PDHonline Course C310 (4 PDH)

Clean Air Act – Taking Toxics Out of the Air

Instructor: John Huang, Ph.D., PE and John Poullain, PE

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5272 Meadow Estates Drive
Fairfax, VA 22030-6658
Phone: 703-988-0088
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Taking Toxics Out of the Air

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Taking Toxics Out of the Air

Progress in Setting "Maximum Achievable Control Technology" Standards Under the Clean Air Act

Contents

Air toxics are those air pollutants that are known or suspected to cause cancer or other serious health problems. Each year, millions of tons of air toxics are released into the air, mostly from manmade sources. This document describes what air toxics are, where they come from, and how they can impact people and the environment. It also describes the steps being taken by the U.S. Environmental Protection Agency to reduce emissions of air toxics from major industrial sources such as chemical manufacturing plants, petroleum refineries, and steel manufacturing plants.

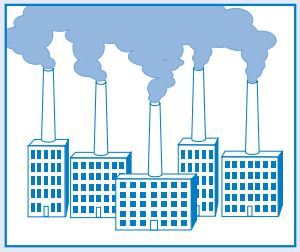
Introduction

The air we breathe can be contaminated with pollutants from factories, vehicles, power plants, and many other sources. These pollutants have long been a major concern because of the harmful effects they sometimes have on people's health and the environment. Their impact depends on many factors, including the quantity of air pollution to which people are exposed, the duration of the exposures, and the potency of the pollutants. The effects of air pollutants can be minor and reversible (such as eye irritation) or debilitating (such as aggravation of asthma) and even fatal (such as cancer).

The technology- and performance-based standards issued by EPA over the past 10 years have proven extremely successful. Once fully implemented, these standards will cut emissions of toxic air pollutants by nearly 1.5 million tons per year–almost 15 times greater reductions than EPA was able to achieve in 20 years prior to 1990.

Since 1970, the Clean Air Act has provided the primary framework for protecting people and the environment from the harmful effects of air pollution. A key component of the Clean Air Act is a requirement that the U.S. Environmental Protection Agency (EPA) significantly reduce daily, so-called "routine" emissions of the most potent air pollutants: those that are known or suspected to cause serious health problems such as cancer or birth defects. The Clean Air Act refers to these pollutants as **"hazardous air pollutants,"** but they are also commonly known as **toxic air pollutants** or, simply, **air toxics**.

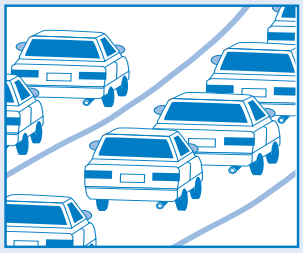
Sources of Air Toxics



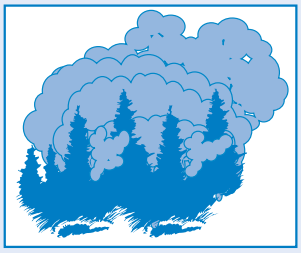
Routine Emissions From Stationary Sources

Accidental Releases

Each year, millions of tons of toxic pollutants are released into the air from both natural and manmade sources.



Mobile Sources



Forest Fires

Prior to 1990, the Clean Air Act required EPA to set standards for each toxic air pollutant individually, based on its particular health risks. This approach proved difficult and minimally effective at reducing emissions. As a result, when amending the Clean Air Act in 1990, Congress directed EPA to use a "technology-based" and performance-based approach to significantly reduce emissions of air toxics from major sources of air pollution, followed by a risk-based approach to address any remaining, or residual, risks.

Under the "technology-based" approach, EPA develops standards for controlling the "routine" emissions of air toxics from each major type of facility within an industry group (or "source category"). These standards—known as "maximum achievable control technology (MACT) standards"—are based on emissions levels that are already being achieved by the better-controlled and lower-emitting sources in an industry. This approach assures citizens nationwide that each major source of toxic air pollution will be required to employ effective measures to limit its emissions. Also, this approach provides a level economic playing field by ensuring that facilities that employ cleaner processes and good emission controls are not disadvantaged relative to competitors with poorer controls.

In setting MACT standards, EPA does not generally prescribe a specific control technology. Instead, whenever feasible, the Agency sets a performance level based on technology or other practices already used by the industry. Facilities are free to achieve these performance levels in whatever way is most cost-effective for them. The MACT standards issued by EPA over the past 10 years have proven extremely successful. Once fully implemented, these standards will cut emissions of toxic air pollutants by nearly 1.5 million tons per year.

Eight years after each MACT standard is issued, EPA must assess the remaining health risks from source categories. If necessary, EPA may implement additional standards that address any significant remaining risk.

What Are Toxic Air Pollutants?

Toxic (also called hazardous) air pollutants are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or to cause adverse environmental effects. The degree to which a toxic air pollutant affects a person's health depends on many factors, including the quantity of pollutant the person is exposed to, the duration and frequency of exposures, the toxicity of the chemical, and the person's state of health and susceptibility.

The 1990 Clean Air Act Amendments list 188 toxic air pollutants that EPA is required to control.[1] Examples of toxic air pollutants include benzene, which is found in

[1] The list originally included 189 chemicals. Based on new scientific information, EPA removed caprolactam from the list in 1996; thus, the current list includes 188 pollutants.

Mobile Sources and Accidental Releases

While this document focuses on EPA's efforts to reduce routine emissions from stationary sources, EPA also is working to reduce toxic emissions from:

- **Mobile sources,** such as cars and trucks. For example, EPA and state governments (e.g., California) have reduced emissions of benzene, toluene, and other toxic pollutants from mobile sources by requiring the use of reformulated gasoline and placing limits on tailpipe emissions. For more information, contact EPA's Office of Transportation and Air Quality at www.epa.gov/OMSWWW/toxics.htm or call (202) 564-1682.
- **Accidental releases,** including leaks and spills. For example, EPA has established regulations under the Clean Air Act requiring certain facilities to implement risk management programs that will help prevent accidental releases of toxic chemicals. For more information, contact EPA's Office of Chemical Emergency Preparedness and Prevention at www.epa.gov/swercepp or call (800) 424-9346.

gasoline; perchloroethylene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

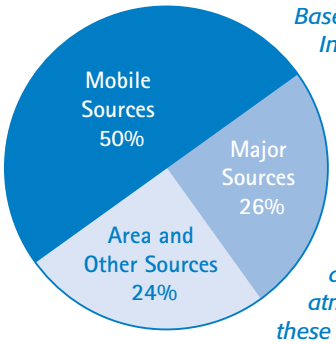
Where Do Air Toxics Come From?

Scientists estimate that millions of tons of toxic pollutants are released into the air each year. Most air toxics originate from manmade sources, including both mobile sources (e.g., cars, buses, trucks) and stationary sources (e.g., factories, refineries, power plants). However, some are released in major amounts from natural sources such as forest fires. This document focuses on EPA's efforts, as of August 2000, to reduce *routine* (as opposed to accidental) emissions of toxic air pollutants from stationary sources. Routine emissions from stationary sources constitute almost one-half of all manmade air toxics emissions.

There are two types of stationary sources that generate routine emissions of air toxics:

- **"Major" sources** are defined as sources that emit 10 tons per year of any of the listed toxic air pollutants, or 25 tons per year of a mixture of air toxics. Examples include chemical plants, steel mills, oil refineries, and hazardous waste incinerators. These sources may release air toxics from equipment leaks, when materials are transferred from one location to another, or during discharge through emissions stacks or vents. One key public health concern regarding major sources is the health effects on populations located downwind from them.

- **"Area" sources** consist of smaller sources, each releasing smaller amounts of toxic pollutants into the air. Area sources are defined as sources that emit less than 10 tons per year of a single air toxic, or less than 25 tons per year of a mixture of air toxics. Examples include neighborhood dry cleaners and gas stations. Though emissions from individual area sources are often relatively small, collectively their emissions can be of concern—particularly where large numbers of sources are located in heavily populated areas.



Based on 1996 National Toxics Inventory data, major sources account for about 26 percent of air toxics emissions, smaller area sources and other sources (such as forest fires) for 24 percent, and mobile sources for 50 percent. Accidental releases, which also contribute air toxics to the atmosphere, are not included in these estimates.

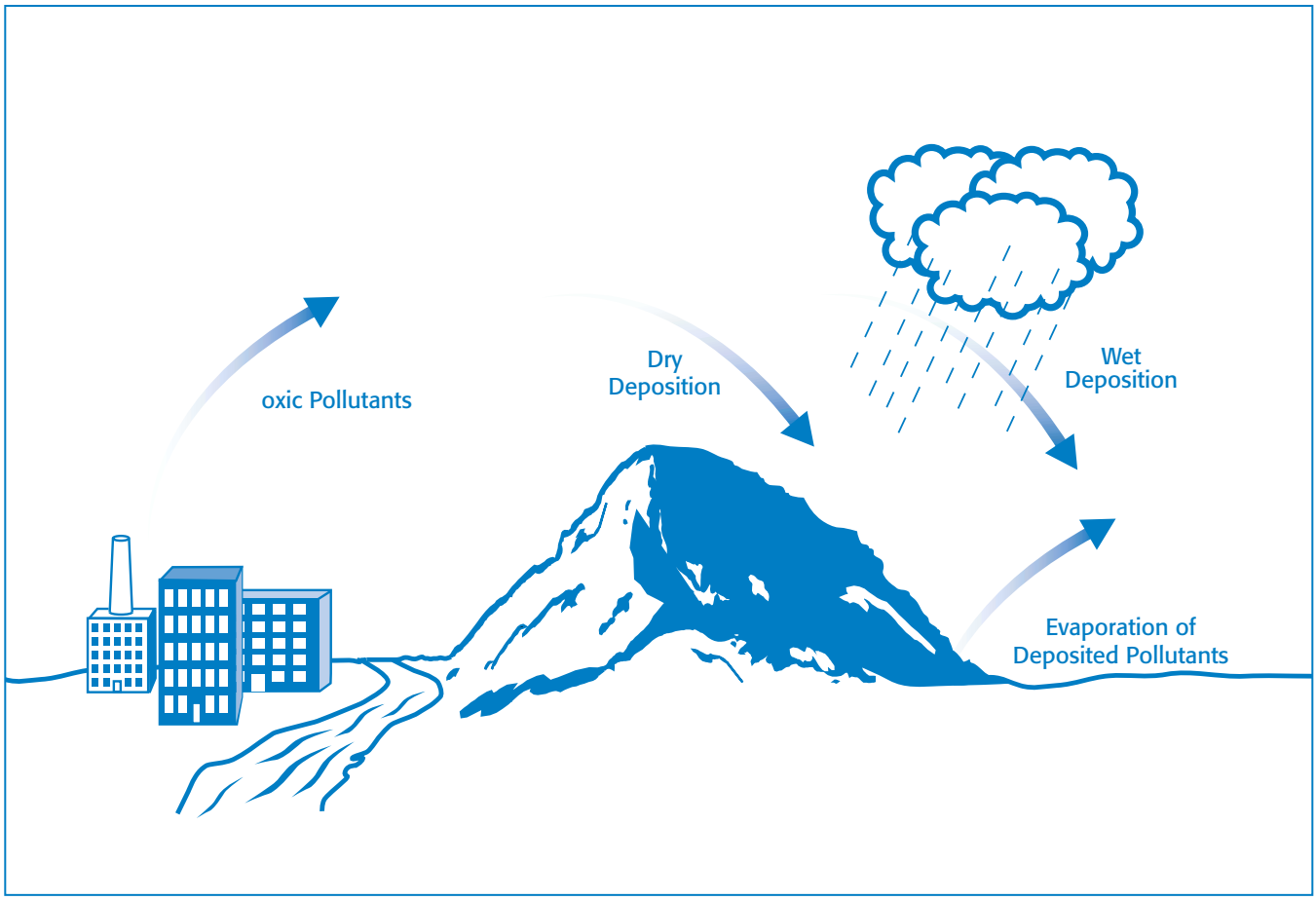
EPA's published list of "source categories" now contains 175 categories of industrial and commercial sources that emit one or more toxic air pollutants. For each of these source categories, EPA indicated whether the sources are considered to be "major" sources or "area" sources. The 1990 Clean Air Act Amendments direct EPA to set standards requiring all major sources of air toxics (and some area sources that are of particular concern) to significantly reduce their air toxics emissions.

Where Do Air Toxics Go?

Once released, toxic pollutants can be carried by the wind, away from their sources, to other locations. Factors such as weather, the terrain (i.e., mountains, plains, valleys), and the chemical and physical properties of a pollutant determine how far it is transported, its concentration at various distances from the source, what kind of physical and chemical changes it undergoes, and whether it will degrade, remain airborne, or deposit to land or water.

Some pollutants remain airborne and contribute to air pollution problems far from the pollution source. Other pollutants released into the air can be deposited to land and water bodies through precipitation, or by settling directly out of the air onto land or water. Eventually, a large portion of those pollutants deposited near water bodies or small tributaries will reach the water bodies via stormwater runoff or inflow from the tributary streams.

Some toxic air pollutants are of particular concern because they degrade very slowly or not at all, as in the case of metals such as mercury or lead. These persistent air toxics (as they are called) can remain in the environment for a long time (or forever, in the case of metals) and can be transported great distances.



Toxic air pollutants can be deposited to land and water bodies through precipitation (wet deposition) or by settling directly out of the air (dry deposition). Repeated cycles of transport, deposition, and evaporation can move toxic air pollutants very long distances.

Often, persistent air toxics reach the ground, evaporate back into the atmosphere, and are then transported further until they are deposited on the ground again. Repeated cycles of transport, deposition, and evaporation can move toxic air pollutants very long distances. For example, toxic pollutants such as toxaphene, a pesticide used primarily in the cotton belt, have been found in the Antarctic, thousands of miles from their likely emissions sources.

How Are People Exposed to Air Toxics?

People are exposed to toxic air pollutants in many ways that can pose health risks, such as by:

- Breathing contaminated air.
- Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil on which air toxics have been deposited.
- Drinking water contaminated by toxic air pollutants.
- Eating contaminated soil. Young children are especially vulnerable because they may ingest contaminated soil from their hands or from objects they place in their mouths.
- Touching (skin contact) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies).

Once toxic air pollutants enter the body, some persistent toxic air pollutants accumulate in body tissues. Also, through a phenomenon called **biomagnification**, predators typically accumulate even greater pollutant concentrations than their contaminated

prey. As a result, people and other animals at the "top" of the food chain who eat contaminated fish or meat are exposed to concentrations that are much higher than the concentrations in the water, air, or soil.

Fish consumption advisories have been issued for thousands of water bodies nationwide, including over 52,000 lakes and over 238,000 miles of rivers. As of December 1999, 40 states have consumption advisories about mercury-contaminated fish for specific water bodies. Eleven of those states have issued state-wide advisories for freshwater lakes and rivers. Many of these water bodies were once thought to be relatively pristine. However, EPA is now finding that deposition from the air may be a major source of the pollution in these water bodies.

Health Effects

People who are exposed to toxic air pollutants at sufficient concentrations and for sufficient durations may increase their chances of getting cancer or experiencing other serious health effects. Depending on which air toxics an individual is exposed to, these health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, and respiratory problems. A growing body of evidence indicates that some air toxics (e.g., DDT, dioxins, and mercury) may disturb hormonal (or endocrine) systems. In some cases this happens by pollutants either mimicking or blocking the action of natural hormones. Health effects associated with endocrine disruption include reduced male fertility, birth defects, and breast cancer.

How Do Air Toxics Affect the Environment?

Toxic pollutants in the air, or deposited on soils or surface waters, can have a number of environmental impacts. Like humans, animals can experience health problems if they are exposed to sufficient concentrations of air toxics over time. Numerous studies conclude that deposited air toxics are contributing to birth defects, reproductive failure, and disease in animals. Persistent toxic air pollutants are of particular concern in aquatic ecosystems because the pollutants accumulate in sediments and may biomagnify in tissues of animals at the top of the food chain to concentrations many times higher than in the water or air.

Toxic pollutants that mimic hormones also pose a threat to the environment. In some wildlife (e.g., birds, shellfish, fish, and mammals), exposures to pollutants such as DDT, dioxins, and mercury have been associated with decreased fertility, decreased hatching success, damaged reproductive organs, and altered immune systems.

What Has EPA Done to Reduce Air Toxics?

The Pre-1990 "Risk-Only" Approach

Prior to 1990, the Clean Air Act directed EPA to regulate toxic air pollutants based on the risks each pollutant posed to human health. Specifically, the Act directed EPA to:

- Identify all pollutants that caused "serious and irreversible illness or death."
- Develop standards to reduce emissions of these pollutants to levels that provided an "ample margin of safety" for the public.

While attempting to control air toxics during the 1970s and 1980s, EPA became involved in many legal, scientific, and policy debates over which pollutants to regulate and how stringently to regulate them. Debates focused on risk assessment methods and assumptions, the amount of health risk data needed to justify regulation, analyses of the costs to industry and benefits to human health and the environment, and decisions about "how safe is safe."

During this time, EPA was still developing methods to assess risk. These methods were essential tools that would be needed to establish the scientific basis for making risk-based decisions about air toxics. While EPA and the scientific community gained valuable knowledge about risk assessment methods through this work, the chemical-by-chemical regulatory approach—an approach based solely on risk—proved difficult. In fact, in 20 years, EPA regulated only seven pollutants (asbestos, benzene, beryllium, inorganic arsenic, mercury, radionuclides, and vinyl chloride). Collectively, these standards cut annual air toxics emissions by an estimated 125,000 tons.

Maximum Achievable Control Technology—MACT

EPA's MACT standards are based on the emissions levels already achieved by the best-performing similar facilities. This straightforward, performance-based approach yields standards that are both reasonable and effective in reducing toxic emissions. This approach also provides a level economic playing field by ensuring that facilities with good controls are not disadvantaged relative to competitors with poorer controls.

When developing a MACT standard for a particular source category, EPA looks at the level of emissions currently being achieved by the best-performing similar sources through clean processes, control devices, work practices, or other methods. These emissions levels set a baseline (often referred to as the "MACT floor") for the new standard. At a minimum, a MACT standard must achieve, throughout the industry, a level of emissions control that is at least equivalent to the MACT floor. EPA can establish a more stringent standard when this makes economic, environmental, and public health sense.

The MACT floor is established differently for existing sources and new sources:

- For **existing sources**, the MACT floor must equal the average emissions limitations currently achieved by the best-performing 12 percent of sources in that source category, if there are 30 or more existing sources. If there are fewer than 30 existing sources, then the MACT floor must equal the average emissions limitation achieved by the best-performing five sources in the category.
- For **new sources**, the MACT floor must equal the level of emissions control currently achieved by the best-controlled similar source.

Wherever feasible, EPA writes the final MACT standard as an emissions limit (i.e., as a percent reduction in emissions or a concentration limit that regulated sources must achieve). Emissions limits provide flexibility for industry to determine the most effective way to comply with the standard.

The 1990 Clean Air Act Amendments: A "Technology First, Then Risk" Approach

Realizing the limitations of a chemical-by-chemical decision framework based solely on risk, and acknowledging the gaps in scientific and analytical information, Congress adopted a new strategy in 1990, when the Clean Air Act was amended. Specifically, Congress revised Section 112 of the Clean Air Act to mandate a more practical approach to reducing emissions of toxic air pollutants.

This approach has two components. In the first phase, EPA develops regulations—MACT standards—requiring sources to meet specific emissions limits that are based on emissions levels already being achieved by many similar sources in the country. Even in its earliest stages, this new "technology-based" approach clearly produced real, measurable reductions. In the second phase, EPA applies a risk-based approach to assess how these technology-based emissions limits are reducing health and environmental risks. Based on this assessment, EPA may implement additional standards to address any significant remaining, or residual, health or environmental risks. EPA completed development of its strategy for addressing residual risks from air toxics in March of 1999.

What Progress Has Been Made in Reducing Toxic Air Pollution?

As of August 2000, EPA has issued 45 air toxics MACT standards under Section 112 of the Clean Air Act Amendments. These standards affect 82 categories of major industrial sources, such as chemical plants, oil refineries, aerospace manufacturers, and steel mills, as well as eight categories of smaller sources, such as dry cleaners, commercial sterilizers, secondary lead smelters, and chromium electroplating facilities. EPA

has also issued two standards under Section 129 of the Clean Air Act to control emissions, including certain toxic pollutants, from solid waste combustion facilities (one standard for municipal waste combustors and the other for medical waste incinerators). Together, these standards reduce emissions of over 100 different air toxics. When fully implemented, all of these standards will reduce air toxics emissions by about 1.5 million tons per year—almost 15 times the reductions achieved prior to 1990. Each of the final rules developed since 1990 is summarized in an appendix to this document (pages 9 to 31). These summaries describe the sources for which final rules have been issued as of August 2000, the types of pollutants the sources emit, and how EPA's rules are reducing their emissions.

Some of these air toxics rules have the added benefit of reducing ground-level ozone (urban smog) and particulate matter. This occurs because some air toxics are also smog-causing volatile organic compounds (VOCs) (e.g., toluene) or particulate matter (e.g., chromium). In addition, some of the technologies and practices designed to control air toxics also reduce VOCs or types of particulate matter that are not currently among the 188 listed air toxics. Reductions of smog-causing pollutants and particulate matter are important because of the health and environmental problems they can cause. Most notably, urban smog can cause respiratory problems and can damage vegetation, and particulate matter can cause many detrimental impacts on human health, such as bronchitis, lung damage, increased infection, aggravation of asthma, and premature death. In addition many of these pollutants can contribute significantly to impaired visibility in places, such as national parks, that are valued for their scenic views and recreational opportunities.

EPA has consistently worked to develop air toxics standards that achieve the required reductions in air pollution while providing regulated communities with as much flexibility as possible in deciding how to comply with the standards. For example, under a flexible regulation, industries may reduce their emissions by redesigning their processes, capturing and recycling emissions, changing work practices, or installing any of a variety of control technologies. Flexibility helps industries minimize the cost of compliance and encourages pollution prevention. To provide flexibility, EPA makes every effort to develop standards that are based on performance measures rather than specific control devices, and that allow for equivalent alternative control measures.

Looking Ahead

To date, EPA has primarily focused efforts to reduce emissions of toxic air pollutants on technology-based or MACT emission standards. Over the next few years, EPA will continue to work with industry; environmental groups; state, local, and tribal agencies; and other interested groups to develop standards for the remaining source categories that will reduce air toxics emissions even further. By 2002, EPA is scheduled to issue 62 technology-based standards covering 96 remaining source categories.

EPA anticipates that its technology-based approach will continue to prove successful at reducing air toxics. Additional air toxics reductions are also expected to continue as a result of mobile and other stationary source control programs (e.g., controls to reduce particulate and volatile organic compound emissions) that indirectly reduce toxics. To identify additional measures beyond the technology standards that may be needed to protect the public health and the environment from toxic air pollutants, EPA will use a more risk-based focus. EPA's efforts underway include national air toxics assessment activities, residual risk standards, evaluation of the impacts of air toxics deposition, data-gathering on mercury emissions from coal-fired electric utilities, and implementation of an urban air toxics strategy. These efforts are explained below.

National Air Toxics Assessment

The National Air Toxics Assessment is an ongoing comprehensive evaluation by EPA of air toxics in the United States. EPA, states, and others are working to improve the national toxics inventory of emissions and to expand air toxics monitoring networks to obtain more air toxics data. This work is expected to help focus future efforts to reduce air toxics and resultant health effects.

Residual Risk Standards

After EPA develops technology-based standards, the 1990 Clean Air Act Amendments require EPA to assess

their effectiveness at reducing the health and environmental risks posed by air toxics. Based on this assessment, the Agency may implement additional standards that address any significant remaining, or "residual," risk. After setting a MACT standard, EPA has 8 years (9 years for the earliest standards) to examine the risk posed by continued emissions from regulated facilities and issue requirements for additional controls if necessary to reduce unacceptable residual risk. EPA has begun to assess residual risk for several source categories, including coke ovens, dry cleaning, gasoline distribution, commercial ethylene oxide sterilizers, halogenated solvent cleaning, industrial cooling towers, and magnetic tape manufacturing. The first residual risk evaluation is scheduled to be completed by EPA in 2001 for the coke oven industry.

Air Toxics Deposition to the Great Waters

Since 1990, EPA has issued three reports to Congress on the deposition of air toxics and their detrimental effects on the Great Waters (i.e., the Great Lakes, Chesapeake Bay, Lake Champlain, and coastal waters). In these reports, EPA lists 15 pollutants of greatest concern, most of which have a tendency to persist in the environment and accumulate in organisms such as fish. The pollutants of concern are: metals (mercury, cadmium, lead), dioxins, furans, polycyclic organic matter, polychlorinated biphenyls (PCBs), pesticides (such as chlordane and DDT/DDE), and nitrogen compounds. Nitrogen compounds from the deposition of air toxics can intensify nutrient enrichment (or eutrophication) of coastal waterbodies. EPA's most recent report, issued in 2000, provides an update on atmospheric deposition of pollutants to the Great Waters and identifies activities that will reduce these pollutants. Several of the MACT standards described on pages 9 through 31 are expected to substantially cut emissions of mercury, dioxins, and other pollutants of concern to the Great Waters from sources such as municipal waste combustors and medical waste incinerators, which alone account for almost 30 percent of the mercury emissions and over 70 percent of the dioxin emissions nationwide (1990 baselines).

Mercury Emissions from Coal-Fired Electric Utilities

Mercury is one of the 188 listed toxic air pollutants. It is of concern because it does not degrade but persists in the environment. The largest emitter of mercury is electric utility plants (primarily coal-fired plants), which are estimated to emit approximately one-third of all manmade mercury in the United States. EPA is currently gathering monitoring data on mercury emissions from coal-fired electric utility plants and expects to complete its evaluation no later than December 2000 on the need to reduce mercury from electric utilities.

Integrated Urban Air Toxics Strategy

A key component of future efforts to reduce air toxics is the Integrated Urban Air Toxics Strategy released by EPA in July 1999. The Strategy presents a framework to address air toxics in urban areas and builds on the substantial emission reductions already achieved from cars, trucks, fuels, and industries such as chemical plants and oil refineries. The Strategy outlines actions to further reduce emissions of air toxics and to improve EPA's understanding of the health risks posed by air toxics in urban areas. The goals of the Strategy are to reduce the risk of cancer by 75 percent and to substantially reduce non-cancer risks associated with air toxics from commercial and industrial sources. The Strategy also reflects the need to address any disproportionate impacts on sensitive populations including children, the elderly, and minority and low-income communities.

For Further Information

EPA Air Toxics Website
Internet: www.epa.gov/ttn/uatw

EPA Office of Air and Radiation
Internet: www.epa.gov/air/
(202) 564-7400

EPA Office of Transportation and Air Quality
Internet: www.epa.gov/OMSWWW/omshome.htm
(202) 564-1682

EPA Office of Chemical Emergency Preparedness and Prevention
Internet: www.epa.gov/swercepp
(800) 424-9346

Summaries of EPA's Final Air Toxics MACT Rules

Over the past 10 years, EPA has issued 45 air toxics MACT standards under Section 112 of the 1990 Clean Air Act Amendments. These standards, listed below, are summarized on the following pages. Compliance is required within 3 years unless otherwise specified in the rule.

Final rule published September 22, 1993

- Dry cleaning facilities are the largest source of perchloroethylene (also called perc) emissions in the United States. Because dry cleaners are located in many communities across the country, perc emissions from dry cleaners are often released in close proximity to large numbers of people.
- Perc can cause dizziness, nausea, and headaches and is suspected to cause cancer in humans.
- EPA's rule requires all dry cleaners that use perc to implement pollution prevention measures. It also contains specific control requirements that vary depending on the type of machinery and the amount of perc a facility uses.
- The rule affects approximately 30,000 dry cleaners and will reduce perc emissions at these facilities by about 7,300 tons per year.

Final rule published October 27, 1993

- Coke oven batteries (a group of ovens connected by common walls) are used to convert coal into coke, which is then used in blast furnaces to convert iron ore to iron.
- Coke oven emissions contain benzene (a known carcinogen) and other chemicals that can cause cancer of the respiratory tract, kidney, and prostate. Exposure to coke oven emissions can also cause conjunctivitis, severe dermatitis, and lesions of the respiratory and digestive systems.
- EPA's rule provides guidelines for day-to-day operations and sets emissions limits for existing sources and even tighter limits for new sources. The rule was developed through a formal regulatory negotiation process that involved extensive industry participation. It provides industry with a menu of compliance options—this flexibility should significantly reduce compliance costs.
- The coke oven rule affects 29 existing facilities and reduces air toxics by approximately 1,500 tons per year.

Final rule published April 22, 1994; additional final rule published May 12, 1998, for Tetrahydrobenzaldehyde Production

- EPA's April 22, 1994 rule reduces emissions of 131 organic air toxics from chemical manufacturing processes in the Synthetic Organic Chemical Manufacturing Industry and from several other chemical production processes. The rule applies to production of about 385 chemicals.
- The rule requires reductions in toxic organic air pollutants emitted from process vents, storage vessels, transfer racks, equipment leaks, and wastewater treatment systems.
- Emissions averaging is allowed in the rule as a compliance option to give industry flexibility in meeting the emissions reduction limits.

- The rule affects an estimated 310 facilities and will reduce air toxics emissions by 510,000 tons per year, a 90 percent reduction from the preregulated levels emitted by these facilities. The rule will also reduce VOCs by about 1 million tons per year, an 80 percent reduction from the preregulated levels emitted by these facilities, and equivalent to taking approximately 38 million cars off the road.
- The May 12, 1998 rule added tetrahydrobenzaldehyde (THBA) to the list of Synthetic Organic Chemical Manufacturing Industry processes. THBA is used in the manufacture of paint additives.
- Acrolein (a possible human carcinogen) and 1,3-butadiene (a probable human carcinogen) are released during the THBA production process.
- Currently, only one facility in the nation manufactures THBA and would have to comply with this rule.

Final rule published September 8, 1994

- Industrial process cooling towers are used to remove heat from industrial processes. In the past, chromium was added to cooling tower waters to prevent equipment corrosion and control algae growth.
- Chromium (Chromium VI, the most toxic form, is known to cause lung cancer) is ultimately released from the cooling towers into the air. Most individual industrial process cooling towers do not qualify as major sources of air toxics; however, almost all cooling towers are part of large production facilities (e.g., petroleum refineries, chemical manufacturing plants, and primary metal producers) that do qualify.
- EPA's rule prohibits the use of chromium-based water treatment chemicals and suggests that facilities substitute phosphate-based chemicals.
- The rule affects an estimated 800 cooling towers at about 400 major sources nationwide and will reduce chromium emissions by 25 tons per year, a 100 percent reduction from the preregulated levels emitted by these facilities.

Final rule published December 2, 1994

- Halogenated solvent cleaning machines (also known as degreasers) are used to clean oil and residues in the manufacturing and assembly of metal parts. Halogenated solvent cleaning is not a distinct industry, but it is an integral part of many industries, such as the aerospace and motor vehicle manufacturing industries. There are three basic types of solvent cleaning equipment:
  - Batch vapor cleaners, which heat the solvent to create a solvent vapor zone within which the parts are cleaned.
  - In-line cleaners, which are enclosed devices distinguished by a conveyor system used to supply a continuous stream of parts for cleaning. In-line cleaners include continuous web cleaning machines, which can clean parts such as film, coils, wire, and metal strips.
  - Batch cold cleaners, which use liquid solvent to remove soils from part surfaces.
- The rule applies to cleaning machines that use methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chloroform, or any combination of these solvents in a total concentration that is greater than 5 percent by weight.
- EPA's rule combines equipment and work practice standards that emphasize pollution prevention. As an alternative to complying with the equipment standards option, facilities using batch vapor or in-line cleaning machines may demonstrate that each solvent cleaning machine emits less than an overall solvent emissions limit.
- The rule affects an estimated 9,000 facilities that use solvent cleaning machines and will reduce air toxics emissions at these facilities by 85,300 tons per year and VOC emissions by 81,700 tons per year.

Final rule published December 6, 1994

- A number of industries (including medical equipment suppliers; pharmaceutical companies; cosmetics manufacturers; spice manufacturers; libraries, museums, and archives; and contact sterilizers) use ethylene oxide as a sterilant for heat- or moisture-sensitive materials or as a fumigant to control microorganisms or insects.
- Ethylene oxide (a probable human carcinogen that also can cause adverse reproductive and developmental effects) is released during these operations.
- EPA's rule sets ethylene oxide emissions limits for sterilization chamber vents, chamber exhaust vents, and aeration rooms.
- The rule affects an estimated 114 sources and will reduce ethylene oxide emissions by about 1,000 tons per year, a 94 percent reduction from the preregulated levels emitted by these sources.

Final rule published December 14, 1994

- The gasoline distribution standard regulates bulk terminals and pipeline breakout stations, which transfer and store gasoline as it goes from petroleum refineries to service stations and gasoline bulk plants.
- Approximately 10 toxic air pollutants, including benzene and toluene, are present in gasoline vapor. These pollutants are released from gasoline distribution facilities during tank truck and rail car loading operations, gasoline storage, and equipment leaks.
- EPA's rule requires the use of pollution prevention methods (such as improving seals on storage tanks and inspecting equipment for leaks) and the use of controls (such as vapor processors to collect and treat gas vapors displaced during cargo tank loading operations).

- The rule affects an estimated 240 gasoline bulk terminals and 20 pipeline breakout stations. It will reduce air toxics emissions from these facilities by 2,300 tons per year and VOC emissions by over 38,000 tons per year. In addition, the collection and/or prevention of gasoline evaporation under the final rule is expected to result in energy savings of an estimated 10 million gallons of gasoline per year.

Final rule published December 15, 1994

- Magnetic tape manufacturers make products such as audio and video cassettes and computer diskettes.
- Toxic air pollutants are released when solvent mixtures are used during coating and equipment cleaning operations. In addition, particulate air toxics may be released when magnetic particles are transferred to the coating mixture.
- EPA's rule requires 95 percent control for most types of emission points, including the coating operations. For some of these emission points, EPA has developed alternative emissions standards, such as one that allows facilities the flexibility to commit to more stringent control of their coating operations in lieu of controlling certain storage tanks.
- The rule affects an estimated 14 of the 25 facilities that manufacture magnetic tape. It will reduce emissions of air toxics, most of which are VOCs, by 2,300 tons per year.

Final rule published January 25, 1995

- Chromium electroplating and anodizing operations coat metal parts and tools with a thin layer of chromium to protect them from corrosion and wear. Examples of electroplated parts include appliances, automotive parts, and large cylinders used in construction equipment and printing presses. Anodized parts include miscellaneous aircraft components such as wings and landing gears.
- Hexavalent chromium (known to cause lung cancer) is released during the electroplating and anodizing processes.
- EPA's rule sets specific emissions limits for new and existing chromium electroplating and anodizing operations that fall into specific size categories. The rule requires facilities to meet emissions limits through the use of pollution prevention practices and controls.
- The rule affects an estimated 1,500 hard chromium electroplating facilities, 2,800 decorative chromium electroplating facilities, and 700 chromium anodizing facilities. It will reduce chromium emissions by 173 tons per year, a 99 percent reduction from the preregulated levels emitted by these facilities.

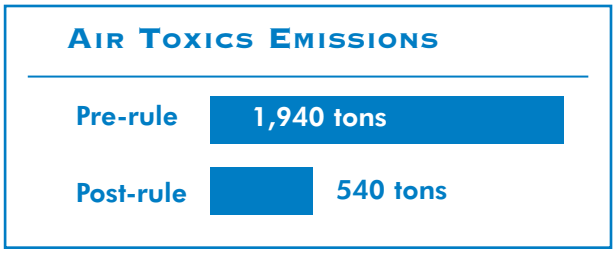
Basic Liquid Epoxy Resins and Non-Nylon Polyamide Resins Manufacture

Final rule published March 8, 1995

- Basic liquid epoxy resins are used in the production of glues, adhesives, plastic parts, and surface coatings. Non-nylon polyamide or wet strength resins are used to improve the strength of paper.
- Epichlorohydrin (strongly suspected of causing cancer and known to cause respiratory problems) is released during the resin manufacturing process.
- EPA's rule is based on an epichlorohydrin emissions limit, which provides facilities with the flexibility to meet the regulation's requirements with a variety of compliance options. The rule also requires facilities to implement leak detection and repair programs.
- The rule affects all three basic liquid epoxy resins manufacturing facilities and all nine non-nylon polyamide manufacturing facilities. It will reduce epichlorohydrin emissions by 110 tons per year.

Final rule published June 23, 1995

- Secondary lead smelters produce lead from scrap and provide the primary means for recycling lead-acid automotive batteries. The basic operations performed at these facilities include battery breaking, smelting, refining and alloying.
- Secondary lead smelter facilities emit a number of toxic air pollutants, including 1,3-butadiene (a known human carcinogen) and lead compounds.
- EPA's rule requires facilities to reduce emissions from a number of sources, including smelting furnaces, kettles, dryers, and fugitive sources such as material handling.
- The rule affects all 23 secondary lead smelters in the United States. It will reduce emissions of air toxics from these facilities by 1,400 tons per year, a 72 percent reduction from the preregulated levels emitted by these facilities. In addition, the rule is expected to reduce emissions of particulate matter (which can cause serious respiratory problems) from these facilities by 150 tons per year, and carbon monoxide (which can cause adverse health effects, including fatigue, nausea, and respiratory problems) by 88,000 tons per year.

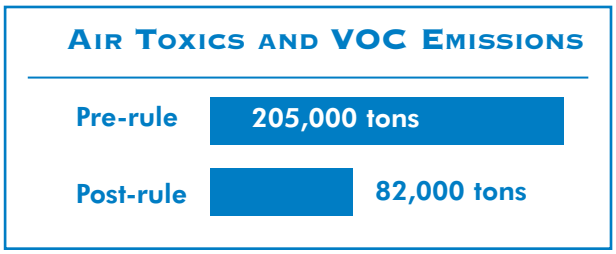


Final rule published August 18, 1995

- Petroleum refineries process crude oil to produce automotive gasoline, diesel fuel, lubricants, and other petroleum-based products.
- Toxic air pollutants, including benzene (a known human carcinogen) and toluene (known to affect the central nervous system and cause developmental problems), are released from storage tanks, equipment leaks, process vents, and wastewater collection and treatment systems at these facilities.
- EPA's rule requires facilities to control emissions from these sources. The rule allows emissions averaging within the petroleum refining facility, and provides additional flexibility by permitting the use of emissions averaging among emission points at petroleum refineries, marine terminal loading operations, and gasoline distribution facilities located at the same site.
- The rule affects all petroleum refineries in the United States and will reduce emissions of 11 air toxics by 53,000 tons per year, a 59 percent reduction from the pre-regulated levels emitted by these facilities. In addition, the rule is expected to reduce VOC emissions by over 277,000 tons per year, a 60 percent reduction from preregulated levels emitted by these facilities.

Final rule published September 1, 1995

- Aerospace manufacturing and rework facilities produce and/or repair aerospace vehicles and vehicle parts, such as airplanes, helicopters, space vehicles, and missiles.
- Toxic air pollutants such as methylene chloride (a probable human carcinogen) and chromium (Chromium VI, the most toxic form, is known to cause lung cancer) are released from these facilities during paint stripping, cleaning, priming, top-coat application, and chemical milling maskant operations.
- EPA's rule requires facilities to eliminate most emissions of toxic air pollutants (particularly methylene chloride) from paint stripping operations and to implement controls that will reduce emissions of air toxics resulting from other operations. In addition, many reductions will be achieved through housekeeping actions. The final rule provides a variety of options for meeting these requirements.
- The rule provides industry the flexibility to meet the required reductions in the most cost-effective way, which should yield cost savings for industry sources. For example, the rule contains a market-based emissions averaging provision, which allows facilities to overcontrol some emission points while undercontrolling others.
- The rule affects an estimated 2,800 aerospace manufacturing facilities and will reduce emissions of air toxics and VOCs by 123,000 tons per year, a 60 percent reduction from the preregulated levels emitted by these facilities.

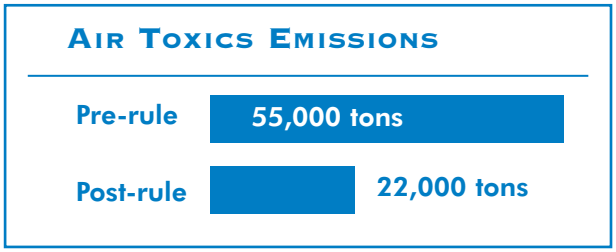


Final rule published September 19, 1995

- Marine tank vessels are used to transport crude oil, gasoline, and toxic chemicals among refineries, bulk terminals, chemical plants, and pipeline terminals.
- These vessels release toxic air pollutants (including benzene, toluene, hexane, xylene, and ethyl benzene) into the air during loading and unloading operations.
- EPA's rule sets limits for both air toxic pollutants and VOCs. It requires large marine loading terminals (i.e., terminals that load either 200 million barrels per year of crude oil, or 10 million barrels per year of gasoline) to reduce emissions of VOCs by at least 95 percent. It also requires all other major sources to reduce air toxic emissions by 97 percent.
- The rule affects an estimated 30 marine tank vessel loading facilities. It will reduce VOC emissions from these facilities by approximately 43,000 tons per year, of which 4,500 tons are air toxics.

Final rule published December 7, 1995

- The wood furniture manufacturing industry includes cabinet shops and facilities that make residential and industrial furniture.
- Toxic air pollutants, including toluene, xylene, methanol, and formaldehyde, are released from these facilities during finishing, gluing, and cleaning operations. These air toxics can cause eye, nose, throat, and skin irritation; damage to the heart, liver, and kidneys; and reproductive effects.
- EPA's rule limits the amount of hazardous air pollutants that can be contained in the coatings used for finishing, gluing, and cleaning operations (substitutes are available that contain lower quantities of hazardous air pollutants). In addition, the rule contains work practice standards such as keeping containers closed, training workers, and periodically inspecting equipment to locate and repair leaks.
- The rule affects an estimated 750 wood furniture manufacturing facilities and will reduce air toxics emissions by 33,000 tons per year (a 60 percent reduction from preregulated levels) and VOC emissions by an additional 8,400 tons per year.



Final rule published December 15, 1995

- The shipbuilding and repair industry includes shipyards that construct and/or repair commercial or military vessels, such as barges and tankers.
- Toxic air pollutants such as xylene and toluene are released during painting and associated cleaning operations.
- EPA's rule, which is based on pollution prevention measures, requires that containers of paint and cleansers be kept closed, and that facilities use low-VOC coatings for painting and coating operations and handle solvent and paint wastes in a manner that minimizes spills and evaporation. The rule does not apply to major source facilities that use less than 1,000 liters (approximately 264 gallons) of marine coatings per year, or to boatyards that only build or repair recreational vessels (marine or freshwater) less than 20 meters (about 66 feet) long.
- The rule affects an estimated 35 shipbuilding and repair facilities and will reduce emissions of air toxics from these facilities by 350 tons per year, a 24 percent reduction from the preregulated levels emitted by these facilities.

Final rule published May 30, 1996

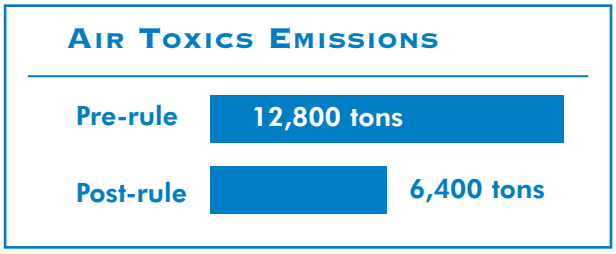
- EPA's rule covers two distinct segments of the printing and publishing industry:
  - Publication rotogravure printers, which produce paper products such as catalogues, magazines, newspaper inserts, and telephone directories.
  - Package-product rotogravure and wide-web flexographic facilities that print on paper, plastic film, metal foil, and vinyl for use in products such as flexible packaging, labels, and gift wrap.
- Toxic air pollutants (including toluene, xylene, methanol, and hexane) are released from the ink systems used by both types of printers.
- For publication rotogravure facilities, EPA's rule limits air toxics emissions to 8 percent of the total amount used (for example, facilities that use only hazardous-air-pollutant-based solvents would be required to recover 92 percent of the air toxics). For package-product rotogravure and wide-web flexographic facilities, the rule requires 95 percent overall control of all organic hazardous air pollutant emissions from their presses.
- EPA's rule incorporates flexible compliance options into its emissions control requirements. Facilities may use pollution prevention methods (which allow printers to eliminate the use of toxic chemicals or to substitute nontoxic chemicals for toxic ones), traditional emissions capture and control equipment, or a combination of the two.
- The rule affects an estimated 27 publication rotogravure facilities and 100 package-product rotogravure and wide-web flexographic facilities. It will reduce air toxics emissions from publication rotogravure printers by about 5,500 tons per year, and those from package-product rotogravure and wide-web flexographic printers by about 2,100 tons per year.

Final rule published July 1, 1996

- Off-site waste facilities include hazardous waste treatment, storage, and disposal facilities; industrial wastewater treatment facilities; solvent recycling facilities; and used-oil recovery facilities that manage hazardous air pollutant-containing materials generated at other facilities.
- A number of toxic air pollutants (including chloroform, toluene, formaldehyde, and xylene) are released from tanks, process vents, equipment leaks, containers, surface impoundments, and transfer systems at these facilities.
- EPA's rule combines equipment, operations, and work practice standards. For example, the rule requires that containers be covered and that process vents meet 95 percent organic emission controls.
- The rule affects an estimated 250 off-site waste operation facilities. It will reduce air toxics emissions by 43,000 tons per year and VOC emissions by 52,000 tons per year.

Final rule published September 5, 1996

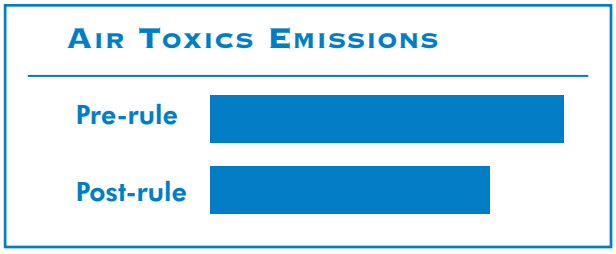
- Elastomers are used in the production of many synthetic rubber products, including tires, hoses, footwear, adhesives, wire insulation, floor tiles, and latexes.
- A number of toxic air pollutants (such as styrene, hexane, and toluene) are released during the initial stages of the elastomer manufacturing process.
- EPA's rule encourages the use of pollution prevention techniques to reduce the amount of air toxics released during elastomer production. The rule sets emissions limits for several specific emission points—storage tanks, process vents, equipment leaks, and wastewater systems. It also contains a market-based emissions averaging provision that allows facilities to overcontrol some emissions points while undercontrolling others, thus achieving the required reductions in the most cost-effective manner possible.
- The rule affects 36 facilities nationwide and will reduce air toxics emissions by approximately 6,400 tons annually, a 50 percent reduction from current levels.



Polyethylene Terephthalate Polymer and Styrene-Based Thermoplastic Polymers Production

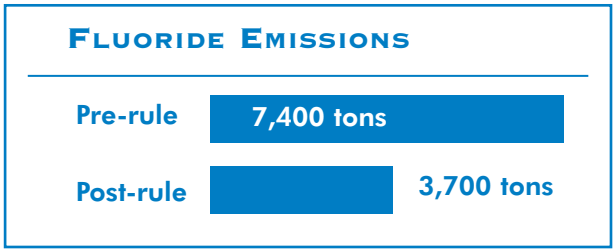
Final rule published September 12, 1996

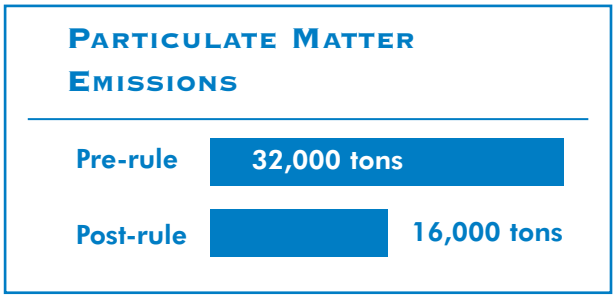
- Polyethylene terephthalate polymers and styrene-based thermoplastics are used in the manufacture of such products as polyester fibers, soft drink bottles, plastic automotive parts, packing materials, and plastic toys.
- A number of toxic pollutants (including styrene, butadiene, and methanol) are released into the air during polymer production.
- To reduce the amount of air toxics released from polymer production facilities, EPA's rule sets emissions limits for several emissions points: storage vessels, process vents, equipment leaks, and wastewater operations. The rule also limits releases from process contact cooling towers at some existing and new facilities.
- EPA developed the rule in partnership with industry representatives and other major stakeholders. The Agency estimates that new facilities will experience annual cost savings of about $5 million under the rule, due to pollution prevention measures.
- The rule affects 66 facilities nationwide and will reduce emissions by approximately 3,880 tons annually, a 20 percent reduction from current levels.

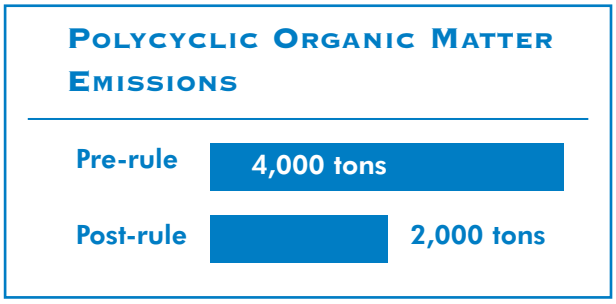


Final rule published October 7, 1997

- Primary aluminum reduction plants produce molten aluminum metal (virgin aluminum) from alumina ore. Typically, primary aluminum plants are components of larger facilities that prepare a variety of finished products. These larger facilities also typically include secondary aluminum plant operations, which use aluminum metal to make products such as cans, aircraft and automotive products, and construction materials. Standards for secondary aluminum production are covered under a separate rule, summarized on page 30.
- Air toxics released during the production of molten aluminum metal include hydrogen fluoride (which can cause serious respiratory damage) and polycyclic organic matter (which is strongly suspected of causing cancer and other serious health effects).
- Developed in partnership with state regulators, industry stakeholders, and tribal governments, EPA's final rule contains an emissions averaging provision that allows facilities to overcontrol some emissions points while undercontrolling others, thus achieving the required reductions in the most cost-effective manner possible. As a further cost-saving incentive, facilities that consistently perform below the levels set in the standard will be allowed to reduce the frequency of sampling or emissions testing.
- To achieve the required reductions, the final rule relies on a combination of pollution prevention measures, including work practices, equipment modifications, operating practices, housekeeping measures, and in-process recycling.
- The rule affects 24 facilities nationwide. It will reduce fluoride emissions by about 3,700 tons per year, polycyclic organic matter emissions by about 2,000 tons per year, and particulate matter emissions by 16,000 tons per year. These emission levels represent a reduction of approximately 50 percent from preregulated levels.





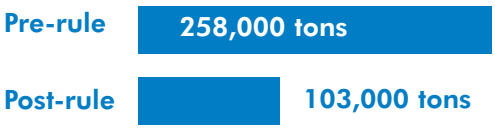


Two final rules published April 15, 1998

- Wood and non-wood fiber sources such as cotton, linen, and straw are turned into pulp either though cooking via chemicals (known as digestion), mechanical grinding, or a combination of both. Following digestion or grinding, the resulting fibrous mass is washed, screened, and (depending on the final product) sometimes bleached.
- A number of toxic air pollutants (including chloroform, chlorine, formaldehyde, methanol, acetaldehyde, methyl ethyl ketone, and metals) are released during cooking, washing, bleaching, and chemical recovery processes at these facilities.

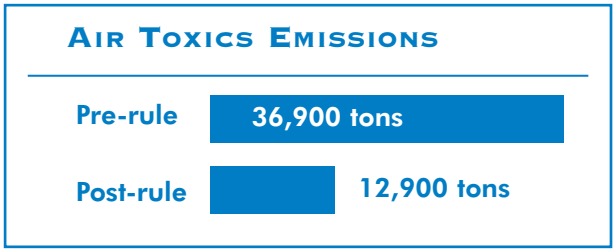
- EPA's air toxics rules are part of an integrated, multimedia regulation designed to control pollutant releases to the water and air. The integrated rules allow the pulp and paper industry to consider all regulatory requirements at one time in order to select the most effective pollution prevention and control technologies.
- EPA has issued two final air toxics standards for the pulp and paper industry that cover emissions from pulping and bleaching processes at mills that chemically pulp wood, and certain bleaching processes at non-wood, mechanical, and secondary fiber mills. These standards do not require controls on paper machines at any mills and on pulping operations at non-wood, mechanical, and secondary fiber mills.
- The final rules will affect approximately 155 mills and will reduce air toxics emissions by 155,000 tons per year, a 60 percent reduction from current levels. The rules will also reduce VOC emissions by 450,000 tons per year and total sulfur emissions by 86,000 tons per year.

Air Toxics Emissions (Final Rules)



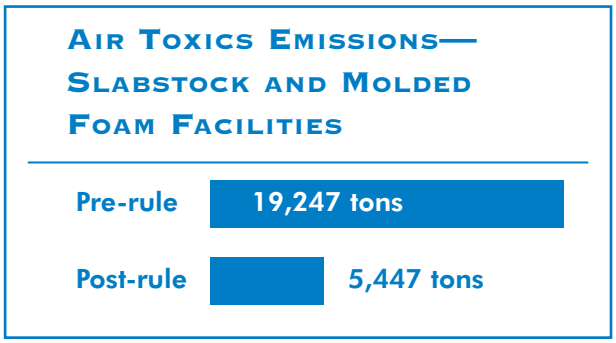
Final rule published September 21, 1998

- Pharmaceutical production includes operations such as chemical synthesis, formulation, and natural extraction, used to produce drugs and medications.
- The production of pharmaceuticals results in the release of a number of air toxics, including methylene chloride, methanol, toluene, and hydrogen chloride.
- This rule, developed in partnership with representatives from industry and states, provides a variety of compliance options. Facility operators may choose to meet either emission limits or control efficiency requirements for storage tanks and process vents. Operators may elect to comply with the pollution prevention alternative in lieu of the standards for process vents, storage tanks, equipment leaks, and wastewater where the operator has reduced the hazardous air pollutant usage for a product process.
- Approximately 100 pharmaceutical production facilities nationwide will be affected by this rule. When fully implemented, the rule will reduce air toxics emissions by 24,000 tons annually, a 65 percent reduction from current levels.



Final rule published October 7, 1998

- This rulemaking affects only flexible polyurethane foam that is manufactured at slabstock, molded, and rebond polyurethane production facilities. These segments of the industry manufacture cushions, bedding materials, and other speciality products.
- The production of flexible polyurethane foam results in the release of air toxics, primarily methylene chloride, which is a probable human carcinogen that can adversely affect the central nervous system.
- This rule is based on pollution prevention techniques and flexible requirements. A variety of compliance options are available to facility operators. As a result of the rule, the use of methylene chloride at molded foam production facilities will be eliminated.
- Approximately 78 slabstock, 98 molded, and 21 rebond foam facilities nationwide will be affected by this rule. When fully implemented, the rule will reduce air toxics emissions by 11,500 tons annually at slabstock foam facilities (a 68 percent reduction from current levels), and by 2,300 tons annually at molded foam facilities (a 98 percent reduction from current levels). All rebond foam facilities are believed to be in compliance with this rule; therefore, no further reductions are expected.



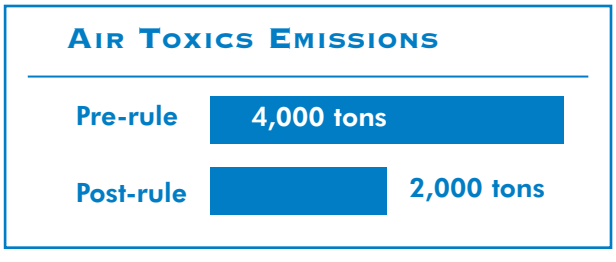
Ferroalloys Production: Ferromanganese and Silicomanganese

Final rule published May 20, 1999

- A ferroalloy is a mixture of iron and one or more other elements, such as chromium, manganese, or silicon. Ferroalloys are primarily used in the manufacturing of steel and cast iron products with enhanced or special properties.
- The production of ferroalloys results in the release of a number of metallic air toxics, including manganese. The variety and quantity of pollutants emitted are related to the amount of metals present in the raw materials. Manganese can adversely affect human health. For example, chronic exposure to high levels of manganese primarily affects the central nervous system.
- This final rule sets limits for particulate emissions from one ferromanganese and silicomanganese production plant. Particulate matter is used as a surrogate for the air toxic manganese emitted from this facility. Particulate control devices are known to remove metallic pollutants with essentially the same efficiency as they remove particulates.
- The facility already has control equipment in place to comply with EPA's rule. This equipment reduces air toxics emissions by 99 percent from uncontrolled levels. The rule is not expected to bring about additional reductions, but will ensure continued use and good operation of existing control equipment.

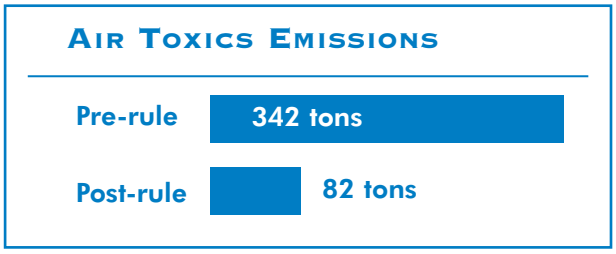
Final rule published June 1, 1999

- Polyether polyols are used as an ingredient in lubricants, adhesives, cosmetics, soaps, and polymers for urethane production.
- A number of air toxics are released during the production of polyether polyols. These include ethylene oxide, propylene oxide, toluene, and hexane, all of which can cause cancer or other adverse health effects.
- EPA's rule establishes emission limits and control efficiency requirements for storage tanks, process vents, equipment leaks, and wastewater treatment systems. For several of the emission units, industry can choose from a number of compliance approaches.
- Of the 80 facilities affected by this rule, roughly half have already installed emission control devices. When fully implemented, the rule will reduce air toxic emissions by approximately 2,000 tons annually, a reduction of 50 percent from current levels.



Final rule published June 1, 1999

- Mineral wool is made by melting natural rock, blast furnace slag, and other materials in a furnace known as a cupola, and then forming the molten material into a fiber. Depending on the final product, an oil or a phenol/formaldehyde-based binder is applied. Fiber to which oil has been applied is then sized and bagged or baled. Fiber to which a phenol/formaldehyde-based binder has been applied is thermoset in a curing oven and cooled.
- Mineral wool is used as an industrial and structural insulator. It is also added to other products to provide structural strength, sound absorbency, or fire protection.
- Production of mineral wool can lead to releases of a variety of air toxics, including arsenic (a known human carcinogen) and beryllium, cadmium, lead, and formaldehyde (probable human carcinogens).
- EPA's rule requires facilities to reduce air toxics emissions from existing and new cupolas, using particulate matter as a surrogate for the metallic toxics (e.g., arsenic, beryllium, cadmium, lead). Additionally, facilities must reduce emissions of carbonyl sulfide from new cupolas, using carbon monoxide as a surrogate for carbonyl sulfide. The rule also requires reduction of phenol and formaldehyde emissions from curing ovens.
- The rule allows flexibility by offering a choice of compliance options (emission limits or percent reduction standards). The rule's use of surrogate pollutants will also help reduce monitoring and emission testing costs.
- The rule will affect 15 mineral wool production facilities nationwide. When fully implemented, it will reduce air toxics and particulate matter emissions from cupolas, and formaldehyde and phenol emissions from curing ovens, by 260 tons annually, a reduction of 76 percent.



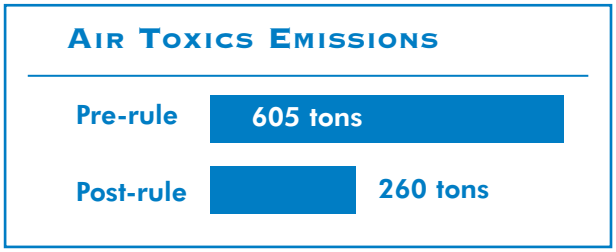
Final rule published June 4, 1999

- Primary lead smelters process lead ore to produce lead metal. The majority of this lead is then used to manufacture lead-acid batteries.
- A variety of air toxics are released during primary lead smelting operations. These include lead, arsenic, antimony, and cadmium.
- EPA's rule will control emissions by setting plant-wide lead emission limits. These limits are based on pre-existing limits established by the states in which affected facilities are located. The rule gives owners and operators the flexibility to determine how and to what extent each source is controlled to achieve the required emission limits. The rule also details several work practice requirements for the control of fugitive dust, and the operation and maintenance of air pollution control equipment.
- Three manufacturing facilities will be affected by this rule. The emissions limits are based on pre-existing state emissions limits. As such, no direct emissions reduction can be estimated based solely on the emissions limits. EPA expects that as a result of following the fugitive dust work practice and monitoring requirements, facilities will achieve air toxics emission reductions by improving equipment performance and reducing the potential for fugitive dust emissions.

Phosphoric Acid Manufacturing and Phosphate Fertilizer Production

Two final rules published June 10, 1999

- Phosphoric acid is used in the production of phosphate-based fertilizers, which are used for farming and other agricultural purposes.
- A variety of air toxics can be released to the atmosphere during the production of phosphoric acid and phosphate fertilizers.
- EPA's rules require facilities to reduce emissions of air toxics from the following emissions points: wet process phosphoric acid plants, superphosphoric acid plants, purified phosphoric acid plants, phosphate rock dryers, phosphate rock calciners, mono- and di-ammonium phosphate fertilizer plants, and granular triple superphosphate fertilizer plants and storage buildings. The rules are structured to limit emissions across process lines that include several different emissions points. The rules establish a single limit for each process line, allowing facilities the flexibility to operate and control each line in the most efficient manner while still achieving specific emission reductions.
- The rules affect an estimated 21 facilities. The rules will reduce emissions of toxic air pollutants (primarily hydrogen fluoride) by approximately 345 tons per year, a 57 percent reduction from current levels. They will also reduce emissions of total fluorides by 1,035 tons per year, and will yield small reductions in emissions of heavy metals. Total fluorides are known to damage vegetation and have other adverse effects on the environment.

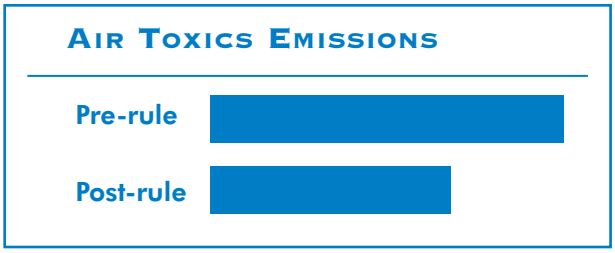


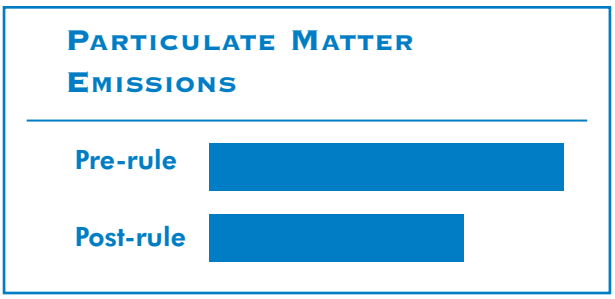
Final rule published June 14, 1999

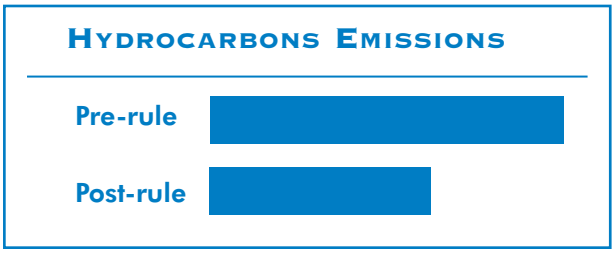
- Wool fiberglass is a constituent of a variety of insulation products, including building and pipe insulation. It is produced from sand, feldspar, sodium sulfate, anhydrous borax, boric acid, and other materials.
- A variety of air toxics are released to the atmosphere during the production of wool fiberglass. These include arsenic (a known human carcinogen), and lead and formaldehyde (probable human carcinogens).
- EPA's rule applies to the following types of facilities: glass manufacturing furnaces, rotary spin manufacturing lines producing building insulation, flame attenuation (FA) manufacturing lines producing pipe products, and FA manufacturing lines producing heavy-density insulation products. The rule also contains new emission test methods for measuring formaldehyde.
- The rule provides owners and operators flexibility in meeting the emission limits by encouraging process modifications and pollution prevention techniques, instead of more costly add-on controls.
- Of the 27 facilities currently manufacturing wool fiberglass nationwide, 21 will be affected by this rule. The rule will reduce emissions of formaldehyde by 580 tons annually, a reduction of 30 percent. The rule will also reduce particulate matter emissions by 840 tons per year and emissions of toxic metals (including arsenic, chromium, and lead) by 20 pounds per year—a reduction of 30 percent from current levels.

Final rule published June 14, 1999

- Portland cement is manufactured by grinding and heating a mixture of raw materials (e.g., limestone, clay, iron ore) in a rotary kiln. The kiln is fired by a variety of fuels, including coal, oil, gas, coke, and/or various waste materials. After firing, the product (called clinker) is cooled and then mixed with gypsum to produce portland cement.
- A number of harmful air pollutants, including air toxics, particulate matter, and hydrocarbons, are released during portland cement manufacturing. Most of these result from fuel combustion in the kiln and from heating and handling of raw materials. The health impacts of these pollutants include an increased risk of respiratory and cardiovascular diseases and cancer.
- This rule sets emission limits for kilns, clinker coolers, and materials handling facilities, and includes new emission measurement methods. In complying with this rule, facility owners and operators have the flexibility to determine how emission limits will be met.
- Approximately 110 portland cement manufacturing facilities nationwide will be regulated under this rule. The rule will reduce air toxics emissions by approximately 90 tons per year (a 31 percent reduction), particulate matter emissions by 4,200 tons annually (a 17 percent reduction), and hydrocarbons emissions by 220 tons annually (a 38 percent reduction).







Oil and Natural Gas Production and Natural Gas Transmission and Storage

Two final rules published June 17, 1999

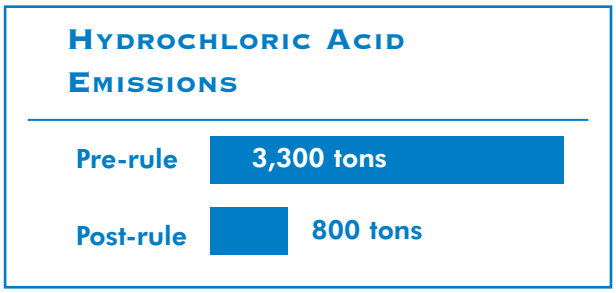
- Emissions of air toxics from oil and natural gas production and natural gas transmission and storage occur during separation, upgrade, transport, and storage of crude oil, condensate, natural gas, and related products. Emissions also occur as a result of vapor leaks from pumps, compressors, valves, flanges, and other equipment.
- The affected facilities can release a variety of air toxics, including benzene (a known human carcinogen) and other volatile organic compounds (VOCs) suspected to cause cancer or other serious health effects such as birth defects or reproductive effects. VOCs also contribute to the formation of ground-level ozone, the primary constituent of smog. In addition, the affected facilities can release methane, a potent greenhouse gas.
- EPA's rules require controls for the following emission points at oil and natural gas production facilities: process vents at some glycol dehydration units, tanks with flashing emission potential, and some fugitive emission sources. Natural gas transmission and storage facilities will be required to control emissions from process vents at some glycol dehydration units.
- In an effort to increase flexibility, EPA is encouraging facility owners and operators to use pollution prevention techniques to reduce emissions from process vents at glycol dehydration systems—the largest single air pollutant emission point at oil and natural gas production facilities.
- The oil and natural gas production rule will affect approximately 440 facilities nationwide. It will reduce air toxics emissions by an estimated 31,000 tons annually (a 43 percent reduction), VOC emissions by 67,000 tons annually (a 45 percent reduction), and methane emissions by 7,700 tons annually (a 33 percent reduction).
- The natural gas transmission and storage rule will affect approximately seven facilities nationwide. It will reduce air toxics emissions by an estimated 430 tons annually (an 18 percent reduction), VOC emissions by 610 tons annually (a 19 percent reduction), and methane emissions by 250 tons annually (a 19 percent reduction).

Air Toxics Emissions—Oil and Natural Gas Production

Air Toxics Emissions—Natural Gas Transmission and Storage

Final rule published June 22, 1999

- Steel pickling is a process in which an acid solution is used to remove the oxide scale that forms on steel as it cools from a molten state.
- Hydrochloric acid and chlorine can be released to the atmosphere during the steel pickling process. Hydrochloric acid is emitted from processing tanks used in continuous and batch pickling lines, from acid regeneration plants, and from storage tanks containing virgin or regenerated acid. Chlorine is emitted from acid regeneration plants.
- Chronic exposure to hydrochloric acid can cause inflammation of the stomach, respiratory system, and skin, as well as sensitivity to sunlight. Acute exposure to high levels of chlorine can result in vomiting, chest pain, lung problems, and even death. At lower levels, chlorine is a potent irritant to the eyes, the upper respiratory tract, and the lungs.
- EPA's rule establishes limits for hydrochloric acid emissions from pickling lines, acid regeneration plants, and acid storage tanks. It also establishes limits for chlorine emissions from acid regeneration plants. The rule offers flexibility to facility operators by providing cost-effective options for both emissions control and monitoring.
- This rule will affect approximately 62 steel pickling plants and 8 acid regeneration plants. When fully implemented, the rule will reduce hydrochloric acid emissions by approximately 2,500 tons per year (a 76 percent reduction from current levels) and chlorine emissions by 8.2 tons per year (a 30 percent reduction from current levels). The controls required by this rule will also reduce particulate matter emissions.



Final rule published June 23, 1999

- Pesticide active ingredients (PAIs) are used in the manufacture of insecticide, herbicide, and fungicide products. These products are typically used in the agricultural industry for treating insects, rodents, weeds, and other pests.
- A variety of air toxics, including toluene, methanol, and hydrochloric acid, can be released to the atmosphere during production of PAIs.
- EPA's rule affects the following points in the PAI production process: process vents, storage vessels, wastewater and associated treatment residuals, heat exchange systems, and certain types of equipment. The rule allows facilities the flexibility to meet emissions limits for process vents by using either an add-on control device or a pollution-prevention alternative.
- Currently, there are approximately 78 PAI production facilities that will be affected by this rule. When fully implemented, the rule will reduce emissions of air toxics by approximately 2,755 tons per year, a 65 percent reduction from current levels.

Generic Rule
for Acetal Resin Production, Acrylic and Modacrylic Fiber Production, Hydrogen Fluoride Production, and Polycarbonate Production

Four final rules published June 29, 1999

- These rules set technology-based emission limits for several categories that have five or fewer facilities nationwide.
- The facilities regulated by these rules manufacture a variety of components, including thermoplastics used in industrial applications and commercial articles; synthetic fibers used in the textile, sporting goods, and aviation industries; polycarbonates used in electrical components and automotive parts; and fluoride compounds.
- A variety of air toxics are sometimes released to the atmosphere during the manufacture of these products. These air toxics include formaldehyde, methanol, and the volatile organic compounds methylene chloride, ethyl chloride, and phosgene.
- EPA's rules will control emissions for all of the categories at similar phases of the manufacturing process. These phases include storage tanks, process vents, equipment leaks, and wastewater.
- The rules will ensure that the nine affected facilities maintain or develop emission controls.

Final rule published October 26, 1999

- Publicly owned treatment works (POTW) treat wastewater received from residential, commercial, and industrial sources. POTW can release air toxics in the form of volatile organic compounds in wastewater.
- The primary air toxics emitted by POTW include xylenes, methylene chloride, toluene, ethyl benzene, chloroform, tetrachloroethylene, benzene, and naphthalene. Each of these air toxics can cause adverse health effects provided sufficient exposure. For example, exposure to methylene chloride (a probable human carcinogen) can adversely affect the central nervous system, while benzene is known to cause cancer in humans.
- EPA's rule will reduce air toxics emissions from new or reconstructed POTW that are major sources of air emissions. EPA is not requiring additional controls on existing POTW.
- Some POTW treat wastewater from industrial sources whose waste streams are already regulated by industrial air toxics rules. By treating their regulated waste streams at a POTW, these industrial sources are able to comply with these other air toxics rules. Under the new POTW rule, plants that treat regulated waste streams from industrial sources are classified as *industrial POTW*. All other treatment plants are classified as *non-industrial POTW*.
- Under EPA's rule, new or reconstructed non-industrial POTW will need to either include air pollution controls on certain wastewater treatment units or demonstrate through pollution prevention techniques an equivalent reduction in emissions. New or reconstructed industrial POTW must comply with the non-industrial standards, or with all other air toxics regulations applicable to the industrial sources whose wastewater they are treating, whichever is more stringent.
- EPA estimates that 20 to 30 non-industrial POTW would need to control air toxics emissions if they elected to reconstruct their existing facilities or build a new facility. EPA estimates that fewer than five POTW currently meet the definition of industrial POTW. The rule is not expected to require additional reductions from these sources.

Final rule published January 20, 2000

- Amino/phenolic resins are primarily used in the manufacture of plywood, particle board, adhesives, wood furniture, and plastic parts.
- A number of toxic air pollutants, including formaldehyde (a probable human carcinogen), phenol, methanol, xylene, and toluene, are released during the resin manufacturing process.
- EPA's rule establishes emission limits or control efficiency requirements for several emission points: reactor batch process vents, non-reactor batch process vents, continuous process vents, storage tanks, equipment leaks, and heat exchange systems. The rule encourages the use of pollution prevention measures and provides flexibility by allowing the use of a variety of control strategies rather than specific control devices.
- The rule affects new and existing amino/phenolic resin manufacturing facilities. EPA has identified 100 existing facilities that may be affected. The rule will reduce air toxics emissions by approximately 360 tons per year, a 51 percent reduction from 1992 levels.

Final rule published March 23, 2000

- Secondary aluminum plants recover aluminum from beverage cans, foundry returns, and other aluminum scrap. These facilities release air toxics during both preprocessing operations (such as aluminum scrap shredding, drying, and decoating) and furnace operations (such as aluminum melting, refining, and alloying).
- Secondary aluminum plants emit a variety of toxic air pollutants. These air toxics may include up to 11 metals, organic compounds, and acid gases such as hydrogen chloride and chlorine. The health effects associated with exposure to these air toxics can include cancer, respiratory irritation, and damage to the nervous system.
- EPA's rule establishes emission standards for metals, dioxin/furans, organic hazardous air pollutants, and acid gases for larger secondary aluminum plants. The rule also establishes standards for dioxin/furan emissions from smaller secondary aluminum plants.
- Affected sources can achieve the emission reductions required by the rule through the use of pollution-control equipment and/or through a variety of pollution-prevention measures, including work practices and operating practices. The rule provides flexibility to the industry by offering alternative compliance and monitoring options. To reduce monitoring and emissions testing costs, the rule uses particulate matter as a surrogate for metals, total hydrocarbons as a surrogate for organics, and hydrogen chloride as a surrogate for total emissions of hydrogen chloride, chlorine, and hydrogen fluoride.
- The rule will affect 80 large secondary aluminum plants. Hundreds of smaller plants may be subject to limitations on emissions of dioxin/furans. The rule will reduce nationwide emissions of air toxics by about 12,420 tons per year, a reduction of nearly 70 percent from current levels. In particular, hydrogen chloride emissions will be reduced by about 12,370 tons per year or by 73 percent, and emissions of metals will be reduced by about 40 tons per year, a reduction of over 60 percent from current levels.

Summaries of Related Solid Waste Incineration Rules

EPA has also issued final rules to control emissions of certain air toxics from solid waste combustion facilities. These rules set emissions limits for new solid waste combustion facilities and provide emissions guidelines for existing solid waste combustion facilities under Section 129 of the Clean Air Act.

Final rule published December 19, 1995; amended August 25, 1997

- Municipal waste combustors include incinerators that burn waste and waste-to-energy plants that generate energy from garbage. EPA's final rule applies to all municipal waste combustion units with the capacity to burn more than 250 tons of garbage per day (known as large municipal waste combustion units; EPA has initiated development of rules for small municipal waste combustion units).
- Municipal waste combustors release a number of pollutants, including cadmium, lead, mercury, dioxin, sulfur dioxide, hydrogen chloride, nitrogen dioxide, and particulate matter. Dioxin and mercury are of particular concern because they are toxic, persist in the environment, and bioaccumulate.
- EPA's rule contains strict MACT-based standards for new incinerators and emissions limits for existing incinerators.
- The rule affects an estimated 164 municipal waste combustion units and will significantly reduce air toxics emissions (dioxins, lead, cadmium, and mercury). The rule will reduce dioxin emissions by 99 percent and mercury emissions by 90 percent, compared with 1990 emissions levels from these sources. Overall emissions of other air pollutants (including sulfur dioxide, particulate matter, nitrogen oxides, and hydrogen chloride) will be reduced by more than 90,000 tons per year.

Final rule published September 15, 1997

- Hospital, medical, and infectious waste is solid waste produced in the diagnosis, treatment, or immunization of humans or animals; it includes needles, gauzes, boxes, and packaging materials. Fewer than half of all hospitals and a small number of nursing homes, pharmaceutical research laboratories, and veterinary clinics use incinerators to dispose of their waste.
- A number of toxic air pollutants, including dioxins, mercury, lead, and cadmium, are released into the air during the incineration process.
- EPA's rule contains one set of emission requirements for new incinerators and another set for existing incinerators. The rule establishes emissions limits for nine pollutants (including dioxin, lead, cadmium, and mercury). It requires training of incinerator operators and establishes requirements for appropriate siting of new incinerators.
- The rule affects an estimated 2,400 existing incinerators and will reduce air toxics emissions (dioxins, lead, cadmium, and mercury) by more than 25 tons per year. Dioxins will be reduced by over 90 percent from the current levels emitted by these incinerators. The rule will also reduce other air pollutant emissions (particulate matter, carbon monoxide, and hydrogen chloride) by over 7,000 tons per year.