



Potential to Emit

A Guide for Small Businesses

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**U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina**



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For more information...

To obtain more information or additional copies of this guidebook, call your state small business assistance program or your state or local air pollution control agency. Also, visit the EPA's Technology Transfer Network – Small Business Assistance Program web site at: <http://www.epa.gov/ttn/sbap> to get information on your state small business assistance program or to find this document and additional materials concerning this subject. If you do not have access to the Internet, you can contact EPA's Clean Air Technology Center (CATC) Hotline at 919-541-0800.

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As a small business, you may have to meet certain requirements in the Clean Air Act to limit the amount of pollutants that are released into the air. One way to find out which requirements apply to you is to figure out your business's *potential to emit*. This document answers the following questions:

- *What is potential to emit?*
- *How do I figure out the potential to emit for my business?*

You may wish to contact your state air pollution control agency or state small business assistance program with questions you have as you read this document (for who to contact, see "Where can I get more information?" on page 28). Also see Appendix C for suggested sources of information.

Potential to emit refers to the highest amounts of certain pollutants that your business could release into the air (even if you have never actually emitted the highest amount). Potential to emit considers the design of your equipment. It can also consider certain controls and limitations on the operation of your business, as discussed throughout this document.

What is the purpose of this document?

What is potential to emit?

WHAT IS POTENTIAL TO EMIT?

It is important to know whether your business is a “major” or “minor” source of air emissions (how to do this is discussed throughout this document). Many requirements of the Clean Air Act only apply to major sources. If your business is not a major source, then you are considered a minor source. As a minor source, you may not have to meet certain requirements, or may have requirements that are easier to meet. Once a business is classified as a major source, generally its classification cannot be changed to a minor source except under certain limited circumstances that involve additional administrative and permitting procedures.

Clean Air Act requirements for major sources make sure that:

- Air quality is not made worse.
- Air emissions are controlled.
- Businesses that are major sources have operating permits.

To find out whether your business is a major or minor source of emissions, you need to figure out its potential to emit certain air pollutants. Then compare these amounts to the amounts that the government considers to be “major” releases of air emissions. This document will describe how to figure out your emissions. But first we discuss what pollutants you need to be concerned about and what amounts of emissions the government considers to be “major.”

What pollutants are regulated under the Clean Air Act?

Pollutants are regulated under the Clean Air Act based on whether they can have negative effects on people’s health or the environment. Pollutants that are regulated fall into two main categories:

- *Criteria pollutants*
- *Hazardous air pollutants (HAPs)*

Appendix A provides definitions of criteria pollutants, HAPs, and other terms that are commonly used when discussing air pollutants. Table 1 lists the six criteria pollutants covered by the Clean Air Act. For ozone, one of the criteria pollutants, “precursors” are regulated rather than ozone itself. Precursors are substances that react together to form a pollutant. The precursors of ozone are volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

Table 1. Criteria Pollutants and Precursors^a

Ground-level ozone (“smog”) Precursors: Volatile organic compounds (VOCs) Nitrogen oxides (NO _x)
Carbon monoxide (CO)
Particulate matter (PM) ^b
Nitrogen oxides (NO _x)
Sulfur dioxide (SO ₂)
Lead (Pb)

^a A precursor of a criteria pollutant is a compound that reacts in the air to produce that pollutant.

^b Several categories of particulate matter may be regulated in different states. Contact your state air pollution control agency or state small business assistance program to find out which categories are covered by your state (for who to contact, see “Where can I get more information?”).

The Clean Air Act also regulates 188 hazardous air pollutants (HAPs), also known as air toxics. Appendix B provides a complete list of HAPs. Some HAPs are volatile organic compounds (VOCs) and count as criteria pollutants as well as HAPs emissions. HAPs in particle form can also be counted as particulate matter (PM), another criteria pollutant.

Do I need to be concerned about “double-counting” these emissions as criteria pollutants and HAPs?

When determining your potential to emit, some HAPs need to be reported as both HAPs and as VOCs or PM. Usually “double-counting” is only a concern if the emission results will be used to determine emission fees. To be sure, contact your state air pollution control agency or state small business assistance program (for who to contact, see “Where can I get more information?”).

What does it mean if my business is a “major source” of a criteria pollutant?

Contact your state air pollution control agency or state small business assistance program to find out the emission levels in your area which classify a business as a major source of criteria pollutants (also see Table 6 in Appendix A) (for who to contact, see “Where can I get more information?”). If your business qualifies as a major source of criteria pollutant emissions, you must do two things:

- Get a Title V operating permit.
- Meet emission limits established by your state.

Title V Permit. Your Title V permit will describe all of your federal obligations for controlling air pollution (additional state and local requirements may exist). Examples of common requirements that may be listed in your permit include:

- Limits on emissions.
- Maintaining progress reports, records, and a compliance schedule.
- Notifying your state air pollution control agency (or possibly EPA) of any violations of your permit conditions.
- Monitoring your compliance with emission limits/requirements.

Your specific obligations may vary, so contact your state air pollution control agency or state small business assistance program to find out how to obtain a permit and about particular permit requirements (for who to contact, see “Where can I get more information?”).

State emission limits. Your state sets emission limits for criteria pollutants in part based on the location (or area) of your business. Location is important because “nonattainment” areas have stricter emission requirements than “attainment” areas. Attainment areas are those areas that meet National Ambient Air Quality Standards (called NAAQS). There is a NAAQS for each criteria pollutant. Nonattainment areas do not meet NAAQS. Also, your business may be located in an attainment area for federal air quality standards, but in a nonattainment area for state/local standards. To find out whether your business is located in an attainment or nonattainment area, contact your state air pollution control agency or state small business assistance program (for who to contact, see “Where can I get more information?”).

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Your business is a major source of HAPs if it has the potential to emit either one of the following:

- At least 10 tons per year of any one of the 188 HAPs (listed in Appendix B).
- At least 25 tons per year of total HAPs.

If your business qualifies as a major source of HAPs, then you must meet certain emission performance standards. To meet these standards, you must do two things:

- Meet certain air pollution control limits (which are established by the federal government based on performance standards that have been achieved in practice by a particular type of process or machinery).
- Get a Title V operating permit (which will list your air pollution control requirements).

For certain industries, the federal government may not yet have set performance standards. If this is true for your business, then you may only have to get a Title V operating permit for now to meet federal requirements. Or, state air pollution control agencies may determine performance standards on a case-by-case basis for some types of industries. In addition, a business that is a major source of HAPs may also have to meet state or local requirements. Contact your state air pollution control agency or state small business assistance program to find out your requirements (for who to contact, see “Where can I get more information?”).

**What does it mean
if my business is a
“major source” of HAPs?**

Is my business a “minor source” of air emissions?

Businesses that cannot emit as much criteria pollutants or HAPs as a major source are called minor sources. Your business can qualify as a minor source of air emissions if it meets one of the following:

- Your potential to emit criteria pollutants or HAPs is below major source levels.
- Your potential to emit is at or above major source levels, but you limit your operations or emissions in certain ways. Generally, if your business qualifies as this type of minor source, you will need to get a permit through your state air pollution control agency.¹ The limits on your operations or emissions that might qualify you as a minor source include:
 - You follow specific requirements to use, operate, and maintain air pollution control devices.
 - You follow specific requirements to restrict operations to a certain amount of time.
 - You use specified restrictions on the types and amounts of input materials used (for example, fuel usage or solvent usage).

If your business has any of the limits discussed above that qualifies it as a minor source, you will probably be required to keep records or other information to show that your business is operating within its limit.

What air pollution regulations apply to my business?

The regulations that apply to your business depend on the types and amounts of criteria pollutants (see Table 1) and hazardous air pollutants (HAPs, see Appendix B) that you emit or have the potential to emit. Whether your business is a major or minor source of air emissions, contact your state air pollution control agency or state small business assistance program to find out what regulations apply (for who to contact, see “Where can I get more information?”).

¹ In some states, certain businesses that have very low actual emissions may not need to go through the permitting process; instead, they may be able to become a minor source by meeting industry-specific requirements in federal, state, or local regulations.

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You need to consider two factors to determine whether your business is a major or minor source of air emissions:

- Your business's "maximum capacity."
- Air pollution regulations and policies that apply to your business, particularly those that affect your potential to emit by limiting your maximum capacity.

Both of these factors are discussed below.

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Your business's maximum capacity is based on the amount of input materials used and products produced by each piece of equipment you have. Begin by assuming that your business operates continuously throughout the year (which equals 8,760 hours). Generally you must assume the highest amounts of inputs and products possible, which result in the highest level of air emissions.

However, when certain limitations (that can be confirmed by regulators) are present at your business, you may instead base your maximum capacity on the amount of input materials that can be used and the products that can be produced given these limitations.

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The limitations present at your business must be unchanging and unavoidable physical constraints in order to reduce your maximum capacity. These constraints must result in predictable upper limits on your operations and capacity. (Note that changeable market conditions or business plans do not qualify to limit your operations and capacity.)

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How do I know whether my business is a "major" or "minor" source of air pollutants?

What is "maximum capacity?"

What types of limitations might reduce my maximum capacity?

A common type of limitation that could reduce your maximum capacity might involve setting limits on operating rates or operating times of equipment. For example, in a paint-spraying booth at a small autobody shop, there is a limitation on the number of cars that can be painted and dried in a given amount of time because of the time it takes to perform each task required (e.g., preparation of the surface, painting, drying, etc.). In figuring out the maximum capacity of such a business, the owner does not have to assume that the paint-spraying equipment operates every hour throughout the year. Instead, he or she can assume that it operates only as much as is necessary to paint the maximum number of cars that the booth can handle if operated every hour throughout the year.

Another example is limitations in the operation of country grain elevators. These businesses serve a limited and generally unchanging geographic area that can produce only a finite amount of grain. While the amount of grain harvested might fluctuate, local grain production generally will not exceed a certain upper limit. It is this upper limit that forms the basis for determining a grain elevator's maximum capacity.

Similarly, the operation of emergency generators is limited to a certain number of hours — the number of hours for which the emergency generator must substitute for regular power. An upper limit of the number of hours the generator will operate can be estimated quite accurately. The upper limit of hours of operation will be much less than the 8,760 hours per year that is normally assumed to determine maximum capacity.

Can control measures qualify as limitations on my maximum capacity?

Control measures can qualify as limitations that reduce your maximum capacity only if they are operated and maintained continuously for reasons other than air quality protection. Examples of using controls for purposes other than for air quality include: quality control, product recovery, or operating efficiency. For example, at a dry cleaning facility, a closed loop dry cleaning machine may be used for operating efficiency. As a side effect, emissions of HAPs and VOCs may also be reduced.

Check with your state air pollution control agency or state small business assistance program if you are unsure of your maximum capacity (for who to contact, see “Where can I get more information?”). Agencies realize that uncertainties exist in determining capacity, particularly for certain types of processes, that may make it difficult to figure out what a business’s maximum capacity is. And yes, there are alternatives to figuring out your own maximum capacity. In some cases, it may be easier for a business to accept a limit set by the state (called an “enforceable limit”), such as one that already exists in a permit, rather than trying to figure out your maximum capacity.

You can also get guidance documents and policy memoranda that discuss limitations (known as “inherent limitations”) on maximum capacity from your state air pollution control agency or state small business assistance program. These materials offer further assistance on maximum capacity. Appendix C (“References”) includes some of these materials. Also check out this information on the Internet at: <http://www.epa.gov/ttn/oarpg>

A business can qualify as a minor source through certain permit and other options without determining maximum capacity. Check with your state air pollution control agency or state small business assistance program for information on these options, which include:

- Case-by-case permits for construction and/or operation.
- General permits for a specific type of business.
- Meeting certain conditions (known as “prohibitory rule”); this option does not require applying for a permit).

**How can I be sure of my maximum capacity?
Do alternatives exist if it's hard to figure out my capacity?**

Can I qualify as a minor source of air emissions without determining my maximum capacity?

WHAT IS POTENTIAL TO EMIT?

The last option listed above applies to certain types of businesses that are known to have low emissions. Some states have programs that make it easy to get prohibitory rule limits, such as mailing in a postcard in which the business owner agrees to meet certain limits. EPA expects that prohibitory rule limits will be used increasingly in the future and has developed guidance on this option (see the references in Appendix C: “Potential to Emit Guidance for Specific Source Categories” and “Technical Support Document for Potential to Emit Memo.”)

Other options also exist. Permits or other conditions can be applied that reduce your potential to emit based on one or more of the following:

- The use of emission control devices.
- Restrictions on the rate or time of operations.
- Limitations on the amounts or types of raw materials used.

Businesses using such options are generally required to keep adequate compliance records and to report regularly to state air pollution control agencies.

In addition, some states have chosen to follow a temporary EPA “transition policy” (until December 31, 1999). This policy allows a business to be treated as a minor source if the business maintains records showing that its actual emissions are less than 50 percent of major source levels. Also, if a business has actual emissions between 50 and 100 percent of major source levels, it may qualify as a minor source by meeting state limits on its potential to emit (e.g., through a permitting program). Not all states use this optional policy, so check with your state air pollution control agency or state small business assistance program to find out whether your state offers this option (for who to contact, see “Where can I get more information?”). After this temporary transition policy ends, most businesses with low emissions should be able to qualify as a minor source through any of the methods discussed above.

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If your business meets the following criteria, there's a good chance that you are complying with limits for the potential to emit:

- Your emission controls are permanent.
- Your business is legally obligated to obey conditions for potential to emit limits.
- Your potential to emit limits do not relax state requirements already accepted by EPA.
- Your limitations on potential to emit are technically accurate and quantifiable.
- Your records of emissions allow for monthly compliance checks by government agencies.
- Your recordkeeping, reporting, and monitoring are sufficient to demonstrate compliance.

Not all permit limits meet these requirements. Also, a single permit limit does not guarantee that you are a minor source for all pollutants. You must still be a minor source for all pollutants to qualify as a minor source. To do this, you must determine your potential to emit for each pollutant, including HAPs. Check with your state air pollution control agency or state small business assistance program to find out more about different types of limits (for who to contact, see "Where can I get more information?").

If I already have a permit that limits my capacity or emissions, do I need to do anything else?

HOW DO I DETERMINE POTENTIAL TO EMIT?

How do I determine the potential to emit for my business?

Your maximum capacity determines your potential to emit. So, once you've identified your maximum capacity (or have chosen alternatives, such as permit limits or other state limits), as described above, you can determine your potential to emit. The steps involved in determining your emissions are presented in Box 1. Specific methods for figuring out your potential to emit are described below.

Box 1. Basic Steps for Determining Emissions

1. Identify all sources of emissions.
2. Identify all criteria pollutants and hazardous air pollutants (HAPs) that your business emits. (Note that other types of pollutants may also be regulated and require a Title V permit; check with your state air pollution control agency or state small business assistance program for a list of all regulated air pollutants. For who to contact, see "Where can I get more information?").
3. Select a method to use from Table 2 below to determine your emissions.
4. For each criteria and hazardous air pollutant, determine the maximum amount that each production process or piece of equipment in your business can emit in one year.
5. For each criteria and hazardous air pollutant, add the maximum emissions from all production processes/equipment.

Does a screening method exist that can easily tell me if I am a major or minor source before I try to determine my potential to emit?

Yes. EPA has developed guidance that you can use to quickly determine if you are a major or minor source (see EPA, 1998a in the Reference section [Appendix C]). The screening method covers pollutants and materials that are of the greatest concern for different types of businesses. The method includes cutoff levels for materials that you may use (e.g., solvents, etc.). If you use less than the cutoff level for a certain material, then you are probably a minor source. In all cases, you should confirm your results with your state air pollution control agency. If the screening method does not apply to you, then you can use the procedures described below to determine your potential to emit.

You can use one of the following four methods to determine your emissions:

- Use test data (onsite measurements).
- Use a material-balance approach (comparing inputs and outputs).
- Use source-specific models (based on information about your business's operations).
- Use emission factors (based on industry-average emission rates).

Table 2 describes these methods in more detail.

Table 2. Emissions Calculation Methods

Method	Description
Test data	Onsite measurement of emissions.
Material-balance calculations	Estimate emissions by comparing types and quantities of inputs to types and quantities of outputs.
Source-specific models	Formulas for emissions using source-specific parameters such as types and quantities of inputs, operating hours, and physical characteristics of equipment.
Emission factors	Uses average pollutant emission rates (provided by EPA, other agencies, or equipment vendors), multiplied by time or frequency of operation, to obtain emissions. Emission factors specific to your business can be used but should be approved by the state air pollution control agency.

It depends on the type of business and types of emissions you have, what information and resources are available, and the degree of accuracy required. Consult your state air pollution control agency or your state small business assistance program before choosing a particular method (for who to contact, see "Where can I get more information?"). Different methods may be used for different types of emissions. Whichever method you use, when you determine your potential to emit, assume that no pollution controls are in place. Each of the methods is discussed below to help you decide which method best suits your business.

What methods can I use to determine my emissions?

Which method should I use to calculate emissions?

HOW DO I DETERMINE POTENTIAL TO EMIT?

1. *Test data method.* This method can provide the most accurate estimates of emissions. Unfortunately the data needed are often expensive to obtain, particularly for businesses that emit a variety of pollutants or have a lot of “fugitive emissions.” (Fugitive emissions are those resulting from leaks or nonlocalized escape, such as from spraying operations. Fugitive emissions are discussed in more detail later in this document—see the question: “What are fugitive emissions...?”.) Useful test data are easier to obtain when emissions come primarily from a point source, such as a smokestack. It may be necessary to collect test data over a period of time and from multiple production areas to gain a reliable measure of average emissions. Only experienced stack testers should measure emission samples and estimate total emissions.
2. *Material-balance approach.* This method is appropriate for businesses that lose a high percentage of input material to the atmosphere (such as solvents in degreasing, cleaning, and coating processes). A material-balance approach can be problematic for operations in which: inputs are consumed; inputs are chemically combined; or losses to the atmosphere make up only a small part of the total throughput. The material-balance approach requires accurate records of the amounts of material used and the waste generated; such records often can be difficult to maintain.
3. *Source-specific models.* These models are available for only a relatively small number of industrial operations. If you want to use this method, you must make sure that the formulas used are relevant to your particular business. You also must determine correct values for parameters that are plugged into the equations.
4. *Emission Factor method.* This method uses EPA emission factors that represent industry averages. An emission factor shows the relationship between an air emission and a measure of production (e.g., pounds of SO₂ per 1,000 gallons of input). Equipment-specific emission factors can often be obtained from equipment vendors, especially through emission performance guarantees or from actual test data of similar equipment. It is important to use factors that are relevant for a particular production process. Emission factors should account for periods of disrupted operation as well as routine operation. While this method has some limitations (e.g., it is simplistic and lacks specific data), it is often the best or only practical means for estimating emissions.

EPA has developed emission factor ratings ranging from best-to-worst (A through E) which can be found in EPA's *AP-42* document (see reference in Appendix C). These ratings indicate the appropriateness of using the EPA factors to estimate average emissions in a particular industry. Specific emission factors based on your business can be used instead of EPA emission factors, but should be approved by the state air pollution control agency. It should be noted that emission factors are not EPA-recommended emission limits or standards.

You can obtain further information on methods for determining potential to emit from state air pollution control agencies, state small business assistance programs, EPA, trade associations, and vendors. It is important to remember that you, the business owner or operator, are ultimately responsible for using the best data available. Your data should be accurate and representative of your emissions. If you had reasonable access to better sources of data but did not use the information because you received poor advice, you remain responsible for not using the best available data.

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The information you need to determine your potential to emit depends on the method you selected. The emission-factor method, which is the simplest of the four methods described above, generally requires only the appropriate emission factors and the maximum operation rates of your business processes. For source-specific models, you need to know a greater variety of information, such as the chemical composition of the inputs, the temperatures at which processes occur, and the dimensions of the equipment used. Material-balance and test data methods require a number of specific measurements made at the business establishment itself.

You must estimate emissions for all pollutants emitted by your business, whether criteria air pollutants or hazardous air pollutants (HAPs). (See Table 1 for a list of criteria pollutants and Appendix B for a list of the 188 EPA-regulated HAPs.) Your estimates must be based on the collective total of emissions from a particular business (e.g., if a business has five printing lines, potential to emit must be based on the total emissions from all five lines).

What information do I need to know to use one of the methods you described to determine my business's potential to emit?

HOW DO I DETERMINE POTENTIAL TO EMIT?

What are fugitive emissions, and do they need to be considered when calculating my potential to emit?

Fugitive emissions refer to air pollutant emissions that enter the atmosphere from a business without first passing through a stack or duct designed to direct or control their flow. While air emissions often do pass through a stack or duct (or are otherwise captured) before being discharged to the atmosphere, some fugitive emissions typically escape the system without being captured.

Depending on the purpose of your potential to emit calculation, you may or may not be required to include fugitive emissions. Also, some regulations require certain types of businesses to include fugitive emissions when determining their potential to emit. Contact your state air pollution control agency or state small business assistance program for guidance on whether to include fugitive emissions in your potential to emit (for who to contact, see “Where can I get more information?”).

How does the number of hours my business operates affect my emission estimates?

As discussed earlier, in determining potential to emit you should assume that equipment operates every hour of the year (8,760 hours per year), unless certain limitations affect how much your business can operate (see the earlier question, “What is maximum capacity?” which describes these limitations). If such limitations are present, you should assume that your equipment operates for the maximum number of hours allowed by the limitations. In the case of batch operations, when emissions are not continuous in time, determine your potential to emit by multiplying the emissions per batch by the maximum number of batches per year.

If after calculating my potential to emit my business is above major source levels, what do I do?

If your potential to emit is just above major source levels, carefully check and document any assumptions used in your calculation. If your numbers are correct, you might still qualify as a minor source if you limit your operations in certain ways (see the earlier question, “Is my business a minor source of air emissions?”)

Below are two examples of how to determine potential to emit. The first is for a small boiler, the second is for a lithographic print shop. The small boiler example uses emission factors. The print shop example uses the material-balance approach.

Could you give some examples of how potential to emit is determined?

A small business operates a boiler for process heating. The boiler fires exclusively natural gas. According to the state air pollution control agency, the major source level for all criteria pollutants for the area in which this business is located is 100 tons per year. Emissions are determined based on:

- The type of fuel burned
- The rated capacity of the boiler (this is your maximum capacity)
- The heating value of the fuel
- Maximum potential hours of operation per year
- Emission factors for pollutants

The boiler typically operates at or close to its maximum of 8,760 hours/year. The rest of the items listed above are discussed below.

Example 1:

Potential to Emit of a Small Boiler

Different fuels result in different types and amounts of pollutants due to the specific composition of the fuel.

How does my fuel type determine emissions?

Most manufacturers place a metal plate on the boiler that identifies the boiler's rated capacity. The rated capacity should also be contained in the manufacturer's literature or operations manual. The rated capacity should be in units of "million British thermal unit per hour" (MMBtu/hr). For this example, the rated capacity of the boiler was listed on the boiler as 15 MMBtu/hr.

How can I determine my boiler's rated capacity?

How can I determine the heating value of my fuel?

Your fuel supplier can provide you with this information. If you are unable to contact the supplier, you can instead use average values from Appendix A of EPA's *AP-42* document (which is listed in the References section). For this example, the heating value of the natural gas is 1,050 MMBtu per MMcf (which stands for million British thermal units per million cubic feet of gas), based on information from the fuel supplier.

Can I use EPA's screening method to determine if I am a major or minor source?

Yes. According to EPA's screening method (see EPA, 1998a in the References in Appendix C), if you burn no more than 710 million cubic feet per year, you are probably a minor source for all pollutants. Since in this example your boiler capacity is 15 MMBtu/hr, at a heating value of 1,050 MMBtu/MMcf, your maximum fuel burning rate is 0.014 MMcf/hr (15 MMBtu/hr divided by 1,050 MMBtu/MMcf = 0.014 MMcf/hr). At 8,760 hours per year, your maximum annual fuel burned is 123 MMcf/yr (0.014 MMcf/hr x 8,760 hr/yr = 123 MMcf/yr). Since 123 MMcf/yr is below the 710 MMcf/yr cutoff, you are probably a minor source. You should confirm this information with your state air pollution control agency. If the screening method is not sufficient to determine whether you are a major or minor source, you can use the procedures described below to determine your potential to emit.

What method should I use to figure out my emissions?

Emission factors are appropriate to use for this example because they are the only practicable and economically feasible method for this business.

Where can I find emission factors?

EPA's *AP-42* document (listed in the References in Appendix C) contains emission factors for boilers firing natural gas (see Section 1.4 and Tables 1.4-1, 1.4-2, and 1.4-3 of *AP-42*). Also check with your state air pollution control agency or small business assistance program because some agencies have additional emission factors that should be used (for who to contact, see "Where can I get more information?"). Table 3 lists emission factors for small boilers from EPA's *AP-42* document.

Table 3. Pollutant Emission Factors for a Small Boiler^a

Pollutant	Emission Factor
SO ₂	0.6 lb/MMcf
NO _x	140 lb/MMcf
CO	35 lb/MMcf
VOC	5.8 lb/MMcf
PM	13.7 lb/MMcf

^a Emission factors obtained from EPA's AP-42, Tables 1.4-1, 1.4-2, and 1.4-3 (see Reference list in Appendix C)

For each pollutant, you need to:

- Determine the "hourly heat input": divide the boiler's rated capacity by the heating value of the fuel to get the hourly heat input.
- Then multiply the hourly heat input by the emission factor for the pollutant of concern to get the emission rate.
- Multiply the emission rate by the maximum hours of operation per year. The result will be the pounds of the pollutant emitted each year.
- Finally, you need to change the annual emissions from pounds to tons; you do this by dividing your annual emissions in pounds by 2,000 (because there are 2,000 pounds in 1 ton).

Box 2 summarizes the procedure for figuring out the potential to emit for the boiler in this example:

Box 2. Potential to Emit for a Criteria Pollutant

Potential to Emit for a Criteria Pollutant (in tons/year) =	
Step 1:	Rated capacity of the boiler (in MMBtu) ÷ Heating value of the fuel (in MMBtu/MMcf) = hourly heat input (in MMcf per hr)
Step 2:	× Emission factor (in lb per MMcf) = emission rate (in lb per hr)
Step 3:	× Maximum hours of operation (in hours per year) = annual potential to emit (in lb of emissions per year)
Step 4:	Now, change from lb to tons by dividing by 2,000: ÷ 2000 lb = tons of pollutant per year

How do I figure out the potential to emit for my small boiler using an emission factor?

EXAMPLE 1: SMALL BOILER

Box 3. The potential to emit NO_x is determined as:

Potential to Emit NO_x =				
Step 1:	15 MMBtu per hour (rated capacity)	÷	1,050 MMBtu per MMcf (heating value of fuel)	= 0.014 MMcf/hr (hourly heat input)
Step 2:	× 140 lb NO_x per MMcf (emission factor)	=	1.96 lb NO_x per hr (emission rate)	
Step 3:	× 8,760 hours per year (maximum hours of operation)	=	17,170 lb NO_x per year (annual potential to emit, in lb per year)	
Step 4:	÷ 2,000 lb	=	8.6 tons of NO_x per year	

Potential to emit for the other pollutants is calculated in the same way; Table 4 displays the results:

Table 4. Potential to Emit for Small Boiler

Pollutant	Potential to Emit
SO_2	0.038 tons/year
NO_x	8.6 tons/year
CO	2.2 tons/year
VOCs	0.34 tons/year
PM	0.86 tons/year

Am I a major or minor source of emissions?

The values determined above for the potential to emit show that this boiler is a minor source because its emissions of criteria pollutants lie below major source levels for criteria pollutants in this area (the major source levels were obtained from the state air pollution control agency), and this business does not emit HAPs.

A small printing company operates several sheetfed offset lithographic presses. Instead of figuring out its maximum capacity, the company has accepted an operating limit from the state of 16,000 pounds of ink per year, and 1,350 gallons of total solvent per year with an average VOC content of 6.6 pounds per gallon. These limits are based on the company's best estimate of the maximum amounts of inks and solvents that will be used. (If the business owner were to determine maximum capacity instead of accepting a predetermined limit from the state, he or she would need to determine the maximum operating schedule, line speed, and drying time, which might be difficult to figure out.)

- For ink: 16,000 pounds of ink per year, which is the operating limit you accepted from the state.
- For solvents: 1,350 gallons of total solvents per year with an average VOC content of 6.6 pounds per gallon, which you also accepted as a limit from the state.

The ink, cleaning solvent, blanket wash solvent, and fountain solution you use all contribute to VOC and HAP emissions. You can get some of the information you need from your state air pollution control agency, state small business assistance program, and Material Safety Data Sheets (MSDS) located at your business, including:

- Find out from your state air pollution control agency or state small business assistance program what the major source level for VOCs is. (For this example, according to the state agency, the major source level for VOCs is 50 tons per year.)
- Comparing your MSDS with the list of HAPs in Appendix B of this document tells you that you emit the following HAPs from your inks and solvents:
 - toluene
 - ethylene glycol
- Look at your MSDS to determine the specific VOC and HAP content of the inks and solvents you use.

Table 5 lists the relevant input materials, their maximum usage rates, and their VOC and HAP content based on the MSDS.

Example 2: Potential to Emit of a Sheetfed Offset Lithographic Printing Operation

What is my
maximum capacity?

What pollutants do I emit?

EXAMPLE 2: PRINTING OPERATION

Table 5. Maximum Usage and Pollutant Content of Inputs

Material	Usage	VOC Content	HAP Content
Ink	16,000 lbs/year	10% by weight (which = 10 lb VOC per 100 lb ink)	0 lb/gal
Cleaning Solvent	600 gal/year	6.9 lb/gal	0 lb/gal
Blanket Wash Solvent	500 gal/year	6.2 lb/gal	2.3 lb/gal toluene
Fountain Solution	250 gal/year	6.8 lb/gal	1.2 lb/gal ethylene glycol

Can I use EPA's screening method to determine if I am a major or minor source?

Yes. According to EPA's screening method (see EPA, 1998a in Appendix C), if your printing business:

- Uses less than 7,125 gallons of cleaning solvent and fountain solution per year, you are probably a minor source for VOCs.
- Uses less than 3,333 gallons of all materials that contain hazardous air pollutants and less than 1,333 gallons of material containing any one HAP, you are probably a minor source for HAPs.

Since, in this example, you have accepted a limit of 1,350 gallons of total solvent per year, you are probably a minor source for VOCs and total HAPs. Based on the solvent data in Table 5, the maximum solvent usage for any one HAP is the 500 gallons per year blanket wash solvent, which contains toluene. Because this is less than 1,333 gallons, you are probably also a minor source for any individual HAP. You should confirm this information with your state air pollution control agency or state small business assistance program (for who to contact, see "Where can I get more information?"). If the screening process is not sufficient to determine whether you are a major or minor source, use the procedures described below.

Because of the information you now know, which includes: (1) your maximum capacity (or limits accepted from the state), and (2) the VOC content and the HAPs content of the materials you use (listed in your MSDS), using a material-balance method is appropriate (assuming that all VOCs and HAPs are emitted).

According to the MSDS, the VOC content of your ink can vary from 5 to 10 percent by weight. Because potential to emit is based on the assumption of maximum VOC content, you need to use 10 percent.

According to the state small business assistance program, your business is not required to include fugitive VOCs in potential to emit calculations for a Title V permit. Fugitive HAPs, however, do need to be included. By using the material balance method to estimate potential to emit, you are assuming that all VOCs and HAPs are emitted. Therefore, fugitive emissions and equipment leaks are included in this estimate.

Determine your VOC emissions by using the following steps:

- Determine the potential to emit VOCs from each material used (e.g., ink, solvents, solutions). To do this, multiply a material's usage by its VOC content (see Table 5 for usage and VOC content).
- Add the individual VOC emissions together. The result will be in pounds of VOCs per year.
- Change from pounds of VOCs per year to tons of VOCs per year. Do this by dividing the result you have by 2,000 (because there are 2,000 pounds in 1 ton).

You can use the equations summarized in Box 4 to carry out the above steps:

What method should I use to estimate my air emissions?

Do I need to add in fugitive emissions or equipment leaks?

What is my potential to emit VOC emissions?

EXAMPLE 2: PRINTING OPERATION

Box 4. How to Determine Potential to Emit VOC Emissions

VOC emissions, in tons/year =				
Step 1: Determine potential to emit VOCs from the ink, solvents, and solution:				
Ink usage (from Table 5) (in lbs per year)	×	VOC content (from Table 5) (in lb of VOC per lb of ink)		
and also:				
Solvent and solution usage (from Table 5) (in gal per year)	×	VOC content (from Table 5) (in lb of VOC per gal of solvents and solution)		
Step 2: Add together the individual results for the ink, solvents, and solution:				
lb VOC per yr (from ink)	+	lb VOC per yr (from the cleaning solvent)	+	lb VOC per yr (from the blanket wash solvent)
			+	lb VOC per yr (from the fountain solution)
Step 3: Change from lb per year to tons per year:				
total lb VOC per year	÷	2000	=	tons total VOCs per year

Thus the VOC emissions from the ink are:

Ink:				
16,000 lb per yr of ink (usage)	×	10 lb of VOC per 100 lb of ink (VOC content)	=	1,600 lb of VOCs per year from ink

The VOC emissions from the solvents and solution are:

Cleaning solvent:				
600 gal per yr of cleaning solvent (usage)	×	6.9 lb VOC per gal of cleaning solvent (VOC content)	=	4,140 lb per year of VOCs from the cleaning solvent
Blanket Wash Solvent:				
500 gal per yr of blanket wash solvent (usage)	×	6.2 lb VOC per gal of blanket wash solvent (VOC content)	=	3,100 lb per year of VOCs from the blanket wash solvent
Fountain Solution:				
250 gal per yr of fountain solution (usage)	×	6.8 lb VOC per gal of fountain solution (VOC content)	=	1,700 lb per year of VOCs from the fountain solution

(Note that changing from pounds to tons per year will be done later.)

To find the total VOC emissions from this printing business, add up all of the individual VOC emissions above as shown in Box 5:

What is my total potential to emit for VOCs?

Box 5. Total Potential to Emit VOCs

Total Potential to Emit VOCs:				
1,600 lb VOC per yr (from ink)	+ 4,140 lb VOC per yr (from cleaning solvent)	+ 3,100 lb VOC per yr (from blanket wash solvent)	+ 1,700 lb VOC per yr (from fountain solution)	= 10,540 lb of total VOC per year
Now, change from lb of VOCs to tons of VOCs by dividing by 2,000: $10,540 \div 2,000 = 5.27$ tons per year of total VOCs				

This result shows that this printing company could be only a minor source of VOC emissions (which can contribute to criteria pollutants), since the maximum VOC emissions are less than the major source level of VOCs, which is 50 tons per year.

Determine your potential to emit for HAP emissions in the same way you did for VOC emissions. That is, for a particular kind of HAP, first figure out separately the maximum HAPs that could be emitted from each individual input material used (in this case, the blanket wash solvent and fountain solution). Determine your potential HAP emissions from each of these materials by using the following steps:

What is my potential to emit HAPs emissions?

- Determine the potential to emit HAPs from each material used (e.g., solvents, solutions). To do this, multiply a material's usage by its HAP content (see Table 5 for usage and HAP content).
- Change each individual HAP emission from pounds of HAP per year to tons of HAP per year. Do this by dividing the result you have by 2,000 (because there are 2,000 pounds in 1 ton).
- Add the individual HAP emissions together to get total HAPs emissions.

You can use the equations summarized in Box 6 to carry out the above steps:

EXAMPLE 2: PRINTING OPERATION

Box 6. Potential to Emit HAP Emissions

Potential to Emit HAP Emissions

- Step 1:** Determine potential to emit HAPs from the solvents and solution:
Solvent and solution usage in gal per year \times HAP content of the material in lb per gal of solvents and solution
- Step 2:** Change each HAP emission from lb per year to tons per year:
 $\text{lb HAP per year} \div 2000 = \text{tons HAP per year}$
- Step 3:** Add together the individual results for the solvents and solution:
 $\text{tons HAP per yr (from the blanket wash solvent)} + \text{tons HAP per yr (from the fountain solution)} = \text{tons of total HAPs per year}$

For this example, first figure out the potential to emit for the individual HAPs: toluene and ethylene glycol, listed in Table 5, as follows:

Toluene from the blanket wash solvent:

$$\begin{array}{rcccl} 500 \text{ gal per yr of blanket wash solvent} & \times & 2.3 \text{ lb of toluene per gal of blanket wash solvent} & = & 1,150 \text{ lb} \\ \text{(usage)} & & \text{(HAP content)} & & \text{of toluene per year} \\ & & & & \text{from the blanket} \\ & & & & \text{wash solvent} \end{array}$$

$$\text{Change from pounds to tons: } 1,150 \text{ lb of toluene per year} \div 2000 = \mathbf{0.575 \text{ ton toluene per year}}$$

Ethylene glycol from the fountain solution:

$$\begin{array}{rcccl} 250 \text{ gal per yr of fountain solution} & \times & 1.2 \text{ lb of ethylene glycol per gal of fountain solution} & = & 300 \text{ lb of ethylene glycol} \\ \text{(usage)} & & \text{(HAP content)} & & \text{per year from the} \\ & & & & \text{fountain solution} \end{array}$$

$$\text{Change from pounds to tons: } 300 \text{ lb of ethylene glycol per year} \div 2000 = \mathbf{0.15 \text{ ton ethylene glycol per year}}$$

To find the total HAP emissions from this printing business, add up all of the individual HAP emissions above, as follows:

What is my total potential to emit HAPs?

Total Potential to Emit HAPs:			
0.575 ton per yr (of toluene from the blanket wash solvent)	+	0.15 ton per yr (of ethylene glycol from the fountain solution)	= 0.725 tons per year of total HAPs

This result shows that the printing company could be only a minor source of HAP emissions, since its individual HAP emissions all lie below 10 tons per year (which is the major source level for individual HAPs), and its total HAP emissions are less than 25 tons per year (which is the major source level for total HAPs).

No, the printing business in this example is not a major source; it is a minor source of both VOC and HAP emissions because its emissions fall below the major source levels for both VOCs and HAPs.

Am I a major source of either VOC or HAP emissions?

Where can I get more information?

The Small Business Assistance Program has an Internet web site at: <http://www.epa.gov/ttn/sbap>. Through this web site you can obtain information pertinent to small businesses, including a list of small business assistance program contacts (click on "Contacts and Resources"). If you do not have access to the Internet, you can call EPA's Clean Air Technology Center Hotline at 919-541-0800 for a list of state small business assistance program contacts or for more information on potential to emit and related subjects.

Also, the EPA's Technology Transfer Network (TTN), available through the Internet at: <http://www.epa.gov/ttn>, provides the public with a variety of air emissions materials, including the text of the Clean Air Act, EPA guidance documents, and software. The Small Business Assistance Program's web site can also be accessed from the TTN main home page (click on "Technical Sites," then click on "SBAP," then click on "Contacts and Resources" for a list of state small business assistance program contacts). The TTN help-line number is (919) 541-5384.

The TTN web site also contains the EPA Office of Air and Radiation's Policy and Guidance site at: <http://www.epa.gov/ttn/oarpg>, which contains policy memoranda on potential to emit and related topics mentioned in this document. The references in Appendix C of this document also provide a partial list of relevant EPA guidance documents and policy memoranda.

The *CHIEF* web site accessed through TTN provides information on emission factors through resources such as *AP-42* and the *Locating and Estimating* series and through software such as the *Factor Information and Retrieval (FIRE)* system. Software for some emission models is available through the *CHIEF* web site.

Appendix A

Definitions

Appendix A: Definitions

Appendix A: Definitions

Attainment area: A geographical area that meets National Ambient Air Quality Standards (NAAQS) for criteria air pollutants.

Criteria air pollutant: One of six air pollutants or classes of pollutants (see Table 1 in the text) regulated by the EPA for which National Ambient Air Quality Standards (NAAQS) have been established.

Emission: Release of pollutants into the air (e.g., from a stack or duct).

Emission factor: A number that shows the relationship between an air emission and a measure of production (e.g., pounds of SO² per 1,000 gallons of input).

Fugitive emissions: Emissions resulting from leaks or from nonlocalized escape (e.g., from spraying operations).

Hazardous air pollutant (HAP): One of 188 hazardous air pollutants (see Appendix B) that are regulated.

Inherent limitation: A limitation on emissions that results from unchanging and unavoidable physical constraints on the operation of a business.

Major source: A business that has a potential to emit for a regulated pollutant (or class of pollutants) that is at or greater than an emission threshold set by the government. The major source threshold is 100 tons per year of any criteria pollutant if the business is located in an attainment area.

The major source thresholds for criteria pollutants for businesses located in nonattainment areas are listed in Table 6 below.

Table 6. Major Source Thresholds for Criteria Pollutants in Nonattainment Areas^a

Pollutant	Nonattainment Area Classification	Potential Emission Rate
Ozone	Marginal	100 tpy VOCs or NO _x ^b
	Moderate	100 tpy VOCs or NO _x
	Serious	50 tpy VOCs or NO _x
	Severe	25 tpy VOCs or NO _x
	Extreme	10 tpy VOCs or NO _x
	Transport regions not classified as severe or extreme	50 tpy VOCs or 100 tpy NO _x
Carbon monoxide	Serious	50 tpy CO
Particulate matter < 10 μm (PM-10)	Serious	70 tpy PM-10

^a Source: The Air Pollution Consultant, Sept./Oct. 1992

^b tpy = tons per year

Major source thresholds for HAPs are listed in Table 7:

Table 7. Major Source Thresholds for Hazardous Air Pollutants (HAPs)

Pollutant	Potential Emission Rate
Any single HAP	10 tpy ^a
Total HAPs	25 tpy

^a tpy = tons per year

Appendix A: Definitions

Material-balance calculation: Calculation of emissions based on the quantities and types of input materials and the quantities and types of output materials.

Minor source: A business with a potential to emit that either (1) lies below major source emission thresholds, or (2) lies above major source emission thresholds, but through adoption of emission or process controls or limitations, gains minor source status.

Nonattainment area: A geographical area that does not meet National Ambient Air Quality Standards (NAAQS) for criteria pollutants.

Potential to emit: The maximum capacity of a business to emit a pollutant given its physical or operational design, and considering certain controls and limitations.

Appendix B

List of Hazardous Air Pollutants (HAPs)

Appendix B: HAPs List^a

CAS No.	Chemical name
75-07-0	Acetaldehyde
60-35-5	Acetamide
75-05-8	Acetonitrile
98-86-2	Acetophenone
53-96-3	2-Acetylaminofluorene
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
107-05-1	Allyl chloride
92-67-1	Aminobiphenyl
62-53-3	Aniline
90-04-0	o-Anisidine
0	Antimony Compounds
0	Arsenic Compounds (inorganic including arsine)
1332-21-4	Asbestos
71-43-2	Benzene (including benzene from gasoline)
92-87-5	Benzidine
98-07-7	Benzotrichloride
100-44-7	Benzyl chloride
0	Beryllium Compounds
92-52-4	Biphenyl
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)
542-88-1	Bis(chloromethyl)ether
75-25-2	Bromoform
106-99-0	1,3-Butadiene
0	Cadmium compounds
156-62-7	Calcium cyanamide
133-06-2	Captan
63-25-2	Carbaryl

^a The Clean Air Act originally specified 189 hazardous air pollutants. In 1996, caprolactam was examined and taken off the list, and thus there are now 188 HAPs.

Appendix B: HAPs List

CAS No.	Chemical name
56-23-5	Carbon tetrachloride
75-15-0	Carbon disulfide
463-58-1	Carbonyl sulfide
120-80-9	Catechol
133-90-4	Chloramben
57-74-9	Chlordane
7782-50-5	Chlorine
79-11-8	Chloroacetic acid
532-27-4	2-Chloroacetophenone
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate
67-66-3	Chloroform
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene
0	Chromium Compounds
0	Cobalt Compounds
0	Coke Oven Emissions
108-39-4	m-Cresol
95-48-7	o-Cresol
106-44-5	p-Cresol
1319-77-3	Cresols/Cresylic acid (isomers and mixture)
98-82-8	Cumene
0	Cyanide Compounds
94-75-7	2,4-D, salts and esters
3547-04-4	DDE
334-88-3	Diazomethane
132-64-9	Dibenzofurans
96-12-8	1,2-Dibromo-3-chloropropane
84-74-2	Dibutylphthalate
106-46-7	1,4-Dichlorobenzene(p)
91-94-1	3,3-Dichlorobenzidene
111-44-4	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542-75-6	1,3-Dichloropropene

Appendix B: HAPs List

CAS No.	Chemical name
62-73-7	Dichlorvos
111-42-2	Diethanolamine
121-69-7	N, N-Diethyl aniline (N, N-Dimethylaniline)
64-67-5	Diethyl sulfate
119-90-4	3,3-Dimethoxybenzidine
60-11-7	Dimethyl aminoazobenzene
119-93-7	3,3¼-Dimethyl benzidine
79-44-7	Dimethyl carbamoyl chloride
68-12-2	Dimethyl formamide
57-14-7	1,1-Dimethyl hydrazine
131113	Dimethyl phthalate
77781	Dimethyl sulfate
534-52-1	4,6-Dinitro-o-cresol, and salts
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)
122-66-7	1,2-Diphenylhydrazine
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
106-88-7	1,2-Epoxybutane
140-88-5	Ethyl acrylate
100-41-4	Ethyl benzene
51-79-6	Ethyl carbamate (Urethane)
75-00-3	Ethyl chloride (Chloroethane)
106-93-4	Ethylene dibromide (Dibromoethane)
107-06-2	Ethylene dichloride (1,2-Dichloroethane)
107-21-1	Ethylene glycol
151-56-4	Ethylene imine (Aziridine)
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)
0	Fine mineral fibers
50-00-0	Formaldehyde
0	Glycol ethers

Appendix B: HAPs List

CAS No.	Chemical name
76-44-8	Heptachlor
118-74-1	Hexachlorobenzene
87-68-3	Hexachlorobutadiene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
822-06-0	Hexamethylene-1,6-diisocyanate
680-31-9	Hexamethylphosphoramide
110-54-3	Hexane
302-01-2	Hydrazine
7647-01-0	Hydrochloric acid
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)
123-31-9	Hydroquinone
78-59-1	Isophorone
0	Lead Compounds
58-89-9	Lindane (all isomers)
108-31-6	Maleic anhydride
0	Manganese Compounds
0	Mercury Compounds
67-56-1	Methanol
72-43-5	Methoxychlor
74-83-9	Methyl bromide (Bromomethane)
74-87-3	Methyl chloride (Chloromethane)
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)
78-93-3	Methyl ethyl ketone (2-Butanone)
60-34-4	Methyl hydrazine
74-88-4	Methyl iodide
108-10-1	Methyl isobutyl ketone (Hexone)
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
1634-04-4	Methyl tert butyl ether
101-14-4	4,4-Methylene bis (2-chloroaniline)
75-09-2	Methylene chloride (Dichloromethane)
101-68-8	Methylene diphenyl diisocyanate (MDI)

Appendix B: HAPs List

CAS No.	Chemical name
101-77-9	4,4'-Methylenedianiline
91-20-3	Naphthalene
0	Nickel Compounds
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl
100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
62-75-9	N-Nitrosodimethylamine
684-93-5	N-Nitroso-N-methylurea
59-89-2	N-Nitrosomorpholine
56-38-2	Parathion
82-68-8	Pentachloronitrobenzene (Quintobenzene)
87-86-5	Pentachlorophenol
108-95-2	Phenol
106-50-3	p-Phenylenediamine
75-44-5	Phosgene
7803-51-2	Phosphine
7723-14-0	Phosphorus
85-44-9	Phthalic anhydride
1336-36-3	Polychlorinated biphenyls (Aroclors)
0	Polycyclic Organic Matter
1120-71-4	1,3-Propane sultone
57-57-8	beta-Propiolactone
123-38-6	Propionaldehyde
114-26-1	Propoxur (Baygon)
78-87-5	Propylene dichloride (1,2-Dichloropropane)
75-56-9	Propylene oxide
75-55-8	1,2-Propylenimine (2-Methyl aziridine)
91-22-5	Quinoline
106-51-4	Quinone
0	Radionuclides (including radon)
0	Selenium Compounds
100-42-5	Styrene

Appendix B: HAPs List

CAS No.	Chemical name
96-09-3	Styrene oxide
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79-34-5	1,1,2,2-Tetrachloroethane
127-18-4	Tetrachloroethylene (Perchloroethylene)
7550-45-0	Titanium tetrachloride
95-80-7	2,4-Toluene diamine
584-84-9	2,4-Toluene diisocyanate
108-88-3	Toluene
95-53-4	o-Toluidine
8001-35-2	Toxaphene (chlorinated camphene)
120-82-1	1,2,4-Trichlorobenzene
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
121-44-8	Triethylamine
1582-09-8	Trifluralin
540-84-1	2,2,4-Trimethylpentane
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)
1330-20-7	Xylenes (isomers and mixture)
108-38-3	m-Xylenes
95-47-6	o-Xylenes
106-42-3	p-Xylenes

Appendix C

References

Appendix C: References

Appendix C:

References

Some of the EPA policy memoranda listed below and other guidance on potential to emit can be found on the Internet at EPA's Technology Transfer Network, Office of Air and Radiation Policy and Guidance web site at:

<http://www.epa.gov/ttn/oarpg>

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State SBAP contacts:

If you don't know the contact for the state small business assistance program in your state, you can find this information on the Internet at: <http://www.epa.gov/ttn/sbap> or contact the Clean Air Technology Center (CATC) at (919) 541-0800.

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