Pollution Prevention in Machining and Metal Fabrication

A Manual for Technical Assistance Providers

Excerpts

March 2001
CHAPTER 2
Regulatory Overview

This chapter highlights the common waste streams associated with typical metal fabrication and machining processes. It also provides an overview of the federal regulations that pertain to metal fabrication processes.

To an extent, all industrial processes have pollution issues and waste streams. For the most part, metal fabrication processes do not generate wastes as hazardous as those produced by other processes involved in the manufacturing of complex metal parts (i.e., metal finishing or metal coating). However, cutting and shaping processes may generate significant volumes of spent metalworking fluid, which require proper storage, handling, manifesting and overall management. Other processes, such as salt bath heat treating, brazing, and soldering, may generate wastes that are regulated under wastewater, air, or hazardous waste regulations. Fabrication processes that are the most heavily regulated include:

- copper forming
- aluminum forming
- nonferrous metal forming
- cyanide salt bath heat treating
- soldering with cadmium-containing solders
- solvent-based adhesive processes

Metal finishing, metal coating, and primary metal processes will not be covered in this Regulatory Overview, as they were covered in previous volumes in this series, namely *Pollution Prevention in the Metal Finishing Industry*, *Pollution Prevention in the Metal Painting and Coating Industry*, and *Pollution Prevention in the Primary Metals Industry*.

Common Wastes in Metal Fabrication Facilities

As mentioned in Chapter 1, metal fabrication facilities vary greatly in size and operation. In metal shaping and cutting operations, the generation of spent metalworking fluids and scrap metal are the two major waste streams. Other processes in the fabrication of metal parts may have significantly more toxic or hazardous byproducts. This section will define the common sources of wastewater, solid and hazardous waste, and air emissions generated from metal fabrication operations. Table 2.1 lists some of the common wastes by media and process.

**Wastewater**

Most metal fabricating facilities generate a variety of wastewater streams. Some of the typical sources are water-based metalworking fluids, non-contact cooling water, interim rinse tanks in quenching processes, boiler blow-down water, wet deburring, waterjet cutting, welding quench tanks, and scrubbers. Metalworking fluids are generally handled as hazardous or state regulated...
oil waste because they contain hazardous constituents and fail fat, oil, and grease (FOG) limits of publicly owned treatment works (POTWs). The contaminants that some of the other process fluids pick up may also make them unsuitable for discharge, and they are often shipped offsite for treatment and disposal through a licensed hauler.

Table 2.1 Common Wastes from Metal Fabrication Processes

<table>
<thead>
<tr>
<th>Process</th>
<th>Air Emission</th>
<th>Solid/Hazardous Waste</th>
<th>Process Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal Shaping &amp; Metal Removal</td>
<td>• evaporating metalworking fluids*</td>
<td>• spent metalworking fluids</td>
<td>• non-contact cooling water</td>
</tr>
<tr>
<td></td>
<td>• metalworking fluid mist</td>
<td>• tramp oils</td>
<td>• boiler blow-down water</td>
</tr>
<tr>
<td></td>
<td>• smoke</td>
<td>• spent hydraulic fluids</td>
<td>• water quenchant</td>
</tr>
<tr>
<td>Heat Treating</td>
<td>• vaporized metalworking fluids</td>
<td>• spent salt baths</td>
<td>• spent rinse baths</td>
</tr>
<tr>
<td>Soldering &amp; Brazing</td>
<td>• evaporating fluxes</td>
<td>• spent flux</td>
<td>• spent rinse water</td>
</tr>
<tr>
<td>Adhesives</td>
<td>• solvent emissions from adhesive curing (i.e., toluene, MEK)</td>
<td>• splattering solder</td>
<td></td>
</tr>
<tr>
<td>Tumbling, Deburring, Polishing, &amp; Honing</td>
<td>• primer evaporative losses</td>
<td>• adhesives overspray</td>
<td></td>
</tr>
<tr>
<td>Welding</td>
<td>• deburring media</td>
<td></td>
<td>quench water</td>
</tr>
<tr>
<td></td>
<td>• deburring chemicals/bath</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• honing/polishing compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• polishing wheels</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• anti-splatter agents</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• tungsten electrodes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*some fluids are designed to evaporate during the fabricating process; others vaporize due to high process temperatures

Solid and Hazardous Waste

In metal fabrication processes, process fluids that become excessively contaminated are periodically changed and disposed of. Process fluids are shipped off-site for disposal or treatment. Process fluids are usually considered a hazardous material, although in some states, if handled appropriately, they can be exempted. The following are common examples of hazardous waste from metal fabrication operations:

- spent metalworking fluids that cannot be treated in process or have been biologically degraded
- spent salt baths from heat treating processes
- spent quenchant
- tank dredges
- spent filter media
- flux baths from certain soldering operations
- scrubber wastes containing hazardous salts and metalworking fluids

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Scrap metal, chips, and swarf are common solid wastes from metal fabrication processes that may require special handling depending on how much metalworking fluid they contain. It is often necessary to reduce the amount of metalworking fluid in these waste streams before a scrap dealer will accept them. Oil contaminated rags and absorbents are other common wastes whose handling also is dictated by how much metalworking fluid they contain. Regulations covering waste oil and spent rags can vary greatly from state to state; for state-specific information contact your state environmental agency’s waste management program.

Metal fabrication facilities generate solid waste in the form of broken pallets, cardboard boxes, and other packaging and shipping materials. Many of these waste streams may be recycled and facilities have set up separation programs to divert as much as possible from the solid waste stream to reduce waste disposal costs.

**Air Emissions**

The use of metal working fluids in metal shaping and metal removal processes may result in fugitive emissions in the form of smoke, mist, or vapor. Other processes may create more hazardous air emissions. Possible sources of air emissions in metal fabrication processes are:

- smoke emissions from metal removal processes
- potential VOC emissions from metalworking fluids
- metalworking fluid mists
- cyanide emissions from salt baths
- evaporating metalworking fluids from salt baths and furnaces
- evaporative losses of solvents from adhesive processes
- vaporized solder fluxes

Regulatory requirements on the above emissions vary depending on the specific application and location. For specific information on regulatory requirements related to these sources, contact your state environmental agency’s air quality program.

**Overview of Federal Regulations Affecting Metal Fabricators**

The metal fabrication industry is regulated under numerous federal, state, and local environmental statutes. Major regulations affecting these processes include the Clean Air Act (CAA), the Clean Water Act (CWA), and the Resource Conservation and Recovery Act (RCRA). Also, facilities using chemicals listed under the Emergency Planning and Community Right-To-Know Act (EPCRA),\(^\text{15}\) are required to report their releases of those chemicals under the EPA’s Toxics Release Inventory (TRI) program.

\(^\text{15}\) Also know as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986.
Clean Water Act

The Clean Water Act regulates the amount of chemicals/toxics released via wastewater/effluent discharges. The EPA has promulgated effluent guidelines and standards for different industries under the CWA provisions. These standards usually set concentration-based limits for the discharge of a given chemical. The EPA defines two types of dischargers: direct and indirect.

Direct Dischargers

A facility that is discharging directly into a body of water is regulated under the National Pollution Discharge Elimination System (NPDES) and must apply for a NPDES permit. The permit specifies what type of pollutants can be discharged and includes a schedule for compliance, reporting, and monitoring. The NPDES regulations limit the amount of metals, cyanides, and total toxic organics that a facility can discharge. These limitations are set based on whether the facility is treating wastewater onsite prior to directly discharging to a body of water or the facility is discharging to a POTW (Haveman 1995).

Indirect Dischargers

Most metal fabrication facilities discharge their wastewater to POTWs. These indirect dischargers must adhere to specified pretreatment standards. Often, specific state or local water regulations require more stringent treatment or pretreatment requirements than those in the federal effluent guidelines because of local water quality issues (Haveman 1995). All facilities discharging to a POTW are governed by the General Pretreatment Standards. These standards state that discharges must have a pH greater than 5.0 and cannot:

- Create fire or explosion
- Obstruct the flow of wastewater through the system
- Interfere with sewage plant operations
- Contain excessive heat
- Contain excessive petroleum, minerals, or non-biodegradable oils

In addition to the above requirements, specific regulations for certain fabrication processes apply under the CWA, including:

- Steel and Iron Manufacturing Point Source Category - 40 CFR 420 (as it applies to hot and cold rolling operations)
- Nonferrous Alloy Manufacturing Point Source Category - 40 CFR 421(as it applies to hot and cold rolling)
- Aluminum Forming Point Source Category - 40 CFR 467
- Copper Forming Point Source Category - 40 CFR 468

Existing companies regulated under these standards face stringent effluent standards for specific chemicals when they make modifications to or expansions of their process. New companies are subject to other, more stringent standards. The following lists the requirements for each type of facility.
Existing facilities:
- Pretreatment Standards for Existing Sources (PSES)
- Effluent Limits Based on Best Practicable Control Technology (BPT)
- Effluent Limits Based on Best Conventional Technology (BCT)
- Effluent Limits Based on Best Available Control Technology (BACT)

New facilities:
- New Source Performance Standards (NSPS)
- Pretreatment Standards for New Sources (PSNS)

For more information on these standards contact a local POTW or your state environmental agency’s wastewaster treatment program.

The standard that is under development that will have the greatest impact on metal fabricators is the Metal Products and Machinery Standard (40 CFR 438). The proposed standard would set stricter limits on the discharge of a 132 pollutants of concern (POC), including: chromium, copper, nickel, zinc, and cyanide. New standards might be set on direct discharges of aluminum and iron. The first part of this standard, Phase I, was proposed in May of 1995. The second part of the standard, Phase II, was scheduled for promulgation in 2000. Due to significant comment on the initial proposal, the two Phases were combined, and both were proposed in October 2000 and will be promulgated in December of 2002.

**Stormwater Discharge**

Under the Clean Water Act Amendments of 1987, the EPA was charged with establishing a system to address stormwater discharges. In response, the EPA promulgated the NPDES stormwater permit application regulations. These regulations address any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. The regulations cover:

- discharges associated with industrial activity
- discharges from a large or medium municipal storm sewer system
- discharges that the EPA or the state determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

The stormwater regulations divide discharges by 11 industrial classifications and metal fabrication facilities are in Category XI. Category XI is unique under the current stormwater regulations in that it contains a “No Exposure Exemption.” This exempts metal fabricators, and other industrial sources within this category from the definition of "stormwater discharge associated with industrial activity," and the subsequent requirement to obtain an NPDES permit, provided their industrial materials, material handling operations, and industrial processes are not "exposed" to stormwater (U.S. EPA 1999).

**Management of Used Oil**

Under the Federal Regulation 40 CFR 279 (Standards for the Management of Used Oil), EPA published specific rules for the accumulation, storage, handling, and on-site burning of used oil as
This standard was established under authority from the Solid Waste Disposal Act and CERCLA. The term "solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 1342 of Title 33, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923) (42 U.S.C. 2011 et seq.).

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) of 1976 addresses solid (Subtitle D) and hazardous (Subtitle C) waste management activities. Regulations promulgated under Subtitle C establish a “cradle to grave” system that governs these wastes from point of generation to disposal. A material is classified under RCRA as a hazardous waste if the material meets the definition of solid waste and exhibits one of the characteristics of a hazardous waste (i.e., corrosiveness, flammability, toxicity, or reactivity, designated with the code “D”) or if it is specifically listed by the EPA as a hazardous waste (designated with the code “F”). The range of listed wastes may vary from state to state because states may add wastes to the list of those that are regulated as hazardous waste.

Within RCRA Subtitle C, the EPA includes hazardous waste from non-specific sources in a series of "F" listings. Table 2.2 presents the F-listed wastes that might be generated from metal fabrication processes.

Another category of hazardous waste is a characteristic waste. These wastes exhibit one or more of the RCRA Subtitle C characteristics (i.e., flammable, corrosive, reactive, or explosive) and are not specifically listed. Common characteristic wastes generated in metal fabrication operations include:

- Spent metalworking fluid whose reaction products between the fluids, additives, and the metals being machined may cause spent fluid to be hazardous even if the “clean” product was not hazardous
- Corrosive salt baths
- Heat treating rinsewater, which might have a low or high pH depending on the contents of the preceding bath
- Spent quenchant media that may be contaminated with heavy metals (other than cyanide) (NCMS 1997)

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16This standard was established under authority from the Solid Waste Disposal Act and CERCLA.

17The term "solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 1342 of Title 33, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923) (42 U.S.C. 2011 et seq.).
Table 2.2  RCRA Listed Wastes (U.S. EPA 1996)

<table>
<thead>
<tr>
<th>Listing</th>
<th>Waste Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F002</td>
<td>Spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; vapor degreasing still bottoms</td>
</tr>
<tr>
<td>F003</td>
<td>Spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobuty ketone, butyl alcohol, cyclohexanone, and methanol</td>
</tr>
<tr>
<td>F004</td>
<td>Spent nonhalogenated solvents: cresols and cresylic acid, and nitrobenzene</td>
</tr>
<tr>
<td>F005</td>
<td>Spent nonhalogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane</td>
</tr>
<tr>
<td>F010</td>
<td>Quench bath residues from oil baths in metal heat treating operations using cyanides</td>
</tr>
<tr>
<td>F011</td>
<td>Spent cyanide solutions from salt bath pot cleaning in metal heat treating operations</td>
</tr>
</tbody>
</table>

After determining whether or not the facility generates hazardous waste, the fabricator must determine its generator status. Generator status is based upon the amount of waste generated on a monthly basis. The first step in determining generator status is to determine the quantity of waste that is regulated by RCRA. The following are some general guidelines to determine whether or not a material counts towards RCRA generation status:

- Material remaining in a production process is not counted as waste until it is no longer being used in that process
- Waste discharged directly and legally to a POTW in compliance with CWA pretreatment standards is not counted toward RCRA generation total
- Any material that is characteristic or listed as a hazardous waste, and is accumulated after its removal from the process before being sent off site for treatment, storage, or disposal, is counted toward RCRA Subtitle C generation total

In general, there are three classes of generators:

- Large Quantity Generators: Facilities that generate more than 1,000 kilograms (2,200 pounds) of hazardous waste per month or that generate or accumulate more than 1 kilogram (2.2 pounds) of acute hazardous waste at one time
- Small Quantity Generators: Facilities that generate between 100 kilograms (220 pounds) and 1,000 kilograms (2,200 pounds) of hazardous waste in any calendar month
- Conditionally Exempt Small Quantity Generators: Facilities that generate less than 100 kilograms (220 pounds) of hazardous waste per month or that generate less than 1 kilogram (2.2 pounds) of acute hazardous waste in any calendar month (NEWMOA 1997)

EPA delegates the oversight of RCRA generators to states, and the generator status groups may differ from state to state by name and threshold limit values. Each state has varying degrees of regulation for the three generator classes. At a minimum, however, the EPA requires each class to comply with the following requirements:
Large Quantity Generators

- Notify the EPA and obtain an EPA ID number
- Store waste for no more than 90 days
- Comply with container standards and tank rules
- Prepare and retain a written Contingency Plan
- Prepare and retain written training plan, including annual training of employees
- Prepare a written waste minimization plan
- Dispose of hazardous materials only at RCRA-permitted sites
- Only use transporters with EPA ID numbers
- Use proper Department of Transportation (DOT) packaging and labeling
- Use the full Uniform Hazardous Waste Manifest
- Place a 24-hour emergency telephone number on all manifests
- Report serious spills or fires to the National Response Center
- Obtain a DOT registration number for shipments over 5,000 pounds
- Keep all records for three years
- Make sure that any treatment or recycling done onsite is permitted
- Report missing shipments in writing
- Submit biennial reports of hazardous waste activities, including waste minimization

Small Quantity Generators

- Notify the EPA and obtain an EPA ID number
- Store waste for no more than 180 days (270 days if the waste is shipped more than 200 miles)
- Comply with container standards and tank rules
- Dispose of hazardous materials only at RCRA permitted sites
- Only use transporters with EPA ID numbers
- Use proper Department of Transportation (DOT) packaging and labeling
- Use the full Uniform Hazardous Waste Manifest
- Place a 24-hour emergency telephone number on all manifests
- Post emergency response telephone numbers near telephones
- Provide informal employee training
- Make sure that any treatment or recycling done onsite is permitted
- Report missing shipments in writing
- Keep all records for three years

Conditionally Exempt Small Quantity Generators

- Avoid accumulating more than 1,000 kg (2,200 pounds) of hazardous waste onsite at any one time
- Send waste to a facility that is at least approved to manage municipal or industrial solid waste (NEWMOA 1997)

Toxics Release Inventory Reporting

Manufacturing facilities included in the SIC codes 20 to 39, which have ten or more employees, and which manufacture, process, or otherwise use specified chemicals in volumes greater than threshold limits, must publicly report their releases of these chemicals. Facilities
report information on a TRI data form (Form R) for each toxic chemical that is used over the threshold amount. Basic information reported in a Form R includes:

- Facility identification
- Parent company information
- Certification by corporate official
- SIC code
- Chemical activity and use information
- Chemical release and transfers
- Off-site transfer information
- On-site waste treatment
- Source reduction and recycling activities

The releases and transfers reported on a Form R include:

- Emissions of gases or particulates to the air
- Wastewater discharges into rivers, streams, and other bodies of water
- Releases to land on site, including landfill, surface impoundment, land treatment, or other mode of land disposal
- Disposal of wastes in underground injection wells
- Transfers of wastewater to POTWs
- Transfers of wastes to other off-site facilities for treatment, storage, and disposal

The thresholds for manufacturing and processing are 25,000 pounds and 10,000 pounds for the “otherwise used” category. Some of the TRI chemicals commonly used in metal fabrication facilities are listed in the Table 2.3.

**Metalworking Fluid Requirement**

Another federal regulation - 40 CFR 747 - Metalworking Fluids - applies to fabricators who use fluids that contain certain amine compounds, specifically mixed mono- and diamides of an organic acid, thriethanolamine salt of a substitute organic acid, and thiethanolamine salt of a tricarboxylic acid. These fluids are clearly marked on the container, which is required of the manufacturer as part of this rule. This rule was created under the authority of the Toxic Substances Control Act (TSCA). Under TSCA, the EPA is required to set limits on the manufacture and use of substances known to the EPA to present unreasonable risk of injury to human health or the environment (15 U.S.C. 2605).

Fabricators who use fluids containing these substances are prohibited from adding nitrosating agents to the fluid because this would cause the formation of nitrosamines, a known carcinogen (40 CFR Part 747).
### Table 2.3 Chemicals on the TRI that Fabricators Commonly Use (PPRC 1997)

<table>
<thead>
<tr>
<th>Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
</tr>
<tr>
<td>Ethylene oxide</td>
</tr>
<tr>
<td>Methylene chloride</td>
</tr>
<tr>
<td>Barium</td>
</tr>
<tr>
<td>Formaldehyde</td>
</tr>
<tr>
<td>Perchloroethylene</td>
</tr>
<tr>
<td>Cadmium</td>
</tr>
<tr>
<td>Freon 113</td>
</tr>
<tr>
<td>Phosphoric acid</td>
</tr>
<tr>
<td>Chromium</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
</tr>
<tr>
<td>Silver</td>
</tr>
<tr>
<td>Copper</td>
</tr>
<tr>
<td>Hydroquinone</td>
</tr>
<tr>
<td>Sulfuric acid</td>
</tr>
<tr>
<td>Cumene</td>
</tr>
<tr>
<td>Lead</td>
</tr>
<tr>
<td>Toluene</td>
</tr>
<tr>
<td>Cydohexane</td>
</tr>
<tr>
<td>Methanol</td>
</tr>
<tr>
<td>Trichloroethylene</td>
</tr>
<tr>
<td>Ethylbenzene</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
</tr>
<tr>
<td>Ethylene glycol</td>
</tr>
<tr>
<td>Methyl isobutyl ketone</td>
</tr>
<tr>
<td>Xylene</td>
</tr>
</tbody>
</table>

### Clean Air Act

Under the Clean Air Act Amendments (CAAA), metal fabricating operations with processes that could emit Hazardous Air Pollutants (HAPs) or volatile organic compounds (VOCs), as defined in the CAAA, could be required to obtain an operating permit and/or comply with other regulatory requirements for those processes. This is not the case for many fabricators that are only involved in metal shaping and cutting operations. However, facilities that perform adhesive joining, brazing, soldering, and heat treating may emit HAPs and VOCs and may need to obtain a permit.

### Hazardous Air Pollutants

Under the Clean Air Act Amendments of 1990, the EPA is required to regulate the emissions of 188 hazardous air pollutants (HAPs). Table 2.4 lists some of the HAP listed chemicals that fabricators commonly use.

### Table 2.4 Common HAPs Used by Metal Fabricators (PPRC 1997)

<table>
<thead>
<tr>
<th>Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
</tr>
<tr>
<td>Glycol ethers</td>
</tr>
<tr>
<td>Perchloroethylene</td>
</tr>
<tr>
<td>Cadmium compounds</td>
</tr>
<tr>
<td>Hexane</td>
</tr>
<tr>
<td>Polycyclic organic matter</td>
</tr>
<tr>
<td>Carbon tetrachloride</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
</tr>
<tr>
<td>Propylene oxide</td>
</tr>
<tr>
<td>Chromium compounds</td>
</tr>
<tr>
<td>Isophorone</td>
</tr>
<tr>
<td>Toluene</td>
</tr>
<tr>
<td>Cumene</td>
</tr>
<tr>
<td>Lead compounds</td>
</tr>
<tr>
<td>2,4-toluene diisocyanate</td>
</tr>
<tr>
<td>Dibutylphthalate</td>
</tr>
<tr>
<td>Methanol</td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
</tr>
<tr>
<td>Diethanolamine</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
</tr>
<tr>
<td>Vinyl chloride</td>
</tr>
<tr>
<td>Ethyl benzene</td>
</tr>
<tr>
<td>Methylene chloride</td>
</tr>
<tr>
<td>Xylene</td>
</tr>
</tbody>
</table>
The CAAA classifies facilities by the amount of HAPs they emit. Listed below are a few examples.

**Major Source** – Any source of toxic air pollution that emits or has the potential to emit 10 tons per year of any listed hazardous air pollutant, or 25 tons or more of a combination of listed hazardous air pollutants.

**Lesser Quantity Major Source** – Certain other sources that are considered major sources even though they emit less than the 10/25-ton limit figure. Lesser quantities (meaning less than the 10 or 25 tons per year definitions in the Act), can be set for pollutants that are highly toxic to human health or the environment. If the EPA sets a lesser quantity limit for a particular industrial group, all sources within that group that emit more than the established limit will be classified as major sources.

**Area Source** – These smaller sources emit less than 10 tons per year of a single air toxic, or less than 25 tons per year of a combination of air toxics. The EPA has discretion over whether to regulate categories of these sources. Most area source emissions are small, but the collective volume can be hazardous in densely developed areas where large numbers of such facilities are packed tightly into urban neighborhoods and industrial parks.

Congress requires the EPA to identify major and area source categories associated with the emissions of one or more listed HAPs. To date, the EPA has identified 174 categories. Congress also requires the EPA to promulgate emissions standards for listed source categories within 10 years of the enactment of the CAAA (November 15, 2000). These standards are called the National Emission Standards for Hazardous Air Pollutants (NESHAPs).

Metal fabrication facilities may fall within a number of the source categories that have or will have NESHAPs. The NESHAPs most likely to affect metal fabrication operations have been promulgated for coating, plating, finishing, and organic solvent degreasing operations. For more information on these NESHAPs visit [http://www.newmoa.org/publications](http://www.newmoa.org/publications) and view the *Pollution Prevention in Metal Finishing* and *Pollution Prevention in Metal Painting and Coating* manuals. To date, no NESHAPs have been developed for the processes covered in this Manual. However, adhesives use has been mentioned in the Preliminary Industrial Characterization (PIC) of some developing standards, including those for the Metal Coil Coating Industry, the Metal Furniture Industry, and the Large Appliance Industry (U.S. EPA 1998). Depending on the final language of these NESHAPs, fabricators who apply adhesives may be required to meet specific emission standards in the future.

For major sources that do not fall under a NESHAP Source Category, facilities must obtain a Title V Air Operating Permit from their state or local air permitting agency and report their emissions of listed pollutants. For more information on Title V Operating Permits contact your state or local air permitting authority.
**Volatile Organic Compounds**

In an effort to limit the emission of certain criteria pollutants, Title I of the CAA required the EPA to develop standards on the following substances:

- Inhalable particulates
- Nitrogen oxide
- Ozone
- Sulfur oxides
- Lead
- Carbon monoxide

The standard of interest to metal fabricators is ozone. Ground level ozone results from the reaction of volatile organic compounds, or VOCs, with nitrogen oxides in the presence of heat and sunlight. VOCs may be emitted from metalworking fluids, adhesives, and fluxes. The level of VOCs regulation depends upon the air quality where the facility is located. Basically, if a source is located in an "attainment" area (i.e., in compliance with the National Ambient Air Quality Standards), it will be required to obtain a permit if its potential to emit is greater than 100 tons of VOCs per year. If the facility is located in an attainment area in the Northeast or Mid-Atlantic states (otherwise known as the Ozone Transport Region), it is required to get a permit from the state if it has the potential to emit 50 tons of VOCs per year (Haveman 1995).

For those facilities located in non-attainment areas, the regulatory thresholds are much lower. How much lower depends on the degree of non-compliance with NAAQSs in that region. The EPA classifies non-attainment areas into five categories: marginal, moderate, serious, severe, and extreme.

As regional or statewide air quality problems increase, the likelihood that a small source of VOCs will be required to obtain a permit increases. This added regulatory burden may be an important impetus for facilities to more closely scrutinize the compounds they are using.

Metalworking fluids, adhesives, solder fluxes, and weld anti-splatter compounds may contain VOCs. If these materials are found to contain VOCs upon examination of their MSDS, then they must be included when determining the facilities emissions or potential to emit. Firms may be required to determine their VOC emissions, or potential to emit VOCs, from the use of these materials under their specific operating conditions.

Three areas where metal fabrication facilities have the greatest potential to emit VOCs include:

- Operations that use solvents containing VOCs, such as parts cleaning or adhesives application
- Operations that use solvent-based paints or coatings
- Operations that use fluxes, such as soldering and brazing

Metal fabricating facilities must take all sources of VOCs into consideration when determining whether or not they need a permit. For more information on determining whether or not a source needs a permit, contact your state air permitting authority.
State Pollution Prevention and Toxics Use Reduction Laws

Many states throughout the U.S. have toxics use reduction or pollution prevention planning laws that require facilities of a certain size to go through a formal planning process where they evaluate alternatives aimed at reducing toxics use or the generation of pollution at its source. The Sections below list the status of pollution prevention and toxics use reduction laws for states in the Northeast.

Connecticut

Connecticut does not have any toxics use reduction or pollution prevention planning requirements.

Maine

In 1999 Maine reauthorized its pollution prevention law. The reauthorization encourages toxic use reduction, reductions in releases of toxics during manufacturing and other processes, and reductions in hazardous waste generation. The Law requires that there be a pollution prevention system for state facilities by 2005. The Law sets goals for toxics use reduction, toxics release reduction, and hazardous waste generation minimization, as listed below.

Toxics Use Reduction Goals

Using the amount of toxics used statewide in 1990 as a baseline figure, the statewide goals for toxics use reduction are a 40 percent reduction in the amount of toxic substances used in the State by January 1, 2002, a 50 percent reduction by January 1, 2004 and a 60 percent reduction by January 1, 2006.

Toxics Release Reduction Goals

Using an average of the aggregate amounts of toxics released at a facility statewide in calendar years 1990 and 1991 as a baseline figure, the goals for reducing the aggregate amount of toxics released to the environment at the facility statewide are a 40 percent reduction by January 1, 2002, a 50 percent reduction by January 1, 2004 and a 60 percent reduction by January 1, 2006.

Hazardous Waste Generation Minimization Goals

The goals for minimizing the amount of hazardous waste generated at a facility statewide are a 40 percent reduction by January 1, 2002; a 50 percent reduction by January 1, 2004; and a 60 percent reduction by January 1, 2006. Reductions must be based on a facility’s average generation rate in the State for the years 1987 and 1989.
Under the Law, facilities are required to go through a planning process. The minimum planning requirements are:

- development of a facility-wide management policy for the reduction of toxics use, release and waste generation.
- completion of a production unit analysis that:
  - characterizes the toxics used and released, and the hazardous waste generated
  - identifies and evaluates appropriate use and release reduction techniques
  - analyzes the costs and benefits of reducing the amounts of toxics used
  - proposes a strategy for implementing selected reduction technologies, including a schedule
  - identifies available markets for recycling the hazardous waste generated
  - establishes a record keeping program
- development of an employee awareness and training program

Facilities are required to submit a biennial progress report that includes:

- the facilities’ goals
- progress achieved
- methods used to achieve reductions
- an explanation of why the facilities’ progress is less than or greater than the goals
- a description of how employees were involved in the planning process
- future P2 methods that will be used to achieve reductions
- a certification of the progress report by senior management

The Law requires that all data collected be made available in electronic format and on the Internet (Maine 1999).

**Massachusetts**

Massachusetts passed the Toxic Use Reduction Act (TURA) in 1989. TURA requires that large quantity toxics users (i.e. manufacturing or processing 25,000 pounds per year, or otherwise using 10,000 pounds per year) develop a toxic use reduction (TUR) plan. The goal of the planning process is to identify TUR opportunities that are cost-effective so as to stimulate companies to implement them voluntarily. The TUR plan should:

- examine how toxic chemicals are used and lost during production
- calculate the cost of toxic chemical usage
- identify potential TUR techniques
- evaluate the feasibility of the TUR techniques
- evaluate the costs and savings of implementing the various TUR techniques (NEWMOA 1997)

Contact the Massachusetts DEP or the Office of Technical Assistance (OTA) for more information about TURA requirements.

**New Hampshire**

New Hampshire does not have any toxisc use reduction or pollution prevention planning requirements.
**New Jersey**

New Jersey has a comprehensive pollution prevention planning requirement. Facilities that are required to file at least one Form R under the federal Emergency Planning and Community Right-to-Know Act (EPCRA) must prepare a P2 plan. The chemicals that must be considered in the plan are those listed under Title III, Section 313 of SARA for TRI reporting under EPCRA and are used, manufactured or processed at the facility in a quantity greater than 10,000 pounds per year. The goal of New Jersey’s mandatory planning program is that companies will discover economically attractive source reduction opportunities that they will implement voluntarily. New Jersey requires the following elements in a P2 plan:

- list of chemicals used or manufactured in quantities greater than 10,000 pounds per year
- inventory data for each chemical to show annual inputs
- inventory data for each chemical to show annual outputs
- out-of-process recycling data for each chemical
- release data for each chemical
- quantities used for each chemical
- description of each production process using or generating a listed chemical
- inventory data for each process showing the amount of hazardous substance:
  - contained in the product
  - consumed by the process
  - used by the process
  - generated as nonproduct output (NPO) from the process
  - released from the process
  - sent for recycling from the process
- hazardous waste information, including total quantities generated, treated, recycled, stored, and disposed, as well as identification of off-site treatment/storage/disposal facility (TSDFs) used
- type(s) and quantity of hazardous waste produced by each production process
- comprehensive financial analysis for each production process
- description of processes targeted for P2
- quantification of nonproduct output for each targeted process
- list of available P2 opportunities for each targeted process
- technical analysis of each option
- a comprehensive comparative financial analysis of each option
- a discussion of all options that are technically and financially feasible
- identification of numeric five-year goals for the facility to reduce use and/or generation of each hazardous substance, the facility’s impact on releases, and the reduction of per unit use and/or generation of each hazardous substance
- a schedule for implementation of feasible P2 techniques (NEWMOA 1997)

**New York**

New York has had a Waste Reduction Policy since 1987, which established the following hazardous waste management hierarchy:
- reduction or elimination of hazardous waste generation
- recover, reuse or recycle wastes that are produced
- detoxify, treat or destroy wastes that cannot be recovered, reused or recycled
- land disposal

In July 1990, the Hazardous Waste Reduction Act (HWRA) was signed into law. The law requires that generators of 25 tons or more of hazardous waste per year prepare and submit to the state a Hazardous Waste Reduction Plan (HWRP). The HWRP is to be implemented according to a phased schedule. The HWRP is to be updated biennially and annual status reports are to be submitted. The requirements of the HWRA apply to manufacturers that have RCRA hazardous waste generation of 25 tpy or more. Therefore, most machinists and metal fabricators will not be affected by HWRP requirements (NEWMOA 1997).

**Rhode Island**

Rhode Island has no toxic use reduction or pollution prevention planning requirements.

**Vermont**

Under Act 100, passed in 1991, Vermont requires that facilities that use toxic substances and/or generate hazardous waste develop a pollution prevention plan. All facilities that manufacture, process or use more than 10,000 pounds per year of a toxic substance are required to develop a plan, as well as facilities that use more than 1,000 pounds per year if that amount accounts for more than 10% of the total toxic substances manufactured, processed or used. A toxic substance is defined as those listed under Title III, Section 313 of SARA. Generators of hazardous waste are required to plan if they generate more than 2,200 pounds of hazardous waste in any one month or if they generate more than 2,640 pounds per year. The P2 plan should include the following:

- general information about the facility, including a description of the products made and production levels
- description of the management policy, and employee training and awareness program regarding P2
- description of current and past P2 efforts
- listing of toxic substance use in each product, including total quantity used and production level (for those required to file because of toxic substance use), or a list of hazardous waste generation by production process (for those required to file because of hazardous waste generation)
- detailed description of each process using toxic substances or producing hazardous waste, including input and outputs (i.e. process flow diagram)
- list of P2 opportunities for each process
- technical feasibility analysis for each opportunity
- economic feasibility analysis for each opportunity
- list of selected P2 opportunities and performance goals (i.e. level of reduction and schedule)

The state requires that facilities submit the summary of their P2 plan for public record. The full plan is to be maintained at the facility and made available on site to state inspectors on request. Metal fabricators that emit/use more than 1,000 pounds (½ ton) per year of a SARA 313 substance are subject to Vermont’s P2 planning requirements (NEWMOA 1997).