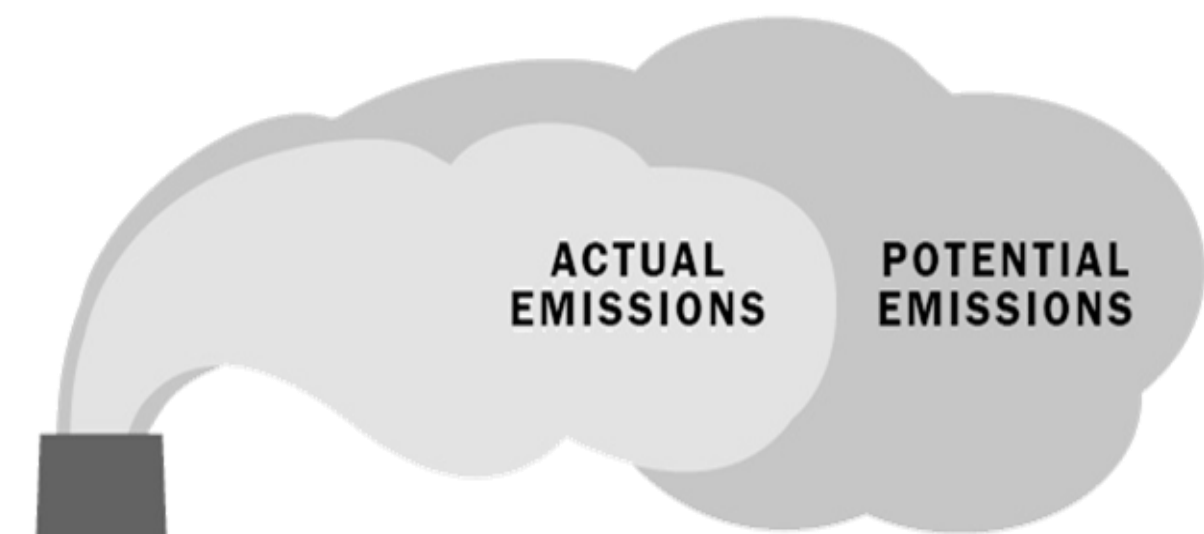




**ACTUAL
EMISSIONS**

**POTENTIAL
EMISSIONS**

Potential to Emit

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Topics

- What is Potential to Emit (PTE)
- When to Calculate Potential to Emit
- How to Calculate Potential to Emit
- Major versus Minor Source
- How to Avoid Being a Major Source

What is Potential to Emit?

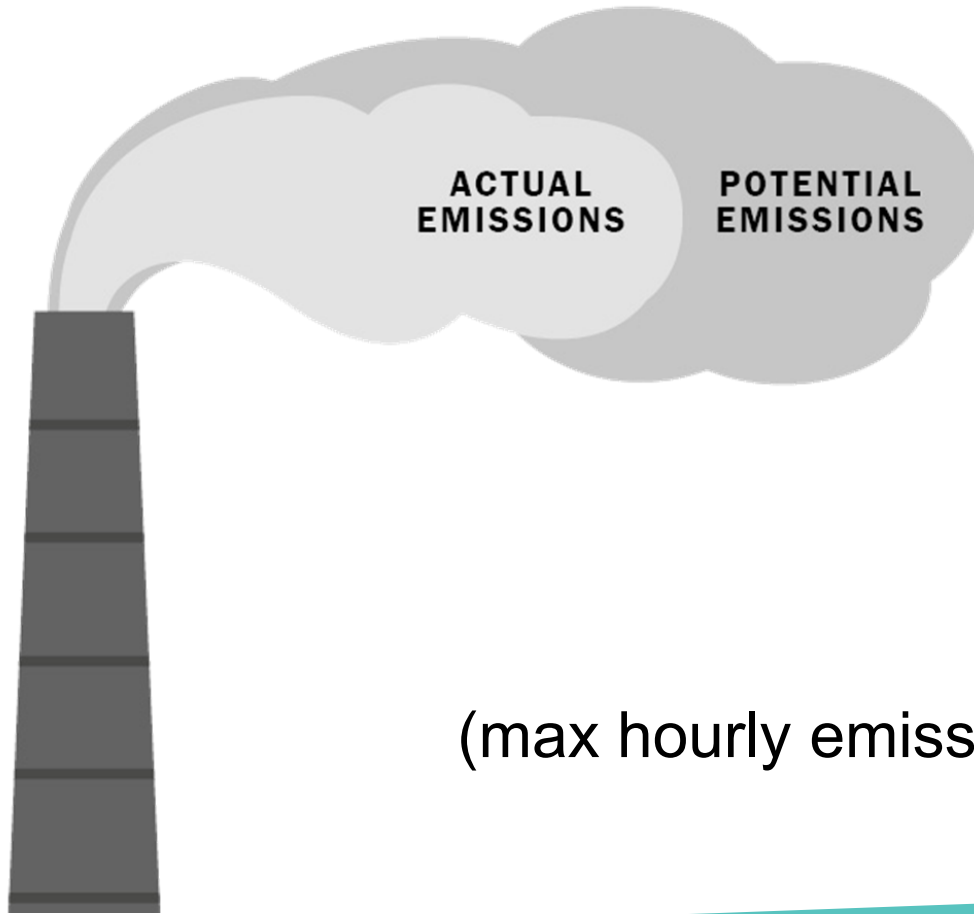
- R336.1116(n) "Potential to emit" means the maximum capacity of a stationary source to emit an air contaminant under its physical and operational design. Any physical or operational limit on the capacity of the stationary source to emit an air contaminant, including air pollution control equipment and restrictions on the hours of operation or the type or amount of material combusted, stored, or processed, shall be treated as part of its design only if the limit, or the effect it would have on emissions, is legally enforceable. Secondary emissions shall not count in determining the "potential to emit" of a stationary source. For hazardous air pollutants that have been listed pursuant to Section 112(b) of the clean air act, quantifiable fugitive emissions shall be included in determining the potential to emit of any stationary source....

What is *potential to emit*?

The maximum amount of air contaminants emitted, if:

- Each process is operated at 100% of its design capacity;
- 24 hours/day, 365 days/year;
- Highest amount of air contaminants are used or processed
- No air pollution control equipment

Introduction to PTE



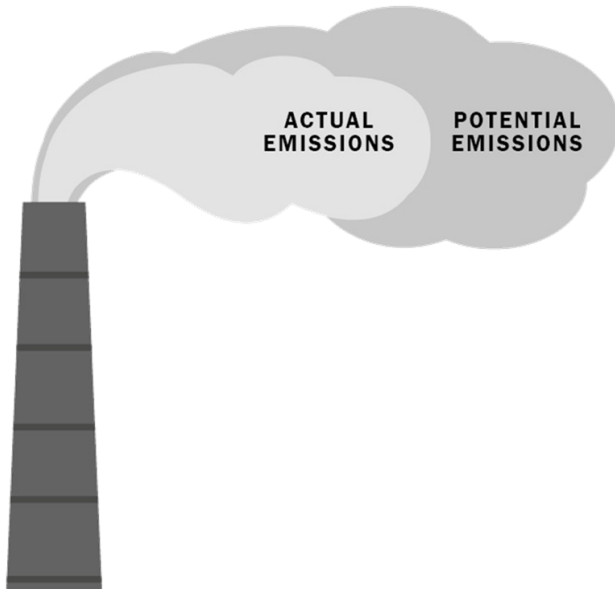
PTE =

(max hourly emission rate of pollutant) x (8760 hours/year)

Why PTE and not actual emissions?

Actual Emissions

- Can change year to year
- May not be consistent



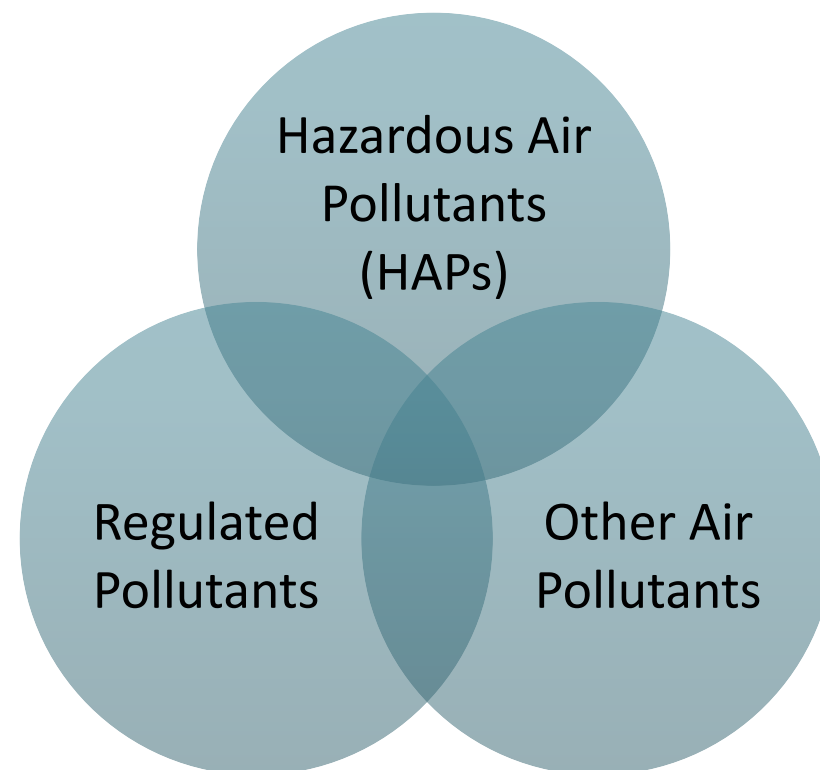
Potential to Emit

- Impartial
- Consistent Criteria
- Levels the playing field

What Pollutants are regulated?

Pollutants regulated:

- Regulated Pollutants
- Hazardous Air Pollutants (HAPs)
- Other Air Pollutants



Regulated Pollutants

- Carbon Monoxide (CO)
- Lead (Pb)
- Ozone (O₃), including precursors:
 - Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x)
- Nitrogen Oxides (NO_x)
- 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)

Hazardous Air Pollutants (HAPs)

Hazardous Air Pollutants (HAPs)

CAS No.	Chemical	CAS No.	Chemical	CAS No.	Chemical	CAS No.	Chemical
75070	Acetaldehyde	91941	3,3-Dichlorobenzidene	302012	Hydrazine	75558	1,2-Propylenimine (2-Methyl aziridine)
60355	Acetamide	111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)	7647010	Hydrochloric acid	91225	Quinoline
75058	Acetonitrile	542756	1,3-Dichloropropene	7664393	Hydrogen fluoride (hydrofluoric acid)	106514	Quinone
98862	Acetophenone	62737	Dichlorvos	123319	Hydroquinone	100425	Styrene
53963	2-Acetylaminofluorene	111422	Diethanolamine	78591	Isophorone	96093	Styrene oxide
107028	Acrolein	21697	N,N-Diethyl aniline (N,N-Dimethylaniline)	58899	Lindane (all isomers)	1746016	2,3,7,8-Tetrachlorodibenzo p-dioxin
79061	Acrylamide	64675	Diethyl sulfate	108316	Maleic anhydride	79345	1,1,2,2-Tetrachloroethane
79107	Acrylic acid	119904	3,3-Dimethoxybenzidine	67561	Methanol	127184	Tetrachloroethylene (Perchloroethylene)
107131	Acrylonitrile	60117	Dimethyl aminoazobenzene	72435	Methozychlor	7550450	Titanium tetrachloride
107051	Allyl chloride	119937	3,3-Dimethyl benzidine	74839	Methyl bromide (Bromomethane)	108883	Toluene
92671	4-Aminobiphenyl	79447	Dimethyl carbarmoyl chloride	74873	Methyl chloride (Chloromethane)	95807	2,4-Toluene diamine
62533	Aniline	68122	Dimethyl formamide	71556	Methyl chloroform (1,1,1-Trichloroethane)	584849	2,4-Toluene diisocyanate
90040	o-Anisidine	57147	1,1 Dimethyl hydrazine	60344	Methyl hydrazine	95534	o-Toluidine
1332214	Asbestos	131113	Dimethyl phthalate	74884	Methyl iodide (Iodomethane)	8001352	Toxaphene (chlorinated camphene)
71432	Benzene	77781	Dimethyl sulfate	108101	Methyl isobutyl ketone		
92875	Benzidine	534521	4,6-Dintro-o-cresol, and				
98077	Benzotrichloride						
100447	Benzyl chloride						
92524	Biphenyl						

Other Regulated Pollutants

- NESHAP – National Emission Standards for Hazardous Air Pollutants
 - Asbestos, Benzene, etc.
- NSPS – New Source Performance Standards
 - Mercury, Hydrogen Chloride, etc.
- Class I and Class II Pollutants
 - Ozone depleting pollutants (Table 1-4 of the PTE Workbook)

What is a “Major Source”?

Type of Pollutant	Major Source Threshold	Common Sources of Pollutants
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 Any single HAP Any combination of HAPs	10 tons/year 25 tons/year	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	

When to Calculate Potential to Emit?

- When adding a process
- When removing a process
- When changing a material
- When changing a process
- ROP Renewal
- New exempt equipment

PTE is not stagnant!



How to Calculate Potential to Emit

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.

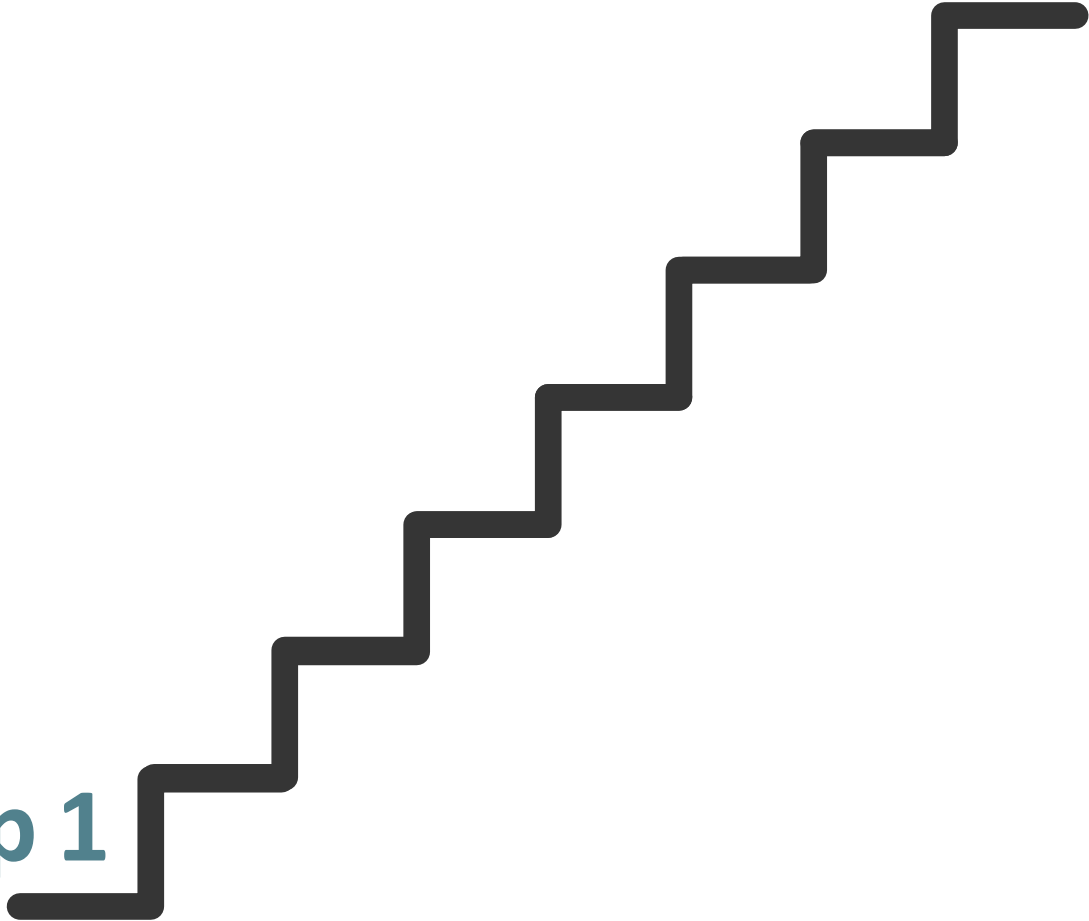
Use of Tools

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
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Figure 2-1: Summary Worksheet

FACILITY INVENTORY

Step 1

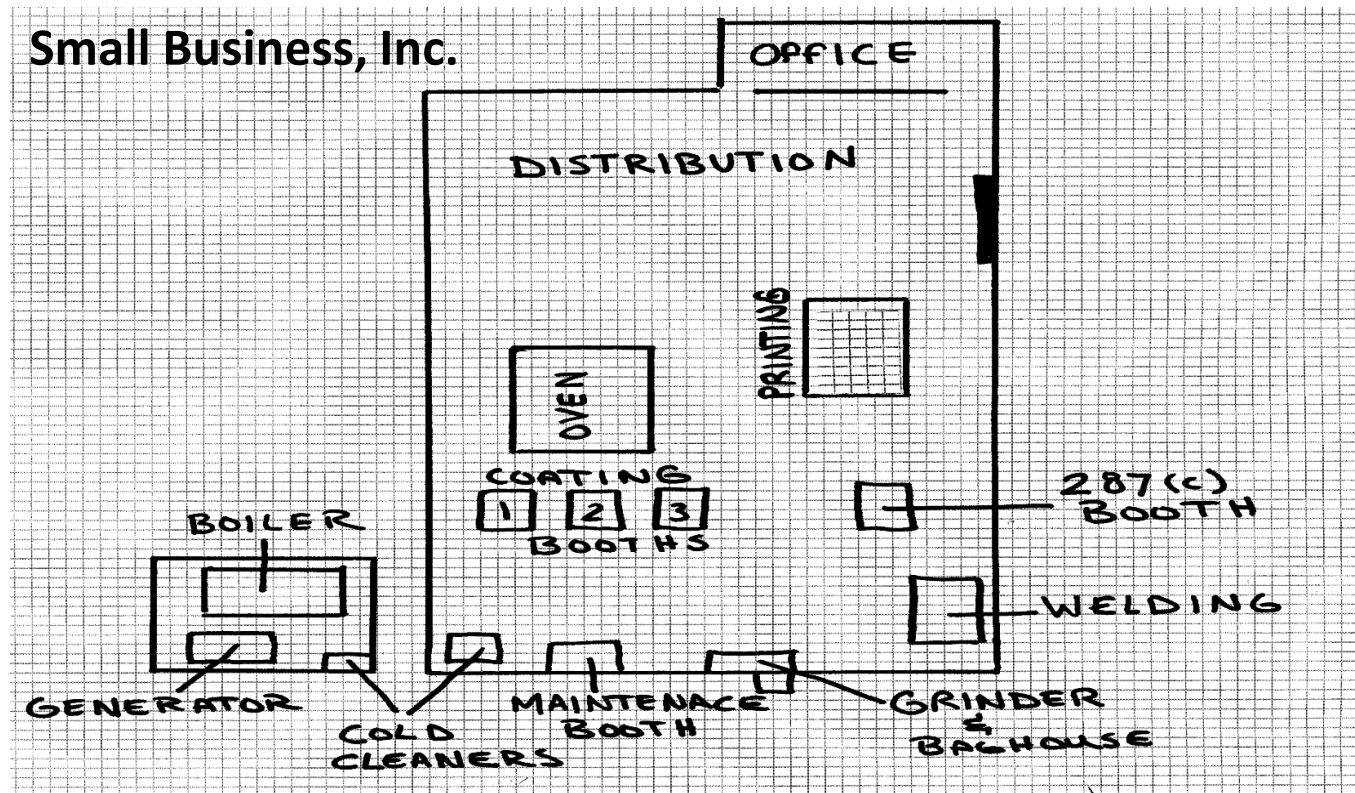


Facility Inventory

- Identify the boundaries of your “Stationary Source”
 - [AQD-011](#) defines this
 - May not just be where the process is
 - Includes contiguous properties
 - Properties under the same owner
 - Properties under the same operational control
 - Belong to the same industrial classification
 - More...

Facility Inventory

- Use an existing facility diagram or draw your own.



Facility Inventory

- Identify Emission Sources:
 - Coating Booths 1-3
 - Oven
 - Maintenance Booth
 - Printing
 - Special Project Booth
 - Cold Cleaners
 - Clean-up Activities
 - Grinder
 - Welding
 - Boiler
 - Generator
- List not all inclusive

Facility Inventory

Some reminders...

- No stack necessary
- Not necessary to be in the main building
- Clean-up solvents
- Aerosol paint usage
- Check existing sources:
 - Permits
 - Emissions reports
 - TRI information



Facility Inventory

- Including Fugitive Emissions?
 - Cannot reasonably pass through a stack or building structure



Leaking valves or flanges



Dust blowing from rock or coal piles

Facility Inventory

- 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
- 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

Facility Inventory

- Insignificant Activities (Table 202)

- Repair and maintenance of grounds and structures and repair and maintenance of process and process equipment pursuant to Michigan Rule R336.1285(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).
- Piping and storage of sweet natural gas, including emergency venting from pressure relief valves or purging of gas lines.

Facility Inventory

Did you forget anything?

- Look at existing permits
- Check your emissions reports
- Check your TRI data



Remember this Worksheet?

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
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		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		

Figure 2.1: Summary Worksheet

Conduct a Facility Inventory

Emission Source	Description
COATING BOOTHS 1-3	3 spray booths
OVEN	2,500,000 Btu/hr natural gas fired
MAINTENANCE BOOTH	Booth used for touchup
PRINTING	Prints information on product
SPECIAL PROJECT BOOTH	Spray booth used for special projects
COLD CLEANERS	2 cold cleaners for parts washing
CLEANUP	Facility-wide cleanup solvents
GRINDER	Metal parts grinder connected to baghouse (29,000 cfm)
WELDING	Shielded metal arc welding
BOILER	10 million Btu/hr natural gas fired boiler
GENERATOR	Diesel fired emergency generator

GATHER DATA

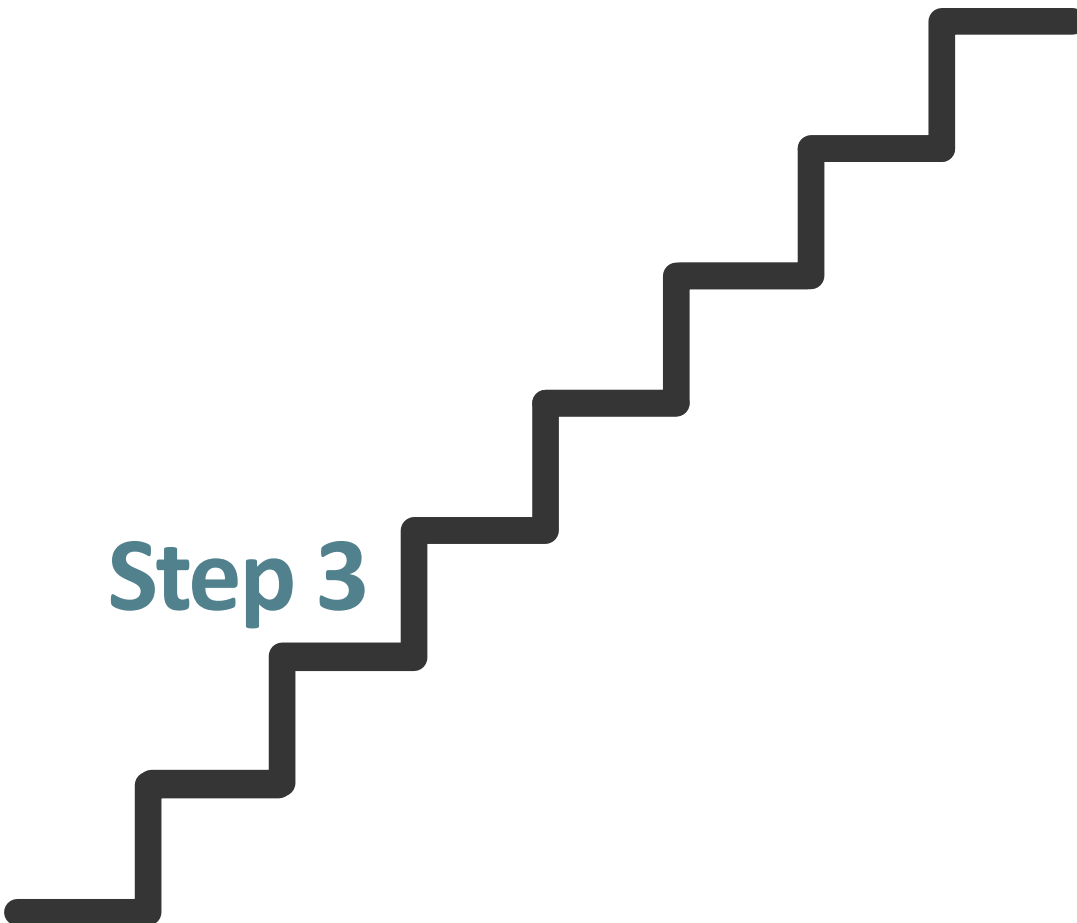
Step 2



Gather Data

- Air Permits
- Safety Data Sheets (SDS)
- Performance test results
- Control efficiency of control equipment
- Manufacturer Specs
- Maximum capacities
 - Rate of spray guns
 - Heat input capacity of boilers
 - Production rate

CATEGORIZE EMISSION SOURCES



Step 3

Categorize Emission Sources

- Permitted
- Grandfathered or exempt from Rule 201 permitting requirements

Air Permit to Install EXEMPTION HANDBOOK

Michigan Air Pollution Control Rules
R336.1278 – R 336.1291 (Rules 278 – 291)

FEBRUARY 2020



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

800-662-9278 | [Michigan.gov/EGLE](https://michigan.gov/EGLE)

Exempt Equipment

- Is the equipment mentioned?
- Is it part of a bigger project?
- Trigger significance thresholds?
- Document it!



Exempt Equipment

When looking at using an exemption:

- Must pass Rule 278 to use
 - Significant Emissions
- R278a records and ongoing monthly recordkeeping
 - Date of installation
 - Description of Emission Unit
 - Determination

Air Permit to Install EXEMPTION HANDBOOK

Michigan Air Pollution Control Rules
R336.1278 – R 336.1291 (Rules 278 – 291)

FEBRUARY 2020



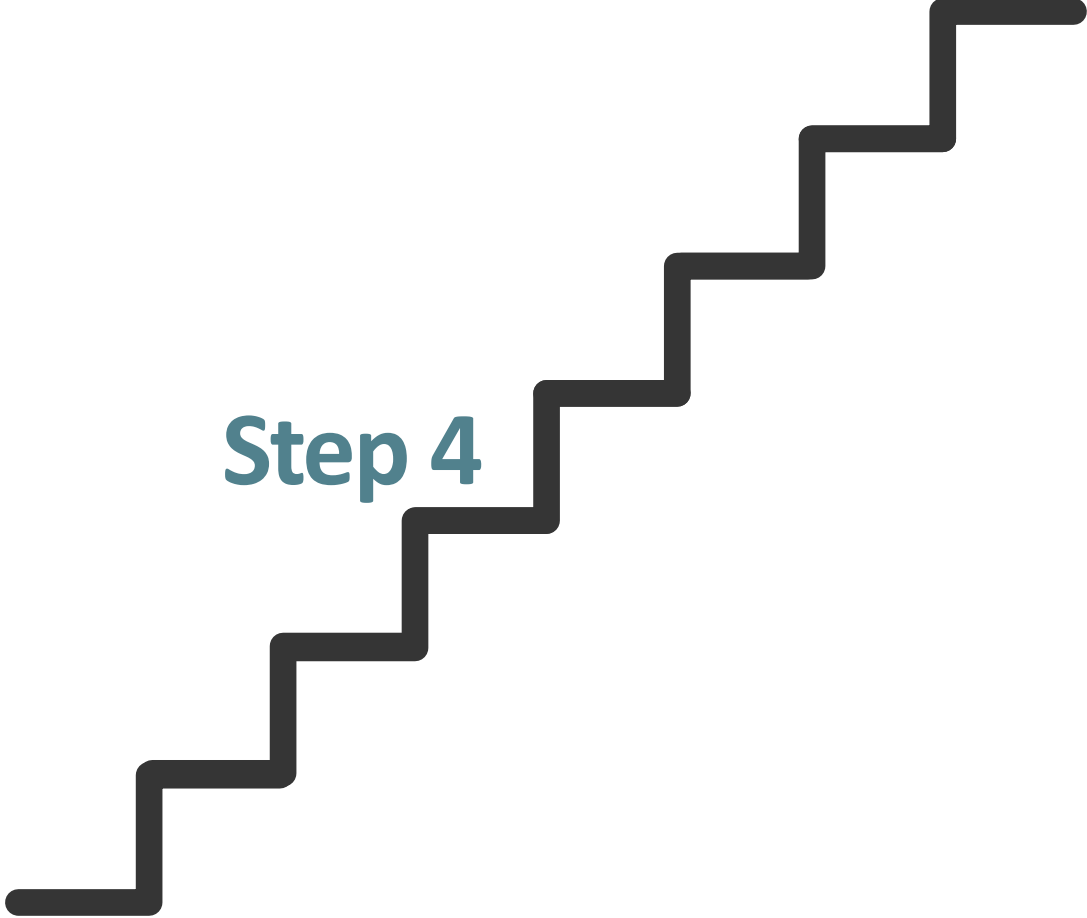
MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

800-662-9278 | Michigan.gov/EGLE

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
Coating Booths 1-3	3 Spray Booths	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☐ Exempt: R336. <u> </u>		
Oven	2.5 MMBtu/hr natural gas-fired curing oven	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☐ Exempt: R336. <u> </u>		
Maintenance Booth	Booth used for touchup coating	☒ Permitted: PTI # <u>852-82</u> ☐ Grandfathered: <u> </u> ☐ Exempt: R336. <u> </u>		
Printing Press	Prints information on products	☐ Permitted: PTI # <u> </u> ☒ Grandfathered: <u>10/15/1966</u> ☐ Exempt: R336. <u> </u>		
287(c) Spray Booth	Spray booth used for special projects	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1287(c)</u> <u> </u>		
Cold Cleaners	2 cold cleaners for parts washing	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1281(h)</u> <u> </u>		
Cleanup	Facility-wide cleanup activities	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1290</u> <u> </u>		
Parts Grinder	Metal parts grinder connected to 29,000 cfm baghouse	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1285(l)(vi)</u> <u> </u>		
Welding	Shielded metal arc welding	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1285(i)</u> <u> </u>		
Boiler	10 MMBtu/hr natural gas-fired boiler	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1282(b)(i)</u> <u> </u>		

IDENTIFY LIMITATIONS

Step 4



What makes something an enforceable limit?

Things that may limit the PTE:

- Conditions in a Permit
- State or Federal Rules
- An Exemption



Permit Conditions

Must be legally and practically enforceable

- Monitoring and recordkeeping

Look for:

- Emission Limits
- Requirements to operate an air pollution control device
- Material Limits
- Operating Hours Limits
- Production Limits

Example

1. Operational hours are limited to 10 hours/day.
2. Monitor and Record hours of operation on a daily basis.

Date	Operating Hours
10/16/17	9.5
10/17/17	9.0
10/18/17	9.5
10/19/17	4.0
10/20/17	7.5
10/21/17	0
10/22/17	0
10/23/17	9.0

State and Federal Rules

- Look for restrictions:
 - Restrict emission types
 - Restrict emission rates
 - Limit the usage of raw materials
 - Restrict operations
 - Require specific control devices

Example

Permit Exemption – Rule 287(2)(c)...

(c) A surface coating line if all of the following conditions are met:

- (i) The coating use rate is not more than 200 gallons, as applied, minus water, per month.
- (ii) Any exhaust system that serves only coating spray equipment is supplied with a dry filter control or water wash control which is installed, maintained, and operated in accordance with the manufacturer's specifications, or the owner or operator develops a plan which provides to the extent practicable for the maintenance and operation of the equipment in a manner consistent with good air pollution control practices for minimizing emissions.
- (iii) Monthly coating use records are maintained on file for the most recent 2-year period and are made available to the department upon request.

Identify Legally Enforceable Limitations

Legally Enforceable Limitation

- Permit limit = 5.6 tons VOC/yr
- Permit requires fabric filter

None

Permit requires fabric filter

None (grandfathered)

Rule: R 336.1287(c) – limits coating usage to 200 gal/month

Rule: R 336.1611 - Requires that cover be closed and that parts be drained

Rule: R 336.1290 – limits emission of non-carcinogenic VOCs to 1,000 lbs/month

Rule: R 336.1331, Table 31J - limits emission of PM to 0.10 lbs per 1000 lbs gas

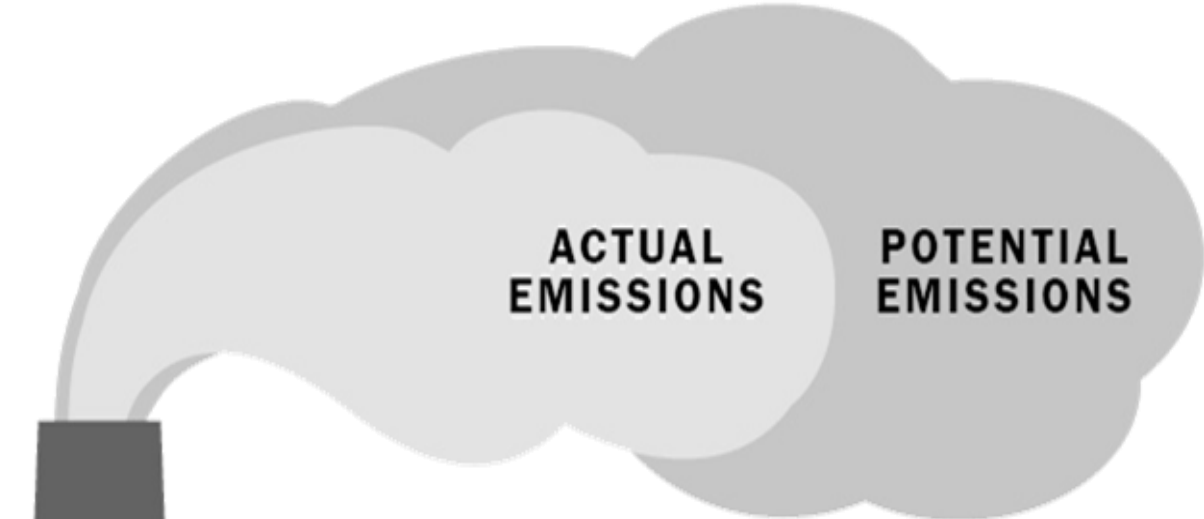
Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
Coating Booths 1-3	3 Spray Booths	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☐ Exempt: R336. <u> </u>	- Permit Limit = 5.6 tpy VOC - Permit requires fabric filter	
Oven	2.5 MMBtu/hr natural gas-fired curing oven	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☐ Exempt: R336. <u> </u>	- None	
Maintenance Booth	Booth used for touchup coating	☒ Permitted: PTI # <u>852-82</u> ☐ Grandfathered: <u> </u> ☐ Exempt: R336. <u> </u>	- Permit requires fabric filter	
Printing Press	Prints information on products	☐ Permitted: PTI # <u> </u> ☒ Grandfathered: <u>10/15/1966</u> ☐ Exempt: R336. <u> </u>	- None (Grandfathered)	
287(c) Spray Booth	Spray booth used for special projects	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1287(c)</u> <u> </u>	- Rule – R336.1287(c) – limits coating usage to 200 gal/month	
Cold Cleaners	2 cold cleaners for parts washing	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1281(h)</u> <u> </u>	- Rule R336.1611 – requires that cover be closed and that parts be drained	
Cleanup	Facility-wide cleanup activities	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1290</u> <u> </u>	- Rule R336.1290 – limits emission of non-carcinogenic VOCs to 1,000 lbs/month	
Parts Grinder	Metal parts grinder connected to 29,000 cfm baghouse	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1285(l)(vi)</u> <u> </u>	- Rule R336.1331, Table 31J – limits emission of PM to 0.10 lbs per 1,000 lbs exhaust gas	
Welding	Shielded metal arc welding	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1285(i)</u> <u> </u>	- None	
Boiler	10 MMBtu/hr natural gas-fired boiler	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1282(b)(i)</u> <u> </u>	- None	

In the Next Session (Part Two)

- Steps 5-7
 - Identify Calculation Methods
 - PTE for Emission Units
 - Facility-wide PTE
 - What Next?
 - Source Classifications



Questions?



**ACTUAL
EMISSIONS**

**POTENTIAL
EMISSIONS**

Potential to Emit Part Two

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Recap of Part One

- What is Potential to Emit (PTE)?
- Steps 1 - 4
 - Conducting a Facility Inventory
 - Gather Data
 - Categorize Emissions Sources
 - Identify Legally Enforceable Limitations

Remember this Worksheet?

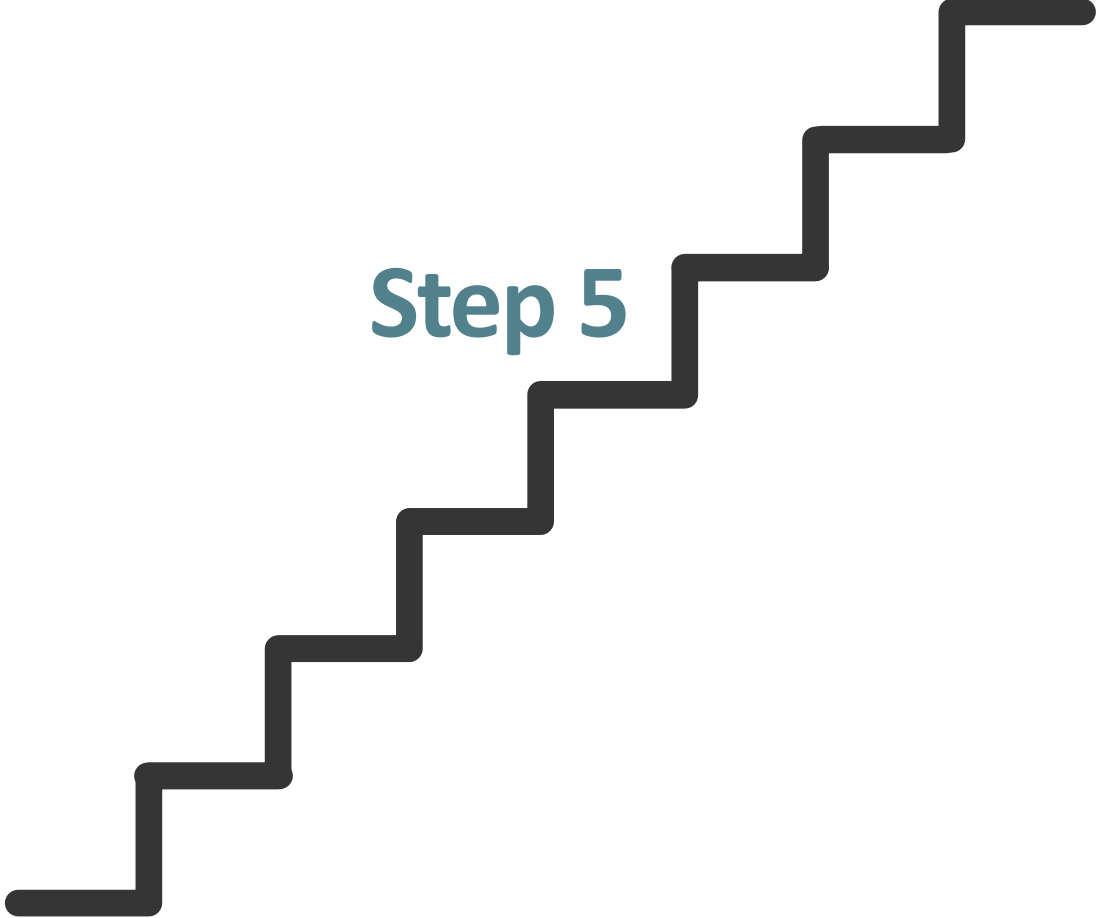
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		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		
		☐ Permitted: PTI # _____ ☐ Grandfathered: ____/____/____ ☐ Exempt: R 336.		

Figure 2.4: Summary Worksheet

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
Coating Booths 1-3	3 Spray Booths	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☐ Exempt: R336. <u> </u>	- Permit Limit = 5.6 tpy VOC - Permit requires fabric filter	
Oven	2.5 MMBtu/hr natural gas-fired curing oven	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☐ Exempt: R336. <u> </u>	- None	
Maintenance Booth	Booth used for touchup coating	☒ Permitted: PTI # <u>852-82</u> ☐ Grandfathered: <u> </u> ☐ Exempt: R336. <u> </u>	- Permit requires fabric filter	
Printing Press	Prints information on products	☐ Permitted: PTI # <u> </u> ☒ Grandfathered: <u>10/15/1966</u> ☐ Exempt: R336. <u> </u>	- None (Grandfathered)	
287(c) Spray Booth	Spray booth used for special projects	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1287(c)</u> <u> </u>	- Rule – R336.1287(c) – limits coating usage to 200 gal/month	
Cold Cleaners	2 cold cleaners for parts washing	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1281(h)</u> <u> </u>	- Rule R336.1611 – requires that cover be closed and that parts be drained	
Cleanup	Facility-wide cleanup activities	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1290</u> <u> </u>	- Rule R336.1290 – limits emission of non-carcinogenic VOCs to 1,000 lbs/month	
Parts Grinder	Metal parts grinder connected to 29,000 cfm baghouse	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1285(l)(vi)</u> <u> </u>	- Rule R336.1331, Table 31J – limits emission of PM to 0.10 lbs per 1,000 lbs exhaust gas	
Welding	Shielded metal arc welding	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1285(i)</u> <u> </u>	- None	
Boiler	10 MMBtu/hr natural gas-fired boiler	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> </u> / <u> </u> / <u> </u> ☒ Exempt: R336. <u>1282(b)(i)</u> <u> </u>	- None	

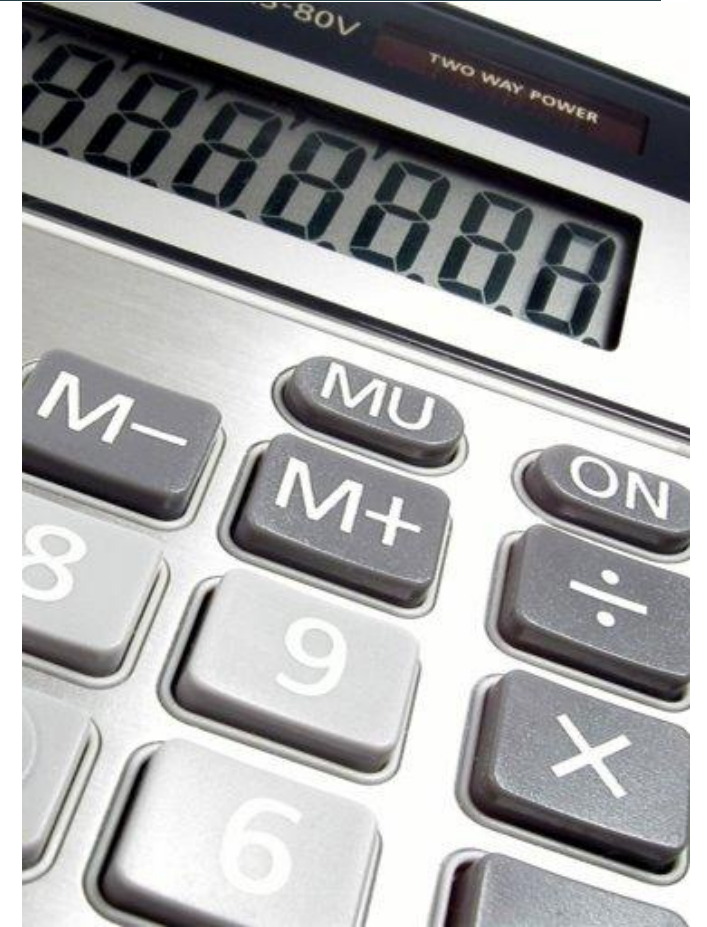
IDENTIFY CALCULATION METHODS

Step 5



Identify the Emission Calculation Methods

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



Legally Enforceable Limitations

- Rules
- Conditions in your permit
- Compliance or enforcement documents



Legally Enforceable Limitations

Rules:

- A metal parts grinder 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 PTE of PM

1. $(29,000 \text{ scf of air/min}) \times (60 \text{ min/hr}) = 1,740,000 \text{ scf of air/hr}$
2. $(1,740,000 \text{ scf of air/hr}) \times (0.075 \text{ lbs of air/1 scf of air}) = 130,500 \text{ lbs of air/hr}$
3. $(130,500 \text{ lbs of air/hr}) \times (0.10 \text{ lbs of PM/1,000 lbs of air}) = 13.05 \text{ lbs of PM/hr}$
4. $(13.05 \text{ lbs PM/hr}) \times (8,760 \text{ hrs/yr}) = 114,318 \text{ lbs of PM/yr}$
5. $(114,318 \text{ lbs PM/yr}) \times (1 \text{ ton/2,000 lbs}) = \textbf{57 tons of PM/yr}$

Legally Enforceable Limitations

Permit Conditions:

1. VOC emissions are limited to 57 tons per year based on a 12-month rolling time period as determined at the end of each calendar month.
2. Calculate and record VOC mass emission calculations in tons on a monthly and 12-month rolling time period basis as determined at the end of each calendar month.

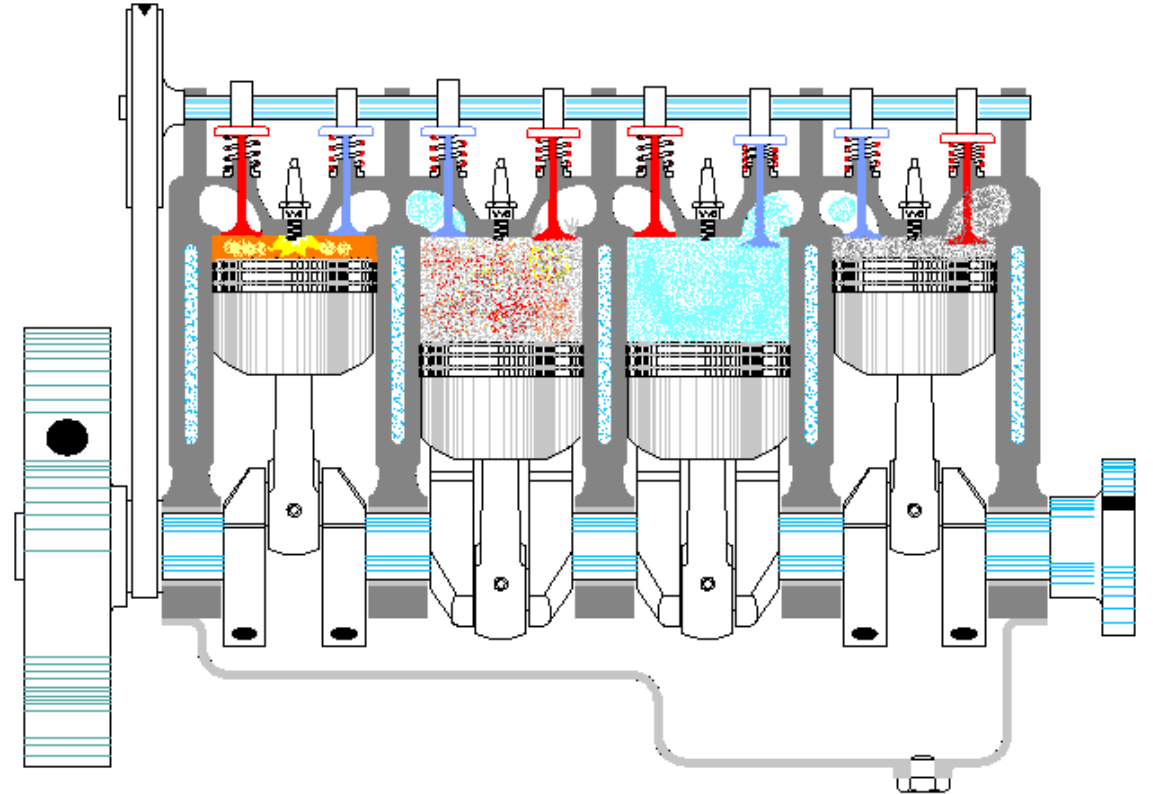
Performance Test Data

- Stack test
- Continuous emission monitoring (CEMS)
- Manufacturer test data

NOTE: used when there is not an applicable limit in a permit or rule.

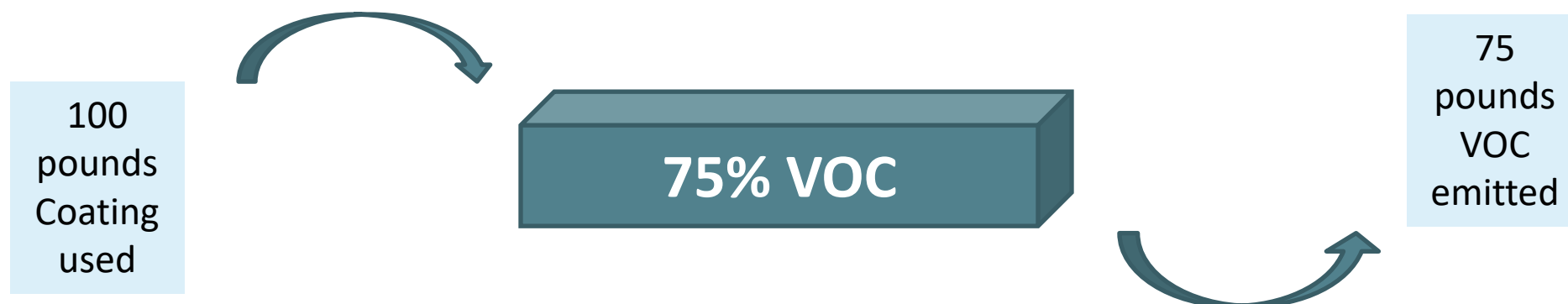
Performance Test Data

- Manufacturer Data
- Look for emission rate for a particular pollutant
- Look for operational parameters needed to calculate emissions (flow rate)



Mass Balance Approach

- What goes in, must come out!



- Used for solvent based processes
 - Painting, printing, clean-up activities
- Calculation of fugitive emissions separately is not necessary.

Mass Balance Approach

PTE Calculations Using MASS BALANCE

Great Paint Job, Inc. has one coating booth with a single spray gun. The gun capacity is 5 gallons per hour. The coating contains 75 percent VOC by weight, and its density is 9.85 lbs/gal.

$$\text{VOC content} = (9.85 \text{ lbs coating/gal}) \times (0.75 \text{ lbs VOC/lb coating}) = 7.39 \text{ lbs VOC/gal coating}$$

$$\text{Maximum operating hours/yr} = 8,760$$

Let's Calculate!

Annual Potential Emission of VOCs

1. $(5 \text{ gal coating/hr}) \times (7.39 \text{ lbs VOC/gal of coating}) = 36.95 \text{ lbs of VOC/hr}$

2. $(36.95 \text{ lbs VOC/hr}) \times (8,760 \text{ hrs/yr})$
 $= 323,682.0 \text{ lbs of VOC/yr}$

3. $(323,682 \text{ lbs VOC/yr}) \times (1 \text{ ton}/2,000 \text{ lbs})$
 $= \textbf{161.84 tons of VOC/yr}$

Emission Factors

- An average emission rate based on specific industry data
 - Weight of air contaminant/volume or weight of activity
-

Ex. NO_x emission factor from gas fired boiler

100lbs/10⁶ scf of natural gas or 100 pounds of NO_x emitted per million standard feet of gas burned.

Emission Factors

- Specific and Appropriate to process
- Watch your units
- Watch grading
- Don't be afraid to "Google"
 - Check your factor
 - Does it make sense?



Emission Factors – Where to find them

- AP-42 (epa.gov, search AP-42)
 - <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors>
- Chief (epa.gov, search Chief)
 - <https://www.epa.gov/chief>

Example

PTE Using EMISSION FACTORS

- A natural gas-fired boiler rated at 10 million Btu per hour. The NO_x Emission Factor from Table 1.4-1 in Chapter 1.4 of AP-42 is 100 pounds of NO_x emitted per million scf of natural gas burned. In addition to NO_x emissions the company would also use emission factors to calculate CO, SO₂, PM, and VOC emissions.

1 scf of natural gas = 1,020 Btu

Maximum operating hours/yr = 8,760

Let's Calculate!

Annual Potential Emission of NO_x:

1. $(10,000,000 \text{ Btu/hr}) \times (1 \text{ scf of fuel}/1,020 \text{ Btu}) = 9,803.9 \text{ scf of natural gas/hr}$

2. $(9,803.9 \text{ scf natural gas/hr}) \times (8,760 \text{ hrs/yr}) = 85,882,352.9 \text{ scf of natural gas/yr}$

3. $(85,882,352.9 \text{ scf/yr}) \times (100 \text{ lbs of NO}_x/1,000,000 \text{ scf of fuel})$
 $= 8,588.2 \text{ lbs of NO}_x/\text{yr}$

4. $(8,588.2 \text{ lbs of NO}_x/\text{yr}) \times (1 \text{ ton}/2,000 \text{ lbs}) =$

4.3 tons of NO_x/yr

What happens if you can't find an emission factor?

- Stack Testing
- Mass Balance
- Similar or More Conservative Emission Factors
 - Chief
 - AP-42
- When in doubt, check with your inspector or a permit engineer!

Document your calculation method

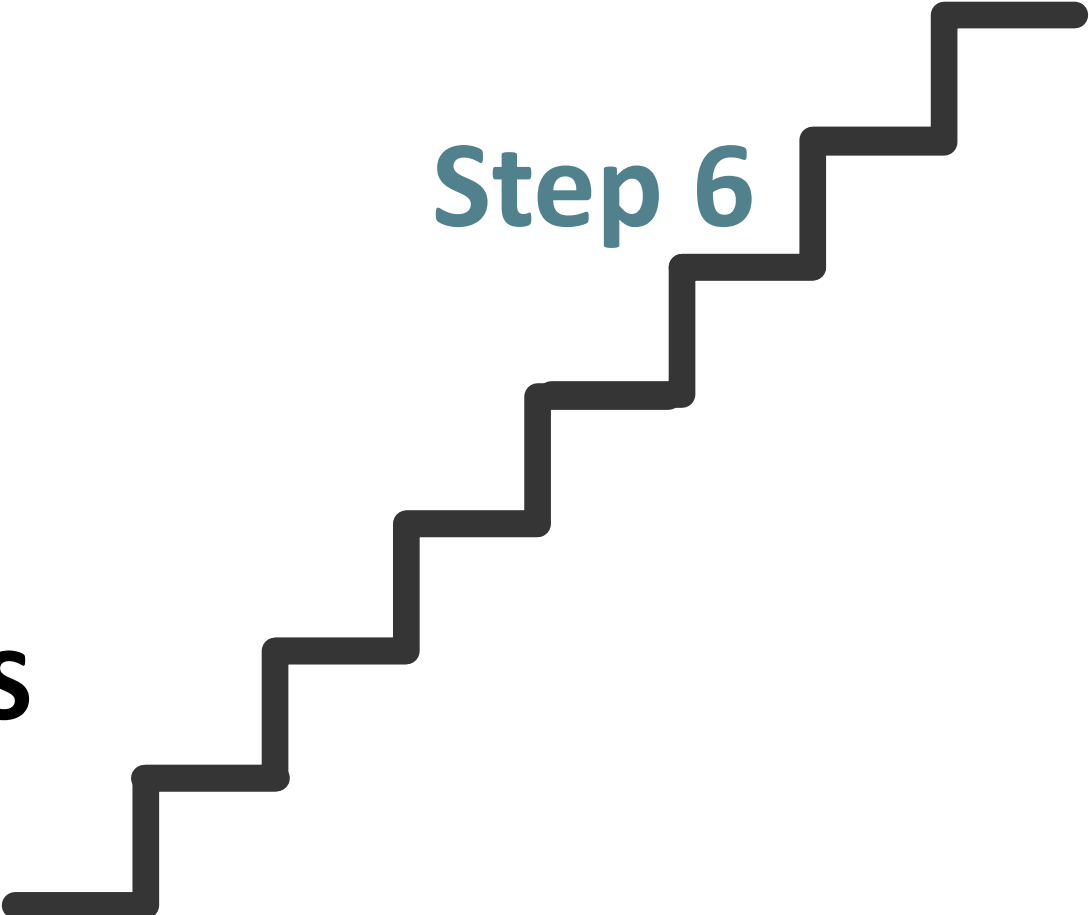
Calculation Method
Permit condition
Emission Factor
Mass balance equation
Mass balance equation
Limitation in Rule
Emission factor
Limitation in Rule
Limitation in Rule

Chart Complete!

Emission Source	Description	Permit Status	Legally Enforceable Limitation	Calculation Method
Coating Booths 1-3	3 Spray Booths	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> / / </u> ☐ Exempt: R336. <u> </u>	- Permit Limit = 5.6 tpy VOC - Permit requires fabric filter	Permit Condition
Oven	2.5 MMBtu/hr natural gas-fired curing oven	☒ Permitted: PTI # <u>999-89</u> ☐ Grandfathered: <u> / / </u> ☐ Exempt: R336. <u> </u>	- None	Emission Factor
Maintenance Booth	Booth used for touchup coating	☒ Permitted: PTI # <u>852-82</u> ☐ Grandfathered: <u> </u> ☐ Exempt: R336. <u> </u>	- Permit requires fabric filter	Mass Balance
Printing Press	Prints information on products	☐ Permitted: PTI # <u> </u> ☒ Grandfathered: <u>10/15/1966</u> ☐ Exempt: R336. <u> </u>	- None (Grandfathered)	Mass Balance
287(c) Spray Booth	Spray booth used for special projects	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> / / </u> ☒ Exempt: R336. <u>1287(c)</u>	- Rule – R336.1287(c) – limits coating usage to 200 gal/month	Limitation in Rule
Cold Cleaners	2 cold cleaners for parts washing	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> / / </u> ☒ Exempt: R336. <u>1281(h)</u>	- Rule R336.1611 – requires that cover be closed and that parts be drained	Emission Factor
Cleanup	Facility-wide cleanup activities	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> / / </u> ☒ Exempt: R336. <u>1290</u>	- Rule R336.1290 – limits emission of non-carcinogenic VOCs to 1,000 lbs/month	Limitation in Rule
Parts Grinder	Metal parts grinder connected to 29,000 cfm baghouse	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> / / </u> ☒ Exempt: R336. <u>1285(l)(vi)</u>	- Rule R336.1331, Table 31J – limits emission of PM to 0.10 lbs per 1,000 lbs exhaust gas	Limitation in Rule
Welding	Shielded metal arc welding	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> / / </u> ☒ Exempt: R336. <u>1285(i)</u>	- None	Emission Factor
Boiler	10 MMBtu/hr natural gas-fired boiler	☐ Permitted: PTI # <u> </u> ☐ Grandfathered: <u> / / </u> ☐ Exempt: R336. <u> </u>	- None	Emission Factor

PTE FOR EMISSION UNITS

Step 6

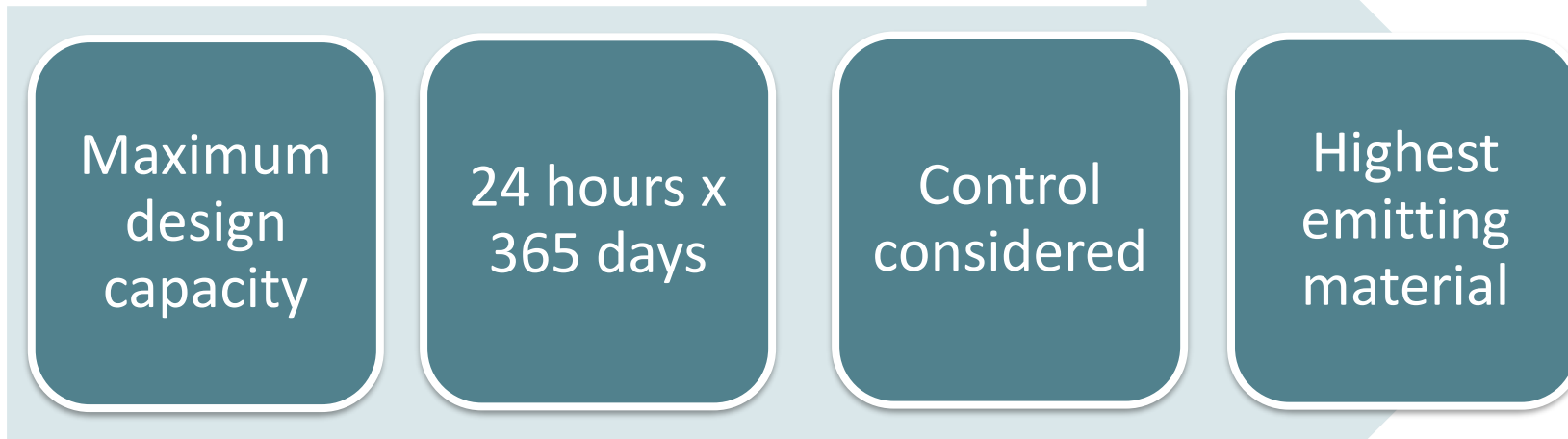


Things to note....

- Calculate each pollutant emitted
- Multiple calculations
- Keep all information separate
- Define your assumptions
- **Show your work!**



The PTE Equation



Even if you never intend to operate like this.

Bottlenecks

- Physical Limitation
- Unavoidable
- Provable

* Removing the bottleneck requires an update to the PTE calculation



Determining What Pollutants are Emitted

- Manufacturer specs
- AP-42/Chief
- SDS
- Manufacturers formulation data
- Any others information



Three Coating Booths

- Each spray gun has a capacity of 5 gallons per hour.
- The booths are included in a PTI with a condition that limits emission of VOCs to 5.6 tons/yr based on a 12-month rolling average.
- Requires a fabric filter.

NOTE: The regulated pollutants that are emitted are VOCs, HAPs, and PM. Of all the HAPs contained in the coatings used, Xylene is present in the highest concentration.

What Pollutants?

- Any existing federally enforceable limits?
 - Yes: The PTI contains a VOC limit of 5.6 tons
- All VOCs are also HAPs. Do we need to do a separate HAPs calculation?
 - No: VOCs=HAPs=5.6 tons
- Any other pollutants of concern from this type of operation?
 - Yes: Particulate matter or PM

PM Assumptions

- The coating with the highest solid content is used continuously - 2.66 pounds of solids/gallon of coating
- Control efficiency for the wall filter in the booths is 95%
- The transfer efficiency of the spray gun is 20%

Calculate Emissions

1. $(5 \text{ gal coating/hr/spray gun}) \times (3 \text{ spray guns}) = 15 \text{ gal coating/hr}$

2. $(15 \text{ gal coating/hr}) \times (2.66 \text{ lbs of solid/gal of coating}) \times (0.80 \text{ overspray}) = 31.92 \text{ lbs of solids/hr}$

3. $(31.92 \text{ lbs of solids/hr}) \times (8,760 \text{ hours/yr}) \times (1 \text{ ton}/2,000 \text{ lbs}) = 139.81 \text{ tons of solids/yr (uncontrolled)}$

4. $(139.81 \text{ tons of solids/yr}) \times ([100-95]/100) =$

7.0 tons of solid(PM)/yr (controlled)

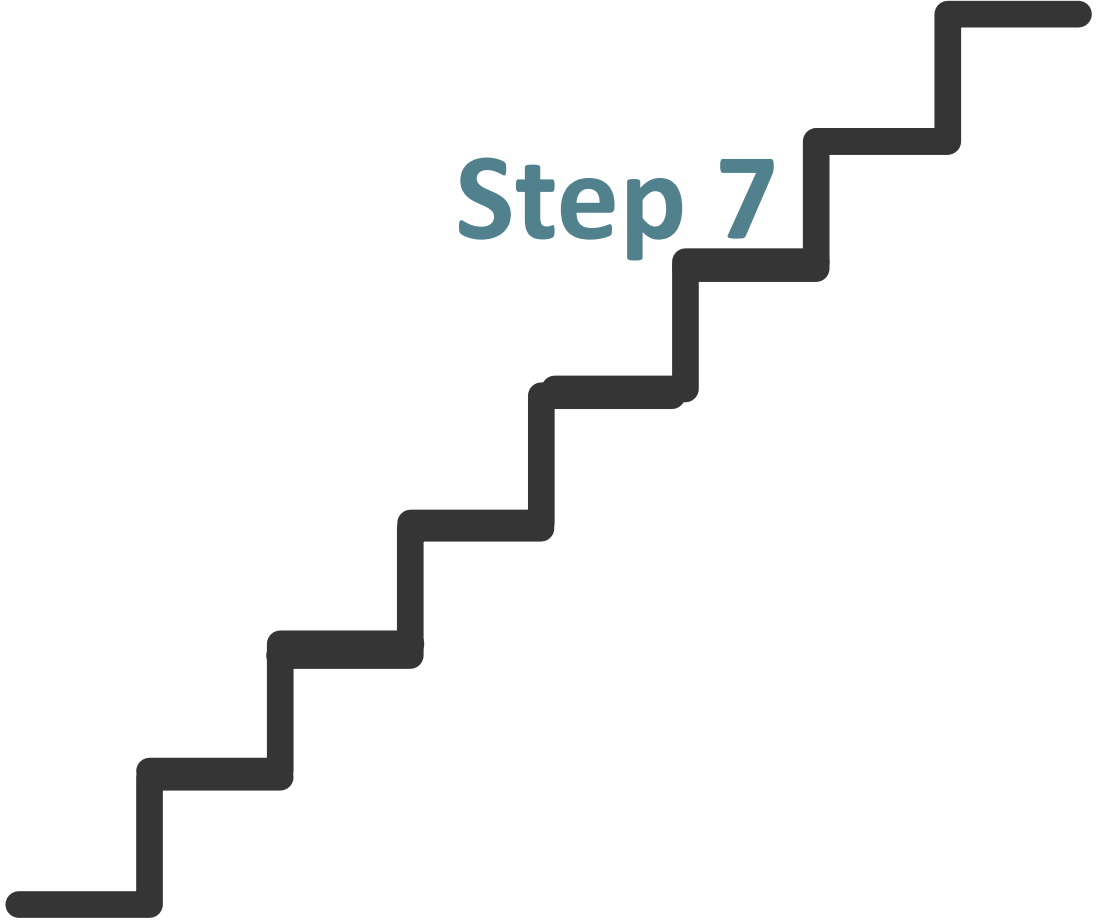
What is our PTE?

- VOC = 5.6 TPY
- Xylene (HAPs) = 5.6 TPY
- PM = 7.0 TPY



FACILITY WIDE PTE

Step 7



Calculate the PTE for the Facility



Example - Two Cold Cleaners

- 100 percent Stoddard solvent, which is a VOC.
- The cold cleaners are subject to R336.1611 (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.

What Pollutants?

- VOCs
 - Stoddard Solvent does not contain HAPs
- Any others?



Emission Factors

- AP-42

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
Open top vapor			
Entire unit	Units in operation	9.5 Mg/yr/unit	10.5 ton/yr/unit
Entire unit	Surface area and duty cycle ^e	0.7 kg/hr/m ²	0.15 lb/hr/ft ²
Conveyorized, vapor			
Entire unit	Units in operation	24 Mg/yr/unit	26 tons/yr/unit
Conveyorized, nonboiling			
Entire unit	Units in operation	47 Mg/yr/unit	52 tons/yr/unit

Rule 611 Reductions

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						
Proper use of equipment	X	X	X	X	X	X
Waste solvent reclamation	X	X	X	X	X	X
Reduced exhaust ventilation			X	X	X	X
Reduced conveyor or entry speed			X	X	X	X
Emission reduction from operating procedures (%)	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

$(0.66 \text{ ton VOC/yr}) \times [(100 - 28)/100] \text{ total emission reduction} = \mathbf{0.475 \text{ ton VOC/yr}}$
(controlled)

Calculate Emissions

1. $(0.33 \text{ ton VOC/yr/unit}) \times (2 \text{ units}) = \mathbf{0.66 \text{ ton VOC/yr(uncontrolled)}}$

2. $(0.66 \text{ ton VOC/yr}) \times [(100 - 28)/100] \text{ total emission reduction) = } \mathbf{0.475 \text{ ton VOC/yr (controlled)}}$



Example: What is our PTE?

- VOC = 0.475 tons/year

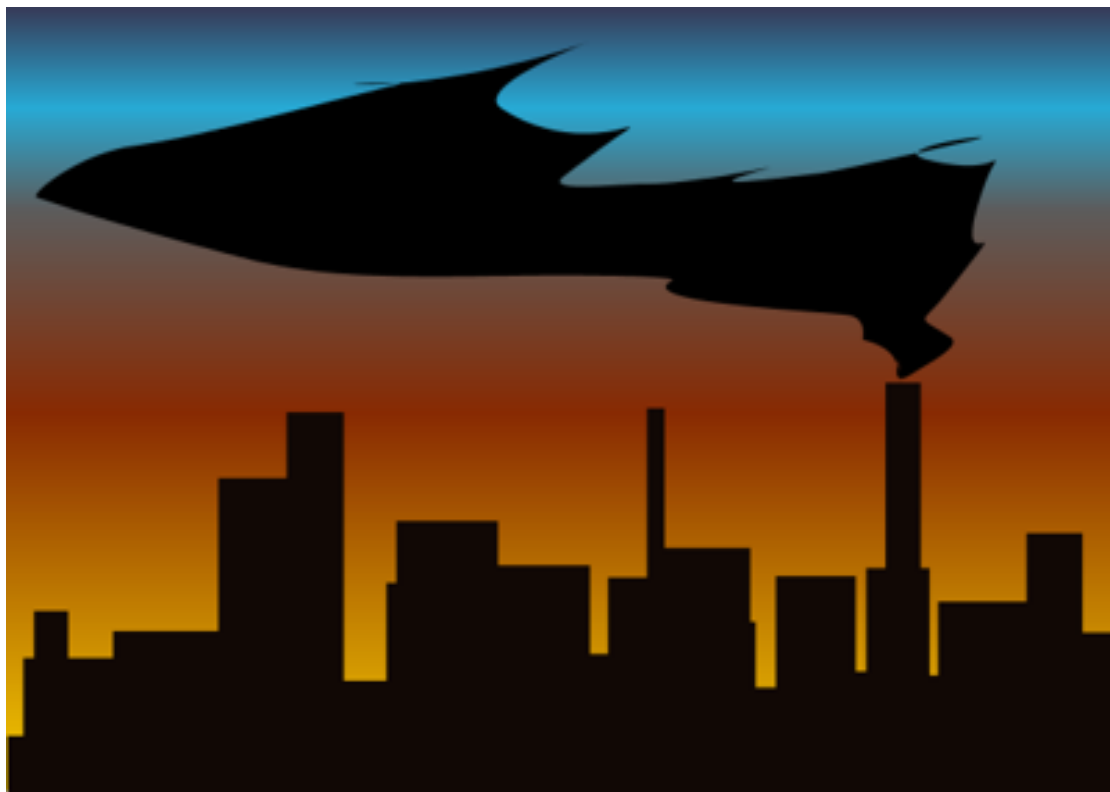


Totals

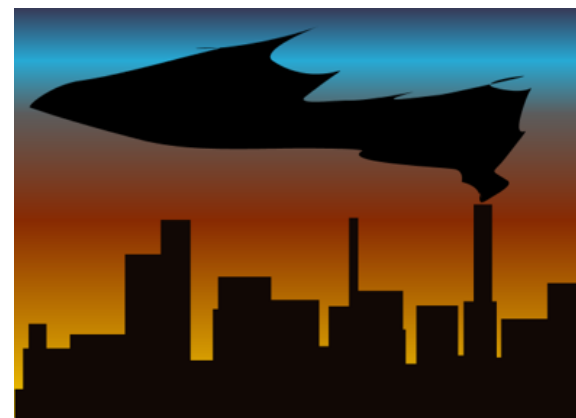
Emission Unit	CO (TON/YR)	NO _x (TON/YR)	SO _x (TON/YR)	PM (TON/YR)	PM10/PM2 .5 (TON/YR)	VOC (TON/YR)	LEAD (TON/YR)
Wood Furniture Coating Line				66	66	230	
Wood Working Equipment with Baghouse				59			
287(2)(c) Booth				3.6	3.6	8.4	
Boiler	36	43	0.3	0.8	3	2	Neg.
TOTAL	36	43	0.3	129.4	72.6	240.4	Neg.

NOW WHAT?

Major or...



Minor Source...



What is a “Major Source”?

Type of Pollutant	Major Source Threshold	Common Sources of Pollutants
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 Any single HAP Any combination of HAPs	10 tons/year 25 tons/year	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	

Major Source Requirements

Subject to:

- More regulations
- More complex
- More recordkeeping
- More reporting
- More oversight



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	
PM			100/250		
PM10	100		100/250	Moderate	100
				Serious	70
PM2.5	100		100/250		
VOCs	100		100/250	Marginal	100
				Moderate	100
				Serious	50
				Severe	25
				Extreme	10
CO	100		100/250	Moderate	100
				Serious	50
NOx	100		100/250	Marginal	100
				Moderate	100
				Serious	50
				Severe	25
				Extreme	10
SO ₂	100		100/250	100	
Lead (Pb)*	100		100/250	100	
Any single HAP		10			
Aggregate HAPs		25			
		*Lead compounds are HAPs			
Greenhouse Gases (GHG)	100,000 on a CO ₂ e basis, and 100 GHGs mass basis		100,000 on a CO ₂ e basis		
Any other regulated air contaminant	100				

How to Avoid Being a Major Source

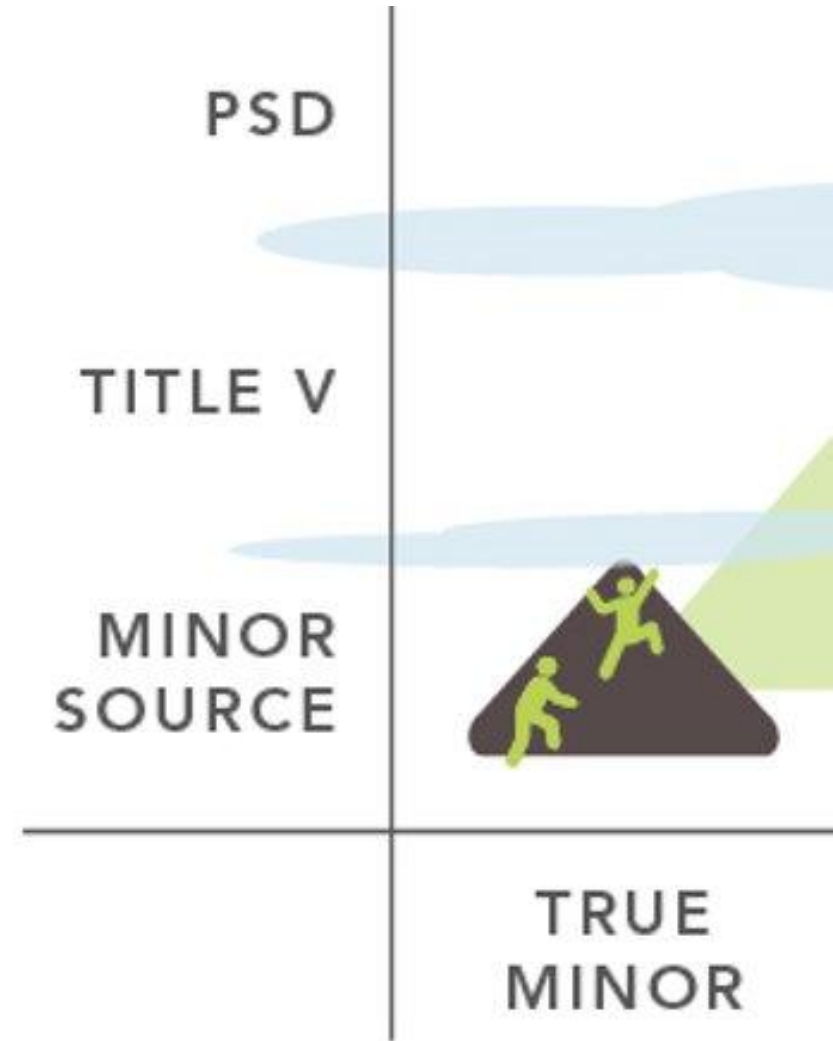
- Don't exceed the thresholds
- Limit your PTE through permitting



TITLE V

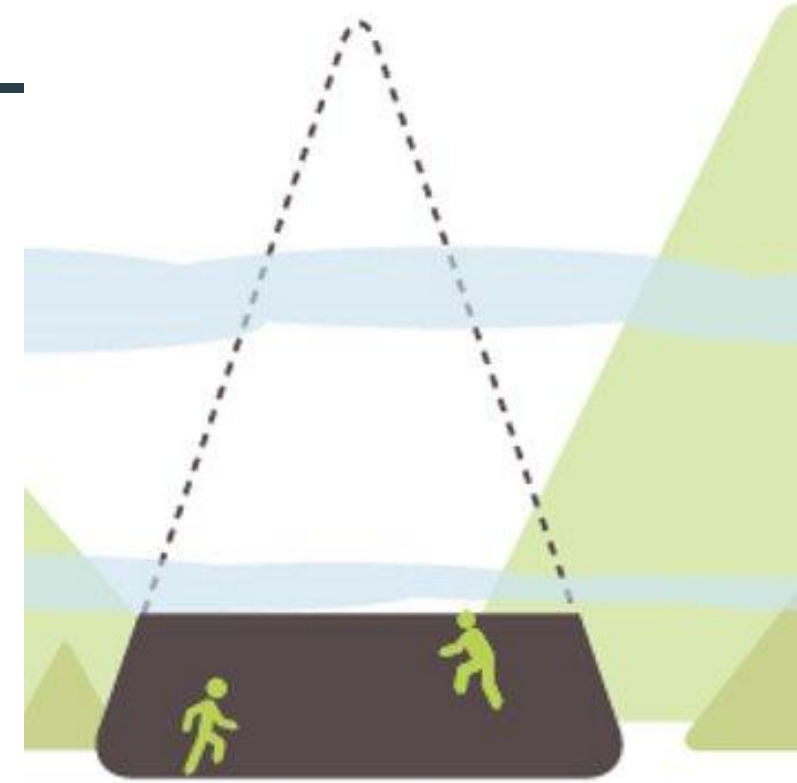
True Minor Source

- PTE shows you as a True Minor
- No emissions over Major Source Thresholds



Synthetic Minor Permit

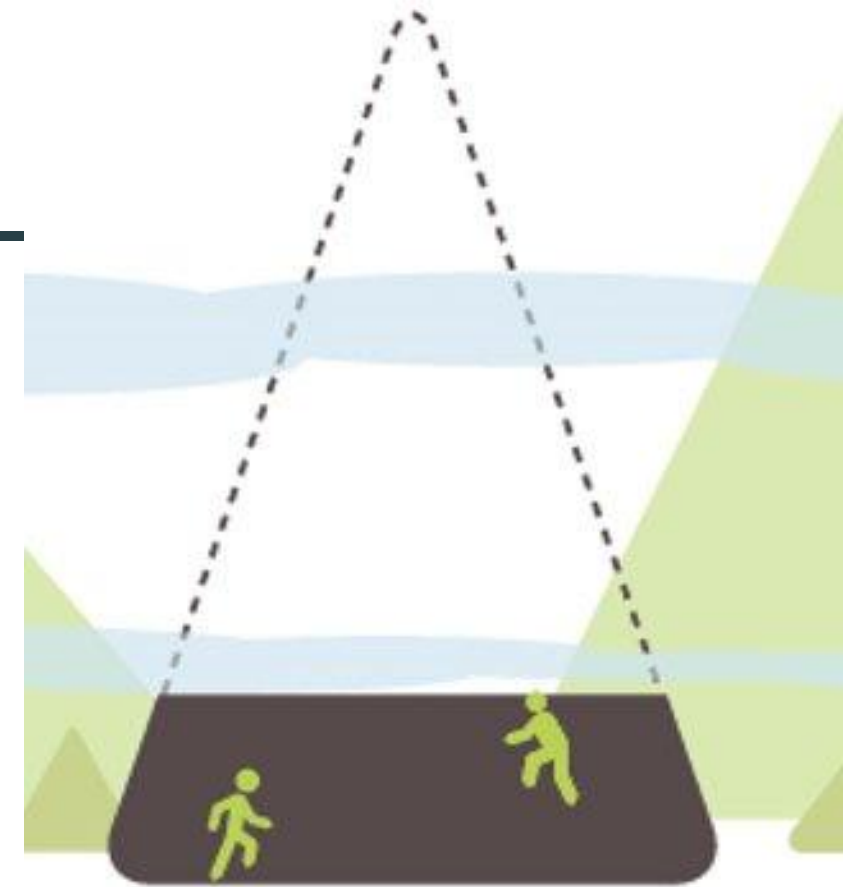
- Emission Unit or Process Equipment Specific
- Does not apply to entire facility
- Does not necessarily keep you out of the ROP Program



SYNTHETIC
MINOR

Opt-Out Permit

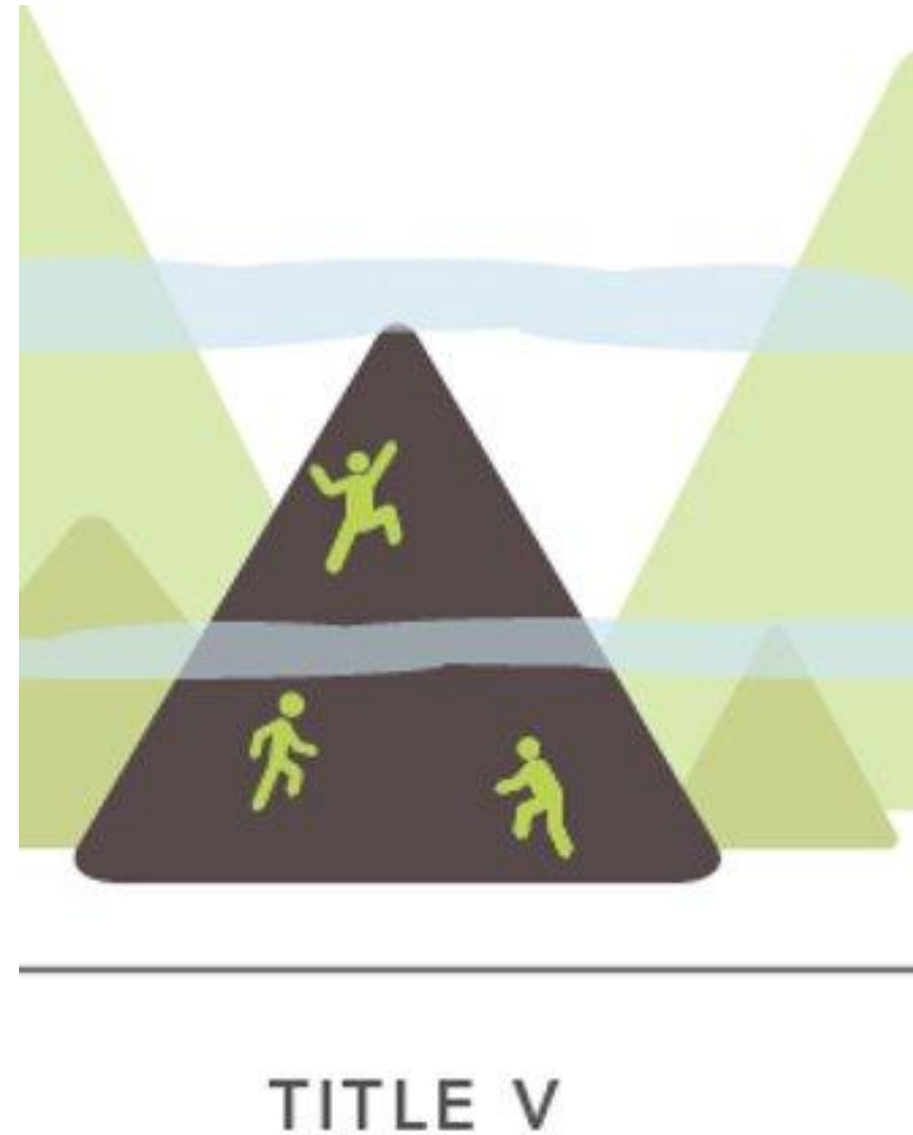
- Take an artificial limit through permitting below Major Source thresholds
- Applies to entire facility
- Over 90% of the threshold must go through public comment



SYNTHETIC
MINOR

Don't want to limit?

- Apply for a Title V Renewable Operating Permit (ROP)
 - Renewed every five years
 - Report emissions annually
 - Pay annual fees on your emissions
 - Submit annual and semi-annual compliance certification reports
 - Other reporting possible as well



Potential to Emit Resources

- [PTE Webpage](#)
- [PTE Workbook](#)
- [Exemption Handbook](#)
- [AP-42 Emission Factors](#)



Questions?