



# CHAPTER 3.

## UNDERSTANDING AIR EMISSION SOURCES

This section of the workbook will help you:

- Determine whether the air emission sources you identified on your “*Air Emission Sources Inventory*” worksheet contain regulated chemicals;
- Perform simple calculations to estimate your annual use of these chemicals;
- Determine your status as an air emitter based on the quantity of chemicals used; and
- Understand some of the basic requirements for your source status and air pollutant emitting equipment.

You will need your copy of the “*Air Emission Sources Inventory*” worksheet with accompanying MSDSs to proceed with the determination process.



### DETERMINE WHETHER PROCESS MATERIALS CONTAIN REGULATED CHEMICALS

This section will help you determine whether your process materials contain chemicals on one of three lists: 1) chemicals regulated as Hazardous Air Pollutants (HAPs), 2) very toxic chemicals used as cleaning solvents, and/or 3) chemicals reportable under the Toxic Release Inventory (TRI) section of the Emergency Planning and Community Right-to-Know Act (EPCRA). Many chemicals are on more than one of the three lists.

Using the MSDS you have for each air emission source you identified on your “*Air Emission Source Inventory*” worksheet, complete the following steps:

***Step 1:*** Go to Section II of the MSDS, usually called “Hazardous Ingredients,” which lists all of the chemicals that make up that particular product.

***Step 2:*** As you read each chemical off the MSDS sheet, refer to **Table 5** on the next page to see if that chemical is listed. **Table 5** is a selection, taken from the 189 Hazardous Air Pollutants (HAPs) list, of chemicals commonly used in the metal fabrication industry. Refer to **Appendix D: Hazardous Air Pollutants** for the full list.

***Step 3:*** If you find a match between chemicals on the MSDS with a chemical in Table 5 or in the Appendix D list, set that MSDS aside (which you’ll use later when calculating your total emissions).



**Step 4:** If no chemical match is found, continue comparing the chemicals on the MSDS with the chemicals found in the list of chemicals in **Table 6** below and **Table 7** on page 22.

**Step 5:** Check the appropriate column on your “*Air Emission Sources Inventory*” worksheet when you determine the nature of the chemicals you use (189 HAPs, Halogenated Cleaning Solvent, TRI or Not an Emission Source).

If you are unsure whether a product contains regulated chemicals, refer to **Appendix B: Contacts List** to find out who to call in your area.

### 189 HAPs

The chemicals listed in **Table 5**, which are commonly used in metal fabrication processes, are listed as HAPs. See **Appendix D** for a complete list of the 189 HAPs.

**Table 5: Chemicals on the List of 189 HAPs that Fabricators Commonly Use**

Benzene	Formaldehyde	Methylene chloride
Cadmium compounds	Glycol ethers	Perchloroethylene
Carbon tetrachloride	Hexane	Polycyclic organic matter
Chromium compounds	Hydrochloric acid	Propylene oxide
Cumene	Isophorone	Toluene
Dibutylphthalate	Lead compounds	2,4-toluene diisocyanate
Diethanolamine	Methanol	1,1,1-trichloroethane
Ethyl benzene	Methyl ethyl ketone	Vinyl chloride
		Xylene

### Halogenated Cleaning Solvents

Some of the cleaning liquids in parts washers are considered very toxic and are heavily regulated. If you use a parts washer to clean equipment or production parts, refer to the cleaning liquid’s MSDS to determine whether the liquid contains any of the chemicals listed in **Table 6** (below). If you find that the cleaning product you are using does contain any of the chemicals in **Table 6**, refer to **Appendix B** to find out who to call in your state.

**Table 6: Chemicals on the List of HAPs Commonly Used in Cleaning Equipment**

*Carbon tetrachloride	Methylene chloride	Trichloroethylene
Chloroform	Perchloroethylene	*1,1,1-trichloroethane

*\*These chemicals are listed as stratospheric ozone depleting chemicals. Products cleaned with these chemicals may need warning labels.*



### Toxics Release Inventory

Chemicals commonly used in metal fabrication that are listed in the Toxics Release Inventory (TRI) are included in **Table 7** below.

**Table 7: Chemicals on the TRI that Fabricators Commonly Use**

Ammonia	Ethylene oxide	Methylene chloride
Barium	Formaldehyde	Perchloroethylene
Cadmium	Freon 113	Phosphoric acid
Chromium	Hydrochloric acid	Silver
Copper	Hydroquinone	Sulfuric acid
Cumene	Lead	Toluene
Cyclohexane	Methanol	Trichloroethylene
Ethylbenzene	Methyl ethyl ketone	1,1,1-trichloroethane
Ethylene glycol	Methyl isobutyl ketone	Xylene

*Note: Table 7 is not a complete listing of all chemicals reportable under EPCRA. The full list includes more than 600 chemicals.*

*When you have determined whether products contain regulated chemicals, check off this action on the Checklist on page 2 and go on to the next action.*



### ESTIMATE ANNUAL USE OF REGULATED CHEMICALS

You should now have a group of MSDSs for process materials that contain regulated chemicals. Write down the product's name and the chemicals in that product in the appropriate spaces of the tables provided on page 25 (make extra copies of this page, if necessary). Then, follow steps 1-5 to determine how many chemicals, and in what quantities, you use annually.

The following steps will help you perform a mass-balance calculation of your annual emissions. This method is used to estimate the amount of chemical in your products, and assumes 100 percent of the chemical is emitted.

#### **Step 1: Calculate Total Annual Usage of Regulated Chemicals**

Using invoices, add up the total gallons purchased of a product in one year. Multiply this total by the **density (lbs./gal.)** of the product and record this figure in the "Total Pounds of Product" column in the table. (The lbs./gal. is usually shown in the Physical/Chemical Data section of the MSDS.)

If **specific gravity** is given instead of actual lbs./gal., multiply the specific gravity by 8.34 to get lbs./gal. Multiply this figure by total gallons purchased, and record the total in the "Total Pounds of Product" column.



For example, say you purchased 2,000 gallons of a paint product, which weighs 9.17 lbs./gal., or has a specific gravity of 1.1. (To convert specific gravity to lbs./gal., multiply 1.1 by 8.34, which equals 9.17.) Next, multiply 2,000 gallons by 9.17 to calculate the total pounds of the product.

*Example: 2,000 gallons x 9.17 lbs./gallon = 18,340 lbs. of product used*

Enter **18,340** in the “Total Pounds of Product” column.

**Step 2: Calculate the Percentage of Chemical in Product**

Section II of the MSDS lists the percentage of each chemical in the product. Often, this is called “Weight Percent.” Find this number and convert it to a decimal (multiply by 0.01), and record the new figure in the “Weight Percent” column in the table. If weight percent is provided in a decimal, simply record that figure in the “Weight Percent” column.

For example, if Chemical “X” in the paint product you bought has a weight percent of 40, multiply 40 by 0.01 to calculate the weight percent.

*Example: 40 x .01 = 0.4*

Enter **0.4** in the “Weight Percent” column.

**Step 3: Calculate the Total Pounds of Chemical**

Multiply the number in the “Weight Percent” column with the quantity in “Total Pounds of Product” column, and record the total in the “Total Pounds of Chemical” column in the table. Put a check in Column A if you know this chemical is found in other products. This will help remind you to add up the totals for each chemical from other worksheets.

For example, for Chemical “X” you would multiply the weight percent (0.4) by the total pounds of the chemical (18,340) to determine the total pounds of the chemical.

*Example: 0.4 x 18,340 lbs. = 7,336 lbs. emission of chemical constituent*

Enter **7,336** in the “Total Pounds of Chemical” column.

**Step 4: Calculate the Total Tons of Chemicals You Use per Year**

Add the totals in the Total Pounds of Chemical column for **each product**, and divide by 2,000. This number is your total tons per year for all chemicals used in your process materials. Next, add the total pounds of **each chemical** (refer to Column A to identify chemicals found in multiple products) and divide by 2,000. This number is your total tons per year for each particular chemical.



For example, if Chemical “X” is found only in one product (i.e. Column A is not checked), you would divide the total pounds of the chemical (7,336) by 2,000 to determine the total tons of Chemical “X” you use in one year.

$$\textit{Example: } 7,336/2,000 = 3.67 \textit{ tons}$$

**Step 5: Calculate Grand Total**

Add the Total Pounds/Year figures from each worksheet to determine the total pounds of all chemicals you use. Divide this figure by 2,000 to determine Total Tons/Year. Enter this figure in the “Grand Total Tons of Chemicals” space below the tables and in the “Total Tons of All Regulated Chemicals Per Year” space on the “*Air Emission Sources Inventory*” worksheet.

***When you have estimated your annual use of regulated chemicals, check off this action on the Checklist on page 2 and go on to the next action.***



**Product Name** \_\_\_\_\_

Example: Chemical "X"	18,340 lbs.	0.4	7,336 lbs.	
Total Pounds/Year				
Total Tons/Year				

**Product Name** \_\_\_\_\_

Total Pounds/Year				
Total Tons/Year				

**Product Name** \_\_\_\_\_

Total Pounds/Year				
Total Tons/Year				

**Grand Total Tons of Chemicals:** \_\_\_\_\_



## DETERMINE AIR EMISSION SOURCE STATUS

**Air Emissions:** \_\_\_\_\_ tons per year

Enter the total estimated tons of regulated chemicals that you calculated on the previous pages in the above space. Use this number to figure out what type of air emission source your business is classified as. The total quantity typically reflects the total amount of HAPs emitted annually. That's because many HAPs also are found on the Halogenated Cleaning Solvents and TRI lists.

### Major Source

Your business is considered a “major source” of air emissions if your processes emit or have the potential to emit:\*

- 10 tons (20,000 lbs.) or more from any one chemical on the list of 189 HAPs, or
- 25 tons (50,000 lbs.) or more from any combination of chemicals on the list of 189 HAPs, or
- More than 100 tons (200,000 lbs.) of all Volatile Organic Compound (VOC) emissions. Check with your local or state air pollution control agency to determine what additional chemicals, other than those you inventoried, are considered VOC sources. Small fabrication shops, however, generally do not use enough chemicals to exceed this threshold. See *Appendix B: Contacts List*.

### Area Source

An “area source” of air emissions is a facility that emits regulated air pollutants below the threshold levels of major sources.

As is discussed on the following page under “Identify Requirements for Using Regulated Chemicals,” attaining “area” source status or using equipment and process materials that contain non-regulated materials have the fewest requirements. If you find you are a major source and are using regulated chemicals, you will want to reduce your annual usage and find alternative process materials. By achieving these reductions you can enjoy the less burdensome requirements. This can be accomplished by reviewing and implementing the best management practices and pollution prevention opportunities in Chapter 5 of this workbook.

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\* *Potential to emit is the maximum amount of air pollutants your facility can emit if, 1) Each process unit is operated at 100 percent of its physical and operational design capacity; 2) Materials that emit the most air pollution are used 100 percent of the time; 3) All of the equipment is operating 24 hours per day, 365 days per year; and 4) No pollution control equipment is used.*



Following is just one of these opportunities, which can eliminate or reduce the use of regulated chemicals:

#### **Use less toxic cleaners that have low air emissions**

Work with your vendor to find less toxic substitutes to your solvent cleaners (parts washers, equipment cleaning). When you begin testing alternatives, follow manufacturer instructions carefully because the new product may need a different working approach than your old cleaning solution required.

*When you have determined your air emission source status, check off this action on the Checklist on page 2 and go on to the next action.* For help determining your air emission source status, refer to *Appendix B: Contacts List*.

The next action item in this workbook explores some of the general requirements associated with your classification as a source of air emissions. Again, this workbook does not include information on local regulations. Local authorities such as solid waste districts, county health departments, air pollution control agencies, and sewage treatment districts may have additional environmental requirements. Refer to your telephone directory to find out who to call.



### **IDENTIFY REQUIREMENTS FOR USING REGULATED CHEMICALS**

There are two ways your facility can be regulated for using regulated chemicals in your processes. One is to regulate (usually by a permit or registration process) the entire facility because of the chemicals it uses; and a second is by regulating specific equipment and processes (e.g., using halogenated solvents in parts washers).

This section points out several of these major regulations that affect metal fabricators. However, if your facility is in an area with a local air pollution control agency (such as the Puget Sound area), you may have additional requirements and should contact the local agency to find out. (See *Appendix B: Contacts List* for local air authority contacts.)

### **HAPs**

#### **Major Sources**

As a major source of air emissions, your business faces a much more stringent and complicated set of rules. The permit and/or registration systems and the National Emission Standards for Hazardous Air Pollutants (NESHAP) for halogenated solvents, which are associated with being a major source, are difficult to cover in the context of this workbook. If you have determined your status is that of a major source, refer to *Appendix B: Contacts List* to find out who to call in your state.



### Area Sources

Each state and local air quality authority may have rules and standards placed on area sources. Over the next several years, the EPA is expected to tighten the air quality rules to include non-major sources of air pollution. By understanding your air emission sources and quantities of regulated chemicals that you use, you will immediately know how you fit into the regulatory framework as rules are developed. Any business located in a designated ozone non-attainment area should refer to **Appendix B: Contacts List** because special standards may apply.

*Note: In Oregon, businesses emitting more than 10 tons of non-hazardous VOC emissions are required to operate under a state air permit. Other states and local air authorities also may have a registration system for businesses that have VOC emissions.*

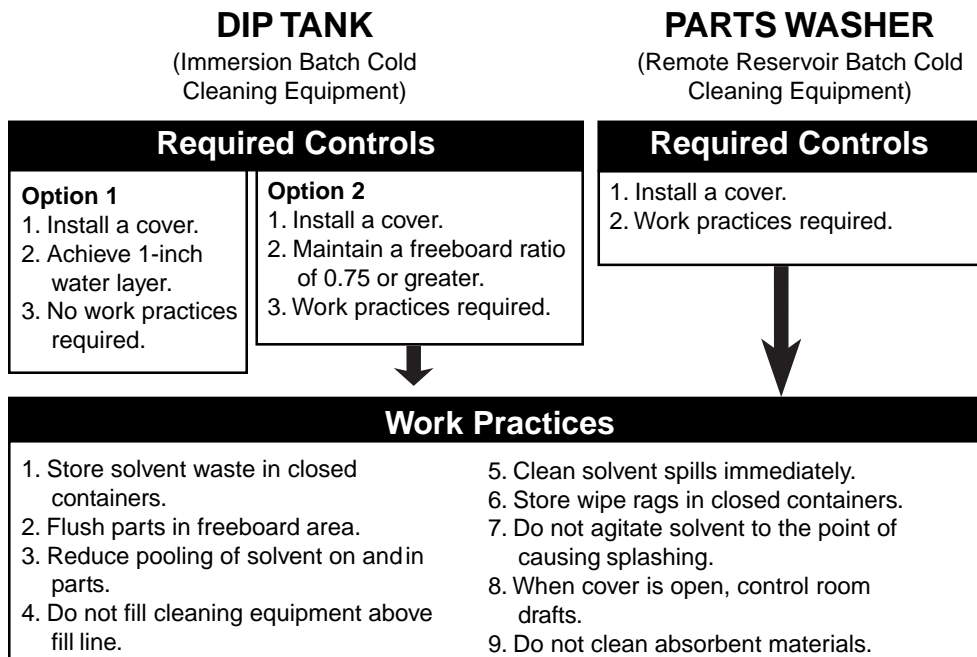
### Halogenated Solvent Cleaning

All fabricators that operate any size solvent cleaning equipment (solvent immersion or stand-up parts washer) using any of the following solvents—methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride or chloroform—are affected by the NESHAP Halogenated Solvent Cleaning regulation. If you use these chemicals in solvent cleaning machinery you have several compliance options (see **Figure 2** below).

#### **Oregon Tax Credit**

Oregon businesses can receive a 50 percent credit on state income taxes for investing in alternative cleaning equipment that does not rely on solvents.

**Figure 2: Options for Complying with Cleaning Equipment NESHAP**





**TRI**

See *Appendix E: Other Federal and State Regulations* for a discussion on the Emergency Planning and Community Right-to-Know Act (EPCRA).

*When you have identified the requirements for using regulated chemicals, check off this action on the Checklist on page 2 and go on to Chapter 4: Understanding Water Pollution Sources.*