SIX COMMON POLLUTANTS

To protect public health and the environment, EPA has established, and regularly reviews, national air quality standards for six common air pollutants also known as "criteria" pollutants: ground-level ozone, particle pollution ($PM_{2.5}$ and PM_{10}), lead, nitrogen dioxide (NO_2), carbon monoxide (CO), and sulfur dioxide (SO_2).

TRENDS IN NATIONAL AIR QUALITY CONCENTRATIONS

Monitors across the country measure air quality. Monitored levels of the six common pollutants show improvement since the Clean Air Act was amended in 1990. Figure 4 shows national trends between 1990 and 2008 in the common pollutants relative to their air quality standards. Most pollutants show a steady decline throughout the time period. Lead declined in the 1990s because all lead was removed from automotive gasoline and stationary source control programs were implemented to lower concentrations in areas above the national standard (year-to-year fluctuations in lead concentrations are influenced by emissions changes due to operating schedules or other industrial facility activities, such as plant closings, on measurements at nearby monitors). The trend for lead shown in Figure 4 is relative to the decision announced by EPA on October 15, 2008, to strengthen the standard to 0.15 μg/m^3 (maximum three-month average) from 1.5 μg/m^3 (maximum quarterly average). Ozone and $PM_{2.5}$ trends are shown relative to standards that were revised in 2008 and 2006, respectively. These trends are not smooth and show year-to-year influences of weather conditions that contribute to the formation, dispersion, and removal of these pollutants from the air. Ozone was generally level in the 1990s and showed a notable decline after 2002, mostly due to oxides of nitrogen (NO_x) emissions reductions in the East.

Many areas still have air quality problems caused by one or more pollutants. Ozone and particle pollution continue to present air quality challenges throughout much of the U.S., with many individual monitors measuring concentrations above, or close to, national air quality standards.

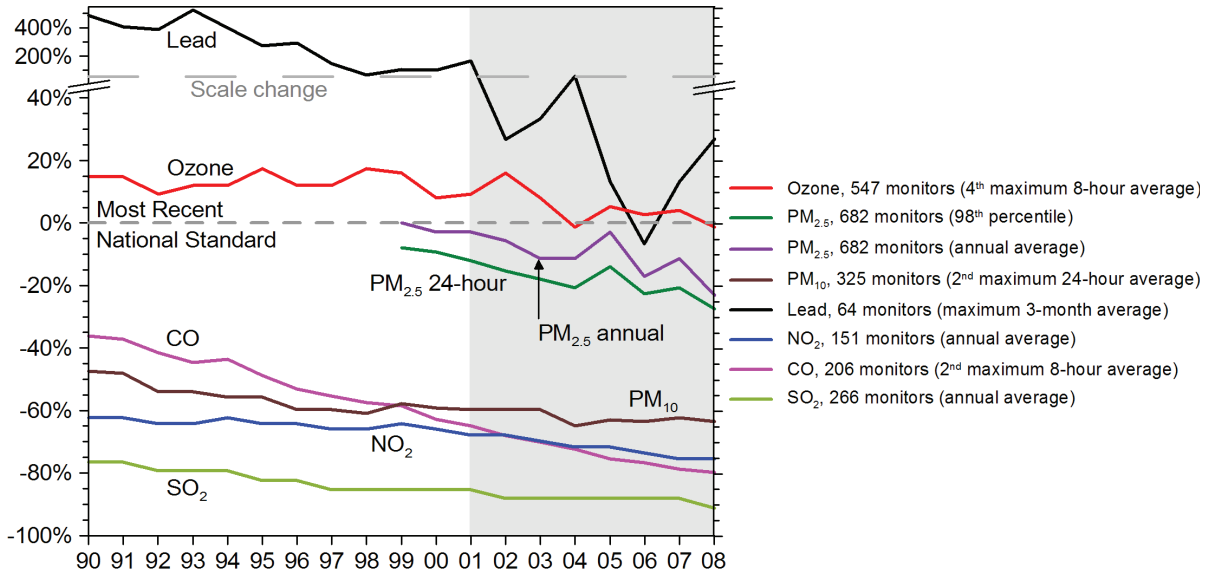


Figure 4. Comparison of national levels of the six common pollutants to the most recent national ambient air quality standards, 1990-2008. National levels are averages across all monitors with complete data for the time period.

Note: Air quality data for $PM_{2.5}$ start in 1999. Trends from 2001 though 2008 (using the larger number of monitors operating since 2001) are the focus of graphics in the following sections.

ENVIRONMENTAL JUSTICE

Integrating environmental justice into our programs and regulatory process is one of EPA's top priorities. We're working to ensure that people of all races, cultures, and incomes are treated fairly and benefit equally from EPA's actions to protect public health and the environment. The agency recognizes that improving environmental health at the local level will bring economic and social benefits to the entire community.

To get an accurate picture of local air quality and sources of emissions that are of major concern, some communities have performed local assessments. Understanding the risks at the local level enables communities to target problem areas and tailor emissions reduction strategies that will improve air quality. EPA has been working in partnership with the West Oakland Toxic Reduction Collaborative to identify and address sources of pollution that are harming public health. West Oakland, CA, is a low-income community of 25,000 people, approximately 90 percent of whom are people of color. West Oakland is impacted by emissions from traffic and the transport of goods and produce. The efforts of the Collaborative, EPA Region 9, and a host of community organizations have resulted in a commitment from the Port of Oakland to reduce risk from port-related diesel pollutants by 85 percent by 2020 and to support cleanup of the fleet of 2,000 heavy duty trucks serving the Port. Community partners include the local health department, labor unions, the West Oakland Commerce Association, environmental advocacy organizations, the University of San Francisco, elected officials, and many other organizations.

The Collaborative's accomplishments include setting up a "truck information center" to facilitate compliance by more than 2,000 truckers with new state truck standards. At least two industrial recyclers are working with the Collaborative's Land Use work group to relocate their operations out of residential areas into industrial areas in order to reduce toxics exposure while retaining businesses in the community. Dozens of households have been trained on indoor air quality and assessment and control by way of the Healthy Homes work group. The Health Impacts Assessment (HIA) work group piloted two applications on an HIA methodology; one at a senior center, which resulted in mitigation measures. The Alternative Fuels work group facilitated the piloting of a dozen applications of alternative fuels including biodiesel and compressed natural gas.

One of the resources used by the Collaborative is the Community Action for a Renewed Environment grant program, which offers communities an innovative way to address risks from multiple sources of toxic air pollutants. EPA offers other kinds of support to help inform and empower citizens to make local decisions concerning the health of their communities. For example, EPA maintains the Air Toxics Community Assessment and Risk Reduction Projects database to inform communities about past community-level air toxics assessments and lessons learned (http://www.epa.gov/ttn/atw/urban/mainwks.html). EPA has also engaged many communities in its Collision Repair Campaign (CRC), a voluntary program that reduces and eliminates harmful air toxics from collision repair and/or auto body shops across the nation. These sources affect many environmental justice communities. The CRC has trained over 750 people, representing close to 500 repair shops. EPA estimates that the CRC has reduced volatile organic compound emissions by 31 tons and particle emissions by 40 tons in 2008.

Through efforts like these, EPA can build on the progress we've made so far, accelerate environmental improvements, and ensure communities that are behind catch up – and continue to keep pace.

AIR QUALITY IN NONATTAINMENT AREAS

Under the Clean Air Act, EPA and state, local, and tribal air quality planning agencies work together to identify areas of the U.S. that do not meet the EPA's National Ambient Air Quality Standards (NAAQS). These areas, known as nonattainment areas, must develop plans to reduce air pollution. Each year, EPA tracks air quality progress in nonattainment areas by reviewing changes in measured concentrations with respect to the standards. Table 2 identifies the nonattainment areas throughout the U.S. and shows how many of these areas were above or below one or more of the standards as of 2008.

Over time, air quality has improved in nonattainment areas for all six common pollutants. All of the areas designated as nonattainment for CO, SO_2, and NO_2 showed air quality levels below their respective standards as of December 2008. Only two nonattainment areas were above the original standard for lead (1.5 μg/m^3)—Herculaneum and Dent Township, MO. For ozone, annual $PM_{2.5}$, and PM_{10}, a number of areas were still exceeding the standards: 31, 21, and 18 areas, respectively. Furthermore, 31 new areas were designated as nonattainment with the revised 24-hour $PM_{2.5}$ standard in October 2009. Figure 5 shows trends for average concentrations of particle pollution and ozone in those nonattainment areas. Although many areas were still above the standard in 2008, there have been improvements in the

Pollutant Standard	Year NAAQS Established	Number of Nonattainment Areas	Number of These Nonattainment Areas Still Above NAAQS Levels in 2008
Ozone (8-hour)	1997	113	31
Annual $PM_{2.5}$	1997	39	21
24-hour $PM_{2.5}$	2006	31	31
24-hour PM_{10}	1987	87	18
Lead (max quarterly)	1978	13	2
Annual NO_2	1985	1	0
CO (8-hour)	1985	43	0
Annual SO_2	1987	54	0

Table 2. Status of original nonattainment areas for one or more standards as of 2008.

Notes: Designations for the recently revised standard for lead (2008) are to be determined and therefore are not included in this table. Depending on the form of the standard, this table and the graphic below compare data from one, two, or three years with the level of the standard. For information about air quality standards, visit http://www.epa.gov/air/criteria.html. For information about air trends design values, visit http://www.epa.gov/air/airtrends/values.html.

The current status of all designated nonattainment areas can be found at the EPA Green Book website (http://www.epa.gov/oar/oaqps/greenbk/). Nonattainment area maps for 8-hour ozone (based on the 1997 ozone standard) and $PM_{2.5}$ (based on the 1997 $PM_{2.5}$ standard) can be generated from information on the GIS download area of the website (http://www.epa.gov/oar/oaqps/greenbk/gis_download.html).

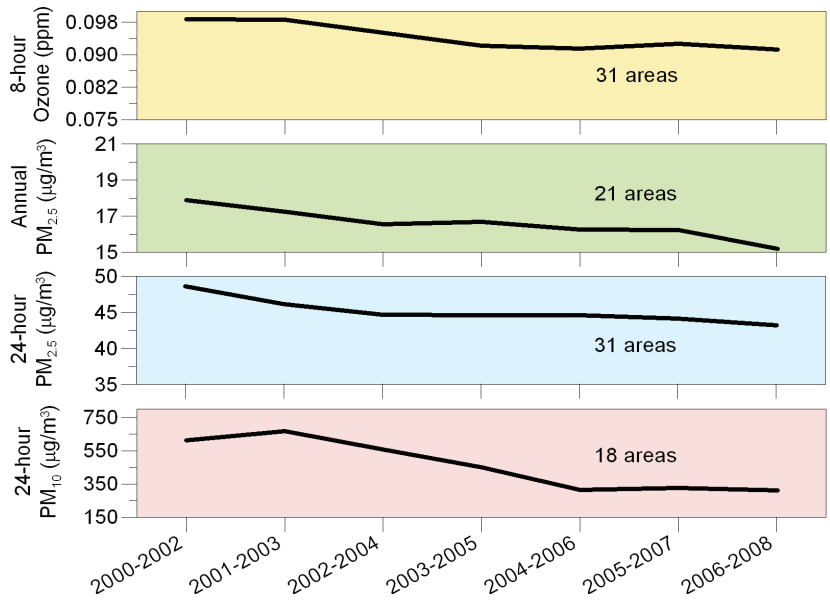
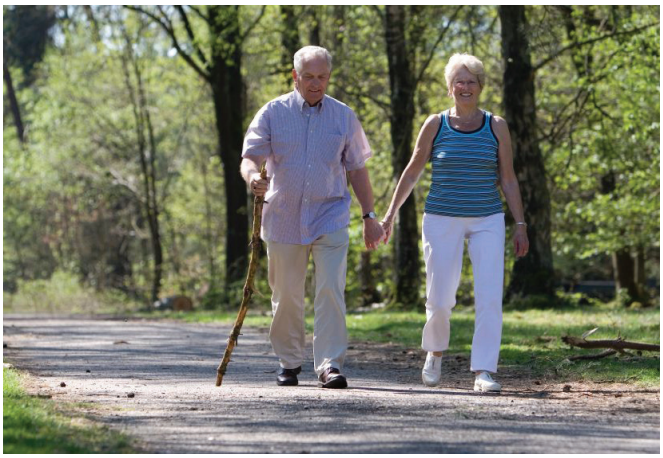


Figure 5. Air quality trends in nonattainment areas above the NAAQS in 2008.

concentration levels in the nonattainment areas. For example, between 2000 and 2008, ozone areas showed a 7 percent improvement, and annual $PM_{2.5}$ areas showed an 11 percent improvement.

Despite these improvements, many areas still have work to do. It is important to note that EPA periodically reviews the standards, and their scientific basis, and revises the standards as appropriate to protect public health and the environment. This means that although areas may be making progress in reducing air pollution, over time they may need to implement additional control measures to meet new air quality standards. In addition, some areas that met previous standards may now need to implement controls to meet new, more protective standards.



NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

The Clean Air Act requires EPA to set two types of NAAQS for the six common air pollutants:

1. Primary standards protect public health with an adequate margin of safety, including the health of at-risk populations such as asthmatics, children, and older adults.
2. Secondary standards protect public welfare from adverse effects, including visibility impairment and known or anticipated effects on the environment (e.g., vegetation, soils, water, and wildlife).

The Clean Air Act requires periodic review of the standards and the science upon which they are based. The standards as of October 2009 are shown below, along with the date the most recent review was completed.

Pollutant	Primary Standard(s)	Secondary Standard(s)	Date Last Review Completed
Ozone[1]	0.075 ppm (8-hour)	Same as primary	2008
$PM_{2.5}$	15 μg/m^3 (annual) 35 μg/m^3 (24-hour)	Same as primary	2006
PM_{10}	150 μg/m^3 (24-hour)	Same as primary	2006
Lead	0.15 μg/m^3 (3-month)	Same as primary	2008
NO_2	0.053 ppm (annual)	Same as primary	1996
CO	9 ppm (8-hour) 35 ppm (1-hour)	None; no evidence of adverse welfare effects at current ambient levels	1994
SO_2	0.03 ppm (annual) 0.14 ppm (24-hour)	0.5 ppm (3-hour)	1996

[1] On September 16, 2009, EPA announced that it is reconsidering the current levels of the ozone primary and secondary standards.

Units of measure are parts per million (ppm) or micrograms per cubic meter (μg/m^3) of air. For more information about the standards, visit http://www.epa.gov/air/criteria.html.

PROCESS FOR REVIEWING AIR QUALITY STANDARDS

Before new standards are established, EPA compiles and evaluates the latest scientific knowledge to assess the health and welfare effects associated with each pollutant. Based on this scientific assessment, EPA staff prepare risk and policy assessments regarding the potential need to revise the standards to ensure that they protect public health with an adequate margin of safety and that they protect the environment and public welfare from known or anticipated adverse effects. These assessments undergo rigorous review by the scientific community, industry, public interest groups, the general public, and an independent review board of external experts known as the Clean Air Scientific Advisory Committee (CASAC) before any decisions are made by the EPA Administrator.

The history of EPA's national ambient air quality standards for particulate matter provides an excellent example of how this iterative review process leads to changes to the standards over time. EPA first established air quality standards for particulate matter (PM) in 1971. These standards limited the amount of Total Suspended Particulate (TSP) in ambient air. They were not significantly revised until 1987, when EPA changed the standard to focus on inhalable particles smaller than, or equal to, 10 microns in diameter (PM_{10}). In 1997, EPA established new standards for fine particles smaller than 2.5 microns in diameter ($PM_{2.5}$). This decision was based on new evidence linking these smaller particles to serious health problems including premature death, aggravation of respiratory and cardiovascular disease, and increased respiratory symptoms. At that time, EPA also retained the standards for PM_{10} to ensure continued protection against the effects of exposure to coarse particles. In 2006, based on the latest scientific information, EPA revised the 24-hour standard for $PM_{2.5}$ while retaining the annual $PM_{2.5}$ standard set in 1997. Furthermore, EPA retained the 24-hour standard for PM_{10} but revoked the annual PM_{10} standard because available evidence no longer suggested a link between long-term exposures to ambient concentrations of coarse particles and adverse health effects.

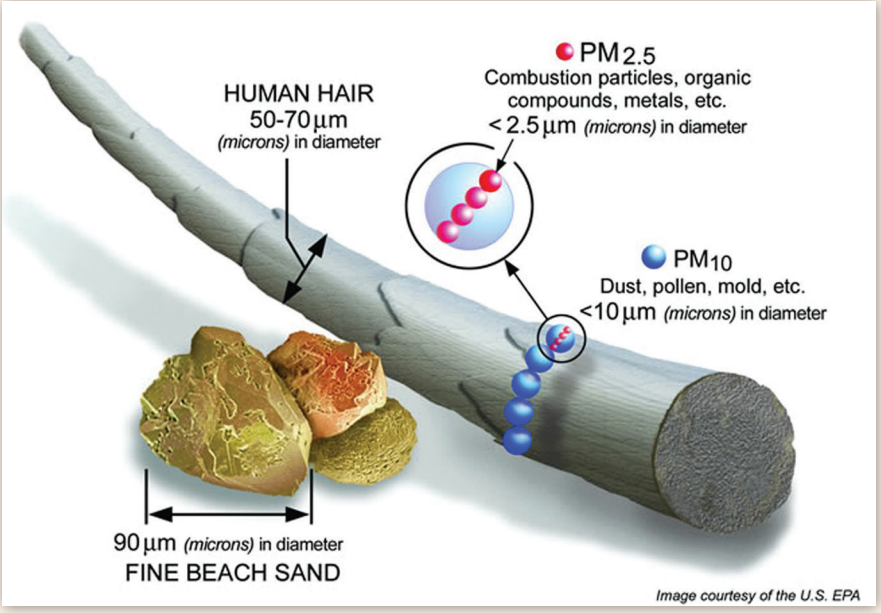


Image courtesy of the U.S. EPA

TRENDS IN "UNHEALTHY" AIR QUALITY DAYS

The Air Quality Index (AQI) relates daily air pollution concentrations for ozone, particle pollution, NO_2, CO, and SO_2 to health concerns for sensitive groups and for the general public. A value of 100 generally corresponds to the national air quality standard for each pollutant. Values below 100 are considered satisfactory. Values above 100 are considered unhealthy—first for certain sensitive groups of people, then for everyone as the AQI values increase.

Figure 6 shows the number of days on which the AQI was above 100 for selected metropolitan areas from 2001-2008. All areas experienced fewer unhealthy days in 2008 compared to 2001. However, Cleveland, Sacramento, San Diego, Dallas, and San Francisco experienced more unhealthy days in 2008 than in 2007. All of the increases in unhealthy days are due to ozone and/or particle pollution. Weather conditions, as well as emissions, contribute to ozone and particle pollution formation. Many areas in the Midwest and eastern U.S. experienced fewer unhealthy days in 2008 compared to 2007, mostly due to weather conditions less conducive to ozone formation in these areas in 2008.

EPA'S AIR QUALITY INDEX (AQI)

AIR QUALITY INDEX

Air Quality Index (AQI) Values	Levels of Health Concern
0 to 50	Good
51-100	Moderate
101-150	Unhealthy for Sensitive Groups
151-200	Unhealthy
201-300	Very Unhealthy
301 to 500	Hazardous

http://www.airnow.gov

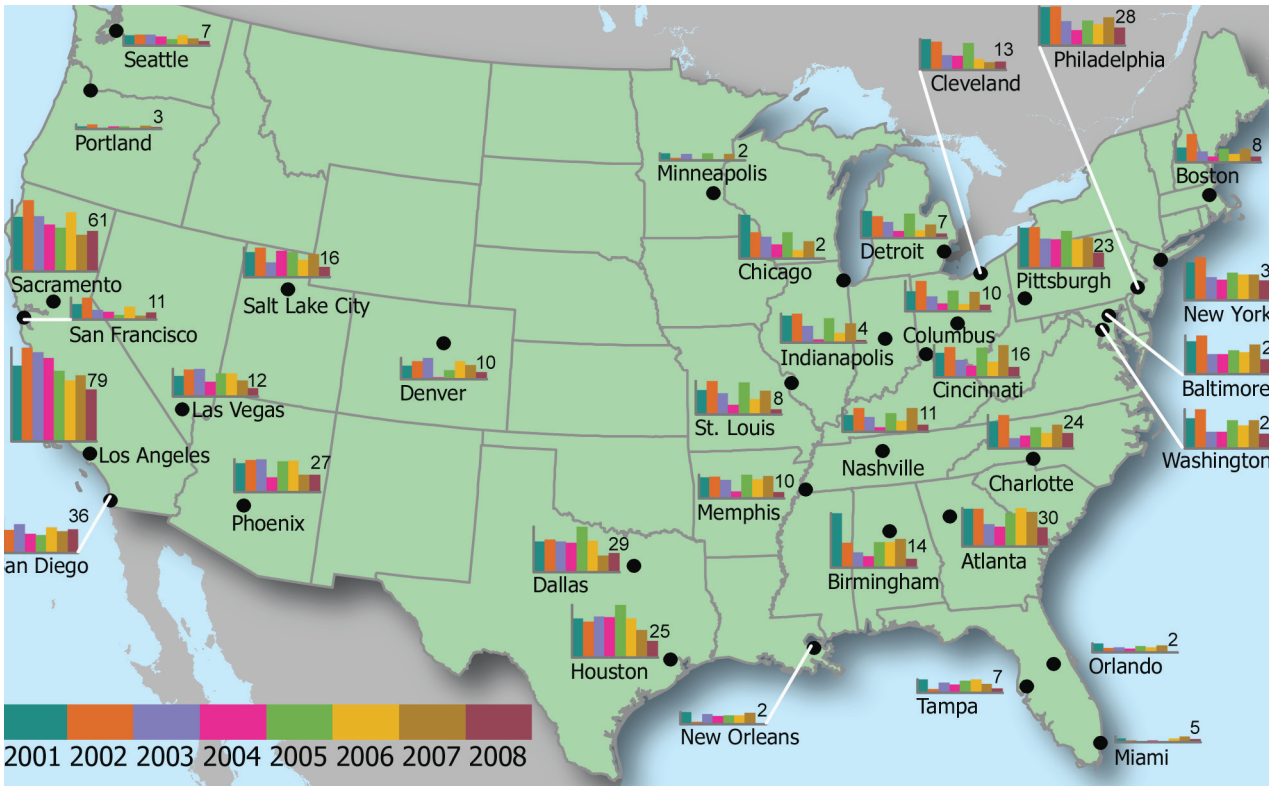


Figure 6. Number of days on which AQI values were greater than 100 during 2001-2008 in selected cities.