

Air Quality

GLOSSARY

Air toxic

An air pollutant that may be harmful to human health or the environment if it is present in sufficient concentration and/or for a sufficient time.

Ambient

Surrounding; encircling.

Attainment area

Regions where criteria pollutant concentrations do not exceed national ambient-air quality standards (limits).

Criteria pollutant

One of six pollutants for which there are federal air quality standards to protect public health and welfare.

Delegated authority

The federal delegation of responsibility to a state for the administration of federal air, water, hazardous waste, and other environmental laws; an example of devolution.

Emission reduction credit (ERC)

A unit of credit that a company earns if the amount of pollutants it is emitting is less than that permitted.

Ground-level ozone

A gas formed in the atmosphere near the earth's surface by a chemical reaction between volatile organic compounds and nitrogen oxides on hot, humid days; it is smog's primary component.

Natural Resources and Environmental Protection Act (NREPA)

Public Act 451 of 1994; codifies state environmental law.

Particulate matter

Solid particles or fine liquid droplets resulting from industrial processes; chemical composition depends on emission source.

BACKGROUND

Michigan industries and motor vehicles are significant sources of air pollution—they release millions of tons of pollutants into the atmosphere each year. Air contaminants impair public health; corrode buildings, bridges, statues, and painted surfaces; damage forests and crops; threaten wildlife; produce unpleasant odors; and reduce visibility. Pollutants dispersed via air deposition contribute significantly to contamination in the Great Lakes. Ninety percent of the total contamination in Lake Superior is believed to be from airborne pollutants. On a global level, emissions containing contaminants cause acid deposition (acid rain), stratospheric ozone depletion, and may be a factor in global warming.

Criteria Pollutants

The following are the six so-called *criteria pollutants*:

- *Ground-level ozone*, formed during reactions between nitrogen oxides and volatile organic compounds emitted by motor-vehicle exhaust, gasoline storage and transfer, paint solvents, and degreasing agents
- *Sulfur dioxide*, primarily from coal-burning power plants
- *Lead* from gasoline additives, nonferrous smelting plants, and battery manufacture
- *Carbon monoxide* from motor vehicles and other fuels being burned
- *Nitrogen oxide* from combustion processes, such as burning coal, oil, and gas
- *Particulate matter* from such activities as combustion, incineration, construction, mining, and metal processing and also from such other sources such as motor-vehicle exhaust, road dust, forest fires, and volcanic activity

The U.S. Environmental Protection Agency (EPA) has been regulating criteria pollutants through national ambient-air quality standards (NAAQS) since 1970, when the federal Clean Air Act was enacted. The act charges the states with implementing programs to control and reduce emissions of criteria pollutants from existing and new pollution sources. There are two types of air quality standards: primary and secondary.

- *Primary* standards protect human health, particularly individuals most susceptible to the effects of air pollution (children, the elderly, and those with chronic health problems).

- *Secondary* standards protect against economic damage and deleterious effects to buildings, plants, and animals.

Primary and secondary standards differ for each criteria pollutant. In regard to air pollution regulation, reference to a “standard” may be assumed to refer to the primary standard, which is the more strict; if the primary standard is met, it may be assumed that the secondary standard is also.

Periodically, the quality of a region’s air is measured at several locations within the region, to determine its attainment/nonattainment status for each of the six criteria pollutants. *Attainment* areas are regions where a pollutant’s concentration is below the maximum established by the NAAQS; *nonattainment* areas are regions where the concentration is higher than the maximum. In the latter, industrial and emission-control standards are more stringent than in attainment areas.

In Michigan, pollutant data are collected by monitors operated by the Michigan Department of Environmental Quality (MDEQ). Air quality levels must not exceed standards over various averaging times. Short averaging times (e.g., one hour) are used to measure acute, or short-term, toxic effects. Longer averaging times (e.g., one year) are used to gauge chronic effects.

The Detroit–Ann Arbor and Grand Rapids regions recently attained the air quality standard for ozone after years of nonattainment. In addition, a small industrial Wayne County region along the Detroit River recently was pronounced in attainment for particulate matter emissions 10 microns or less in diameter (referred to as PM_{10} and of concern because at this size they easily penetrate lung tissue). However, ozone still occurs in six Michigan counties at levels unacceptable to the EPA. Muskegon County is designated as a moderate nonattainment area for ozone, and Allegan, Genesee, Saginaw, Midland, and Bay counties also are in nonattainment. The balance of the state is in attainment for all six criteria pollutants.

In 1996 the EPA proposed a revision to the ozone and particulate national ambient-air quality standards; if adopted, additional industrial and automobile-emission controls will be required. The proposed revision will (1) reduce the ozone standard from 0.12 parts per million (ppm), as measured over one hour, to 0.08 ppm averaged over eight hours; and (2) limit annual emission of fine particulate matter measuring 2.5 microns in size ($PM_{2.5}$) to 15 micrograms per cubic meter. Existing MDEQ monitoring information suggests that the new ozone standard will result in nonattainment in ten counties in southeast Michigan, four in the Grand Rapids area, certain counties in the Kalamazoo and Battle Creek areas, and counties in the Lansing area. The new particulate-matter emission limit is expected to affect only Wayne County.

Air Toxics

Air toxics are a class of pollutants known to cause or suspected of causing cancer or other serious health effects, such as reproductive problems or birth defects. Unlike criteria pollutants, air toxics are measured at their *emission point*, not in the ambient air. Before the Clean Air Act was amended in 1990, the EPA had established national emission standards for eight hazardous air pollutants: arsenic, asbestos, benzene, beryllium, mercury, radio nuclides, radon-22, and vinyl chloride. The Clean Air Act amendments require that 189 substances be controlled with equipment that meets technology-based standards for reducing emission of these compounds.

To comply with the amendments, Michigan enacted enabling legislation and promulgated air-toxic rules and requirements that are administered by the MDEQ.

Michigan Regulatory Framework

The 1990 federal act, which significantly changed the way in which air pollutants are regulated, has five major sections (Titles I–V) and has been called the most complicated legislation ever authorized. In sum, the act

- toughens penalties imposed on states that fail to bring nonattainment areas into compliance;

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- regulates 189 prevalent toxic compounds emitted from major sources;
- initiates programs to greatly reduce the sources of pollutants contributing to acid rain;
- initiates programs to reduce release of stratospheric ozone-depleting chlorofluorocarbons (commonly called CFCs) into the atmosphere; and
- requires all major air-pollution generators to obtain renewable operating permits and, to control emissions, adopt maximum achievable control technology (referred to as MACT standards).

Michigan's enabling legislation amended the state's Air Pollution and Motor Fuels Quality acts and created four new statutes that (1) provide the basis for the MDEQ permit program; (2) authorize fees mandated by Title V of the federal legislation; (3) create a program to assist small businesses in their efforts to comply with requirements; and (4) increase the state's authority to enforce the new laws. In 1996 the air pollution and control laws were codified into P.A. 451, the Natural Resources and Environment Protection Act (NREPA), of 1994.

Various NREPA sections authorize the state's air-pollution permit program for stationary sources (facilities) emitting air pollutants, including toxics, and established the following three major permit categories:

- Permit to install
- Nonrenewable permit to operate
- Renewable permit to operate

Under this law's authority, the legislature also adopted a fee system to cover the cost of developing and administering the program; two types of fees are charged, one on facilities and one on emissions. The facility charge is a \$200–2,500 flat fee based on the extent of the applicant's capacity to pollute; e.g., dry cleaners and gasoline stations are assessed at the low end of the fee range, and large manufacturing facilities at the high end. The emission charge is \$25 per ton of pollutant, up to 4,000 tons annually of all pollutants emitted (thus, the maximum fee imposed is \$100,000); if fewer than 4,000 tons are emitted in total, the fee

cap is set at 1,000 tons per pollutant). Municipal electric utilities are assessed a single \$10,000 fee.

Although the federal government has responsibility for regulating 189 specific hazardous air pollutants, it may delegate this responsibility to the states, and Michigan has received such "delegated authority" (this is an example of devolution). Michigan rules 230–32 are the "air toxic rules" and set out the state's role in this regard. Michigan law does not list specific air contaminants as toxic; instead, it defines as toxic—and thus subject to state regulation—"any air contaminant for which there is no national ambient-air quality standard and is or may become harmful to public health or the environment when present in the outdoor atmosphere in sufficient quantity and duration." Forty substances are exempt from the Michigan definition, among them inert gases, nuisance particulates, and substances having relatively low toxicity. Michigan's air-toxic regulation rests on two basic requirements: (1) Each new emission source must utilize the best available control technology for toxics (referred to as T-BACT), and (2) emissions of the toxic air contaminant cannot result in a maximum ambient concentration that exceeds the health-based screening level defined for each substance.

DISCUSSION

The proposed new federal ozone and particulate matter air standards are being met in Michigan with considerable criticism by the regulated community, the governor, and state administrators. The manufacturing and industry sectors claim that the air quality laws already are too complicated and expensive. Moreover, these sectors are concerned that Michigan's air quality is greatly affected by air pollutants being carried from the Chicago area, which is in serious nonattainment for ozone and other criteria pollutants. In letters to Congress and the EPA, Governor Engler and other governors claim that the additional regulatory burdens will outweigh any additional benefit to human health.

Although the full implications of the new standards are not yet known, critics suggest that nationwide the ozone standard alone will cost \$11–60 billion annually. The

Michigan Chamber of Commerce has stated that the new rules will cost the state's electric utilities alone an estimated \$1 billion in new emission-control equipment plus tens of millions in annual operating expenses. The new standards' supporters, such as the American Lung Association and certain environmental groups, point to research showing that for sensitive populations (e.g., asthmatics), tighter standards that improve air quality could prevent at least 20,000 deaths and 60,000 cases of chronic bronchitis and other serious health effects each year. Such debate is part of the broader national discussion on the cost and benefit of all regulation and whether regulations and policies involving human health should be put to a cost/benefit test.

New Air Quality Programs

In 1996 the state launched a new air-emissions trading program to help businesses comply with air quality regulations. The program is designed to create market-based incentives that will encourage companies to reduce emissions and also stimulate innovative emission-reduction technology. Under the program, companies earn emission reduction credits (ERCs) when their emitted pollutants are below the level allowed by their permit or by law. An ERC represents one ton of total emissions reduced and may be sold to another company. A company also may "bank" its ERCs against a time that it emits more pollutants than allowed. Of all ERCs earned, 10 percent are permanently retired—that is, they may not be sold or banked; this means there is a permanent air reduction in emissions.

The Michigan program still is evolving and has not been approved by the EPA. The plan is eventually to allow ERCs to be earned and traded for all volatile organic compounds (VOC) and all criteria pollutants except ozone. Environmental groups, including the Michigan Environmental Council, criticize the program because it will allow the various VOCs to be exchanged one-to-one, despite some having higher toxicity than others.

Other recent initiatives to help reduce air emissions include the OzoneAction! program, also sponsored

by the MDEQ. OzoneAction! alerts urban-area residents when weather conditions are right to escalate ground-level ozone, typically on hot, humid days in July and August. On such days the MDEQ advises the media and meteorologists in the affected areas—typically, the metropolitan Detroit and Grand Rapids areas—that the ozone level is predicted to rise throughout the day. The alert is announced on radio and television and in newspapers, and the public is advised as to how to reduce the problem: e.g., limit refueling vehicles and equipment and avoid unnecessary automobile trips, burning charcoal lighter fluid, and using gasoline-powered lawn mowers. The OzoneAction! program is very popular in the Detroit area, and most major media participate. Such voluntary environmental education programs are popular with regulators and the public alike, because they call attention to air quality, reduce pollution, and give everyone the opportunity chance to have some small effect on environmental quality.

See also Environmental Audits; Environmental Quality Indicators; Great Lakes Concerns.

FOR ADDITIONAL INFORMATION

Air Quality Division
Michigan Department of Environmental Quality
106 West Allegan Street, 4th floor
P.O. Box 30260
Lansing, MI 48909-7760
(517) 373-7023
(517) 335-6993 FAX
www.deq.state.mi.us/aqd

American Cancer Society
1205 East Saginaw Street
Lansing, MI 48906
(517) 371-2920
(517) 371-2605 FAX
www.gl.cancer.org

American Lung Association of Michigan
18860 West Ten Mile Road
Southfield, MI 48075-2689
(248) 559-5100
(248) 559-7434 FAX
www.lungusa.org

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Director of Environmental and Regulatory Affairs
Michigan Chamber of Commerce
600 South Walnut Street
Lansing, MI 48933
(517) 371-2100
(517) 371-7224 FAX
www.michamber.com

Michigan Environmental Council
119 Pere Marquette Street
Lansing, MI 48912
(517) 487-9539
(517) 487-9541 FAX

Natural Resources Defense Council
40 West 20th Street
New York, NY 10011
(212) 727-2700
(212) 727-1773 FAX
www.nrdc.org
[See “Danger in the Air,” www.nrdc.org/find/aibresum.html and “Breath-taking,” www.nrdc.org/nrdcpro/bt/tableGu.html]

Science and Technology Division
Legislative Service Bureau
124 West Allegan Street, 4th Floor
Lansing, MI 48909
(517) 373-0170
www.michiganlegislature.org