Danger in the Air

Unhealthy Levels of Air Pollution in 2003

CLEAR THE AIR

THE NATIONAL CAMPAIGN AGAINST DIRTY POWER

September 2004

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Unhealthy Levels of Air Pollution in 2003

U.S. PIRG
Education Fund

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Executive Summary

While air quality has improved in the last three decades, half of all Americans live in counties where air pollution exceeds national health standards.[*] Most of these places suffer from high levels of ozone and/or particle pollution. Ozone is the country's most pervasive air pollutant; particle pollution is the nation's deadliest air pollutant. Coal-fired power plants and motor vehicles are the largest sources of these pollutants. This report, which is based on a comprehensive survey of environmental agencies from all 50 states and the District of Columbia, examines levels of ozone and fine particle pollution in cities and towns across the country in 2003 and finds that air pollution continues to pose a grave health threat to Americans.

Ground-level ozone, the primary component of smog, is a severe respiratory irritant that can aggravate asthma and cause other respiratory problems, including permanent lung damage. Fine particle pollution, or "soot," can bypass the body's defenses and cause serious respiratory and cardiovascular problems, including heart attacks, lung cancer, and premature deaths.

Danger in the Air: Unhealthy Levels of Air Pollution in 2003 is a compilation of 2003 data from the nation's network of ozone and fine particle air quality monitors, based on our comprehensive survey of state environmental agencies. Key findings include the following:

- Ozone levels in 40 states and the District of Columbia exceeded the 8-hour national health standard 4,583 times and the 1-hour health standard 684 times on 187 days in 2003. The Riverside-San Bernardino-Ontario, California metropolitan area was the most ozone-polluted large city; Bakersfield, California was the most ozone-polluted mid-sized city; and Merced, California was the most ozone-polluted small city.

- Fine particle pollution exceeded the year-round national health standard in 20 states in 2003. Among large cities, the Riverside-San Bernardino-Ontario, California metropolitan area was most polluted by year-round particle pollution; Dayton, Ohio was most polluted by year-round particle pollution among mid-sized cities; and the Weirton-Steubenville, West Virginia-Ohio metropolitan area was most polluted by year-round particle pollution among small cities.

- Fine particle pollution exceeded the 24-hour national health standard 106 times on 39 days in 13 states in 2003. Of large cities, the Riverside-San Bernardino-Ontario metropolitan area was most polluted by spikes in particle pollution; of mid-sized cities, El Paso, Texas was most polluted by spikes in particle pollution; and of small cities, Missoula, Montana was most polluted by spikes in particle pollution.

This report also includes preliminary ozone data for 19 states and the District of Columbia for 2004, which, like 2003, has been a relatively mild and wet summer. Yet, through the beginning of September 2004, ozone levels have exceeded the 8-hour health standard 602 times and the 1-hour standard 84 times in these areas.

[*] U.S. Environmental Protection Agency, *National Air Quality and Emissions Trends Report: 2003 Special Studies Edition*, September 2003, 8.

Until policymakers require tough cleanup standards for power plant smokestacks, Americans will continue to suffer serious health problems from ozone and fine particle pollution. Instead of taking action to solve this problem, the Bush administration is helping powerful energy companies rewrite the rules, weakening existing protections and making Americans even more vulnerable to the health effects of harmful pollutants.

Given the extent of our air pollution problem, we need much stronger, not weaker, clean air protections. The Bush administration should:

- Substantially strengthen, accelerate, and finalize its proposal to cap smog- and soot-forming pollutants from power plants in the eastern U.S. to adequately protect public health and comply with the law.

- Designate all areas where people breathe unhealthy levels of fine particles as nonattainment areas and propose and finalize a strong rule to bring these areas into compliance with the health standards by the end of this decade, as required by the Clean Air Act.

State environmental agencies and other policymakers should:

- Continue to reject the Bush administration's "Clear Skies" plan, which would replace the Clean Air Act's power plant cleanup programs with far weaker programs.

- Adopt a comprehensive program to reduce emissions of smog- and soot-forming pollutants, as well as carbon dioxide and mercury, from power plants.

- Ensure that states continue to have the authority to set clean air standards that are more protective than federal standards.

Sources of Ozone and Fine Particle Pollution

Ozone

Ozone is an odorless, colorless gas. In the upper atmosphere, ozone forms naturally and shields the planet from ultraviolet radiation. At ground level, however, ozone causes serious health problems.

Ozone is not emitted directly from pollution sources but rather forms when nitrogen oxide (NOx) emissions and volatile organic compounds (VOCs) react with heat and sunlight. Ozone levels in the U.S. typically rise from May to October, when temperatures are generally higher, sunlight is more abundant, and atmospheric conditions can be stagnant.

The combustion of fossil fuels to generate electricity and power motor vehicles and other sources produces 95 percent of all NOx emissions (see Figure 1).[1] VOCs result from a wider range of sources, including motor vehicles, chemical plants, refineries, factories, and commercial and consumer products (see Figure 2).[2] Prevailing winds can carry ozone and the pollutants that form it for hundreds of miles. As a result, the highest ozone concentrations typically occur downwind of urban centers in suburban areas.[3]

Note that 1999 is the most recent year for which complete emissions data are available. While EPA estimates emissions data annually, the agency inventories sources only every three years. EPA has not yet released the 2002 inventoried data.

Figure 1. Emissions of Nitrogen Oxides by Source, 1999

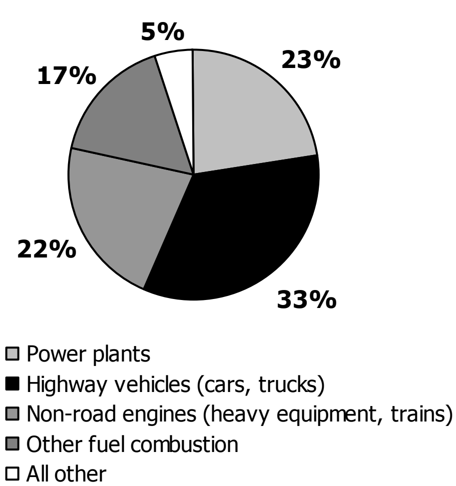
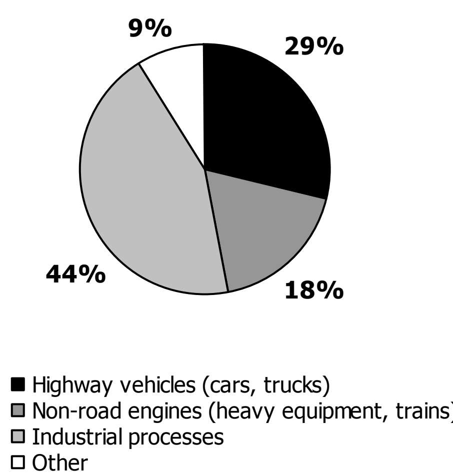


Figure 2. Emissions of Volatile Organic Compounds by Source, 1999



Fine Particle Pollution

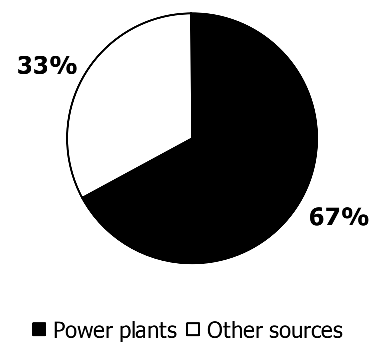
Solid particles and liquid droplets in the air are referred to as particle pollution. Some particles are large enough to be seen as dust or dirt; others are too small to be seen with the naked eye, though we see the haze that forms when particles obscure city skylines or scenic vistas in our national parks. The smallest particles are of most concern because they are so tiny that they can bypass the body's natural defenses and lodge deep in the lungs and even pass into the bloodstream.[4]

"Coarse" particles are between 2.5 and 10 microns in diameter; "fine" particles are less than or equal to 2.5 microns in diameter. For comparison, a single strand of human hair is about 75 microns in diameter.

Fine particles are a complex mixture generally composed of sulfate, nitrate, chloride, ammonium compounds, organic carbon, elemental carbon, and metals. Fine particles can remain in the atmosphere for days to weeks and travel through the atmosphere far from their source.

Mechanical processes such as construction and demolition, mining operations, agriculture, and coal and oil combustion form coarse particles. Fine particles generally are created through chemical processes in the atmosphere. Gases emitted from combustion sources, such as power plants and diesel engines, react with other gases and particles in the atmosphere to form complex toxic particles. The vast majority of fine particles are formed through the reaction of sulfur dioxide (SO_2), NOx, and VOCs with ammonium and other compounds in the atmosphere. Sulfates, which are formed from SO_2, are the dominant form of fine particles east of the Mississippi.[5] Power plants emit 67 percent of U.S. SO_2 emissions (see Figure 3).[6]

Figure 3. Sources of Sulfur Dioxide, 1999



Health Effects of Ozone and Fine Particles

Ozone

Exposure to even very low levels of ozone contributes to a wide range of adverse health effects.[7] Ozone is a powerful oxidant that burns our lungs and airways, causing them to become inflamed, reddened, and swollen. According to the American Lung Association, nearly half (47 percent) of all Americans live in places with unhealthy levels of ozone.[8] Children, senior citizens, and people with respiratory disease are particularly vulnerable to the health effects of ozone.

Following a lengthy scientific review process, in 1997 EPA tightened the national ambient air quality standard for ozone.[9] Based on extensive evidence of the risks posed by ozone at lower concentrations and over longer periods of exposure, EPA set the new standard at 0.08 parts per million (ppm) averaged over an eight-hour period. The new "8-hour standard" is more protective than the 1979 "1-hour standard" of 0.12 ppm averaged over one hour.

When EPA tightened the standard, the agency concluded that, when inhaled even at very low levels, ozone can cause chest pain and cough, aggravate asthma, reduce lung function, increase emergency room visits and hospital admissions for respiratory problems, and lead to irreversible lung damage.[10]

Since 1997, more than 1,700 additional studies on the health and environmental effects of ozone have been published in peer-reviewed journals.[11] These studies point to additional, even more serious health effects associated with exposure to ozone, particularly in the following areas:

Development of Asthma

Asthma is the most common chronic disease among children.[12] Between 1980 and 1996, the prevalence of asthma among children increased by an average of 4.3 percent per year.[13] A recent study of schoolchildren in Hartford, Connecticut found that 19 percent had asthma.[14] While it is well documented that ozone triggers asthma attacks, a recent study provides the first evidence that ozone may increase children's risk of developing asthma. A 2002 study of more than 3,500 children in 12 communities in Southern California found that children who played three or more sports in high ozone areas were three times more likely to be diagnosed with asthma for the first time compared with children who did not play sports. Sports had no effect in areas of low ozone concentration. In addition, the amount of time the children spent outside was associated with a higher incidence of asthma in areas of high ozone but not in areas of low ozone.[15]

Hospital Admissions of Young Children

EPA concluded in 1997 that 10 to 20 percent of all summertime respiratory-related hospital visits in the Northeast U.S. are associated with ozone pollution.[16] Research suggests that exposure to ozone increases the risk that children under two years of age are hospitalized for acute respiratory diseases.[17]

Birth Defects

A 2002 study by UCLA researchers found that women in four Southern California counties who were exposed to ozone in their second month of pregnancy had an increased risk of giving birth to babies with serious heart defects, including aortic artery and valve defects.[18]

Premature Mortality
Studies suggest that exposure to ozone is associated with increased mortality. Repeated ozone exposure, which causes an inflammatory response in the lungs, may cause elderly and other sensitive individuals to become more susceptible to the adverse health effects of particle pollution and in turn lead to premature death.[19]

While high ozone concentrations pose pervasive health risks and may be even more serious than previously believed, research demonstrates that declines in ozone levels can reduce these effects. For instance, during the 1996 Summer Olympics, officials closed downtown Atlanta to traffic and increased public transit, which reduced ozone levels and significantly lowered rates of acute care visits and hospitalizations for asthma among children.[20]

Fine Particle Pollution

Fine particles are so small that they can bypass the body's natural defenses and penetrate some of the most fragile parts of the lung, causing serious respiratory and cardiovascular problems. The American Heart Association recently concluded, "Although exposure to ambient air pollution poses smaller relative risks for incident cardiovascular disease than obesity or tobacco smoking, because it is ubiquitous, the absolute number of people affected is enormous, and exposure occurs over an entire lifetime."[21] According to the American Lung Association, one quarter of Americans live in areas with unhealthy levels of fine particle pollution.[22] A 2004 study by Abt Associates found that fine particles from U.S. power plants alone cause 554,000 asthma attacks, 38,200 non-fatal heart attacks, and 23,600 premature

California May Strengthen Its Ozone Standard

California is considering strengthening its air quality standard for ozone in response to mounting evidence that adverse health effects result from ozone levels at or near the current standard. California's Children's Environmental Health Act requires the state to ensure that all existing ambient air quality standards adequately protect infants, children, and other potentially susceptible groups. In June 2004, the staff of the California Air Resources Board and Office of Environmental Health Hazard Assessment recommended that the state adopt an 8-hour ozone standard of 0.070 ppm, not to be exceeded, which would be substantially more stringent than the federal standard. California's 1-hour ozone standard of 0.090 ppm, not to be exceeded, is already tighter than the federal 1-hour standard.

The proposed standard is based on an extensive review of the scientific literature on the health effects of exposure to ozone. The staff review found that for sensitive groups such as children, seniors, and people with respiratory diseases, exposure to ozone concentrations of 0.080 ppm over several hours leads to decreased lung function and signs of respiratory irritation such as coughing, wheezing, and painful breathing. Healthy adults moderately exerting themselves for several hours, such as working outside when ozone concentrations are at 0.080 ppm, experience similar health effects.

California is taking public comments on the staff report and is scheduled to finalize the new standard by the end of 2004.

Source: California Environmental Protection Agency, Air Resources Board and Office of Environmental Health and Hazard Assessment, "Review of the California Ambient Air Quality Standard for Ozone: Volume 1, Public Review Draft," 21 June 2004.

deaths, including 2,800 from lung cancer, every year.[23] Senior citizens, people with heart and lung diseases, and children are most vulnerable to particle pollution.

Although exposure to ambient air pollution poses smaller relative risks for incident cardiovascular disease than obesity or tobacco smoking, because it is ubiquitous, the absolute number of people affected is enormous, and exposure occurs over an entire lifetime.

- American Heart Association

After an extensive scientific review process, in 1997 EPA established the first national ambient air quality standards for fine particles. EPA concluded that exposure to fine particles is associated with premature death, increased hospital admissions and emergency room visits, increased respiratory symptoms and disease, and decreased lung function. Both short-term (few hours or days) and chronic exposure to particle pollution are associated with illness and death. In order to protect against both short- and long-term exposure, EPA set 24-hour and annual standards for fine particles of 65 micrograms per cubic meter ($\mu g/c^3$) and 15 $\mu g/c^3$, respectively.[24]

At the time, EPA estimated that meeting the fine particle standards would prevent, on an annual basis, at least 15,000 premature deaths, 75,000 cases of chronic bronchitis, 10,000 hospital admissions for respiratory and cardiovascular diseases, 20,000 cases of acute bronchitis, hundreds of thousands of occurrences of aggravated asthma, and 3.1 million days when people miss work because they are suffering from particle-related symptoms. With more recent studies linking fine particle exposure to premature death, infant mortality, and non-fatal heart attacks, EPA now says that the benefits of meeting the standard would be even greater.[25]

Since 1997, scientists have published more than 2,000 peer-reviewed studies on the adverse health effects of particle pollution, confirming previous studies on the relationship between particle pollution and illness and death and shedding light on why particle pollution is so damaging.[26] In particular, researchers now believe that most deaths attributable to particle pollution result from cardiopulmonary rather than respiratory disease. Two landmark studies highlight these recent developments as follows:

Lung Cancer Deaths

In the largest study to date on the long-term health effects of air pollution, a 2002 study found that long-term exposure to fine particle pollution increases the risk of dying from lung cancer and heart disease. Over many years, the danger is comparable to the health risks associated with long-term exposure to second-hand smoke. The study is a follow up to the landmark 1995 American Cancer Society study, which helped to establish the link between long-term particle exposure and premature death. The new study expands the previous work by analyzing data from 500,000 adults who were followed from 1982 to 1998 and lived in all 50 states. Cause of death was linked to air pollution levels for cities nationwide, while controlling for factors such as smoking status and diet. The researchers concluded that lung cancer deaths increase by 8 percent for every increase of 10 micrograms of fine particles per cubic meter of air. The relationship between fine particles and adverse health effects was linear and without a discernible lower "safe" threshold.[27]

Heart Disease

A 2004 study – also an extension of the 1995 American Cancer Society study –

found that long-term fine particle exposure increased the risk of dying from ischemic heart disease (heart failure resulting from decreased oxygen supply to the heart muscle), arrhythmias, heart failure, and cardiac arrest. Previous studies linked long-term fine particle exposure to cardiopulmonary mortality but not to specific diseases.[28] Remarkably, EPA estimates that particle pollution takes an average of 14 years off the lives of people who die prematurely from particle exposure.[29]

With studies indicating that adverse cardiovascular and respiratory effects occur even when levels are well below current standards, the American Heart Association, American Lung Association, and other medical and public health organizations have called on EPA to strengthen the national health standards for fine particles.[30]

As with ozone, evidence suggests that reducing particle pollution would greatly and rapidly improve public health. For instance, air quality in Dublin, Ireland deteriorated in the 1980s after a switch from oil to coal for domestic heating. In 1990, the Irish Government banned the marketing, sale, and distribution of coal within Dublin. Respiratory and cardiovascular death rates fell markedly following the ban, with researchers concluding that "control of particulate air pollution in Dublin led to an immediate reduction in cardiovascular and respiratory deaths."[31]

Code Orange, Red, and Purple for Ozone and Fine Particles

Newspaper, television, and radio weather reports provide information about local air quality using warnings such as "code red" days, which are based on EPA's Air Quality Index (AQI). The AQI divides ambient air pollution levels into color categories, including green (good), yellow (moderate), orange (unhealthy for sensitive groups), red (unhealthy), and purple (very unhealthy), and describes actions people should take at each pollution level to protect their health.[32] For instance, on code red days for ozone, EPA warns everyone to limit outdoor activities and sensitive groups (active children and adults and people with respiratory disease) to avoid outdoor activities altogether.

Tables 1 and 2 provide additional information on the AQI for ozone and fine particles.

Table 1. EPA's Air Quality Index for Ozone[33]

8-Hour Ozone Concentration (parts per million)	Level of Health Concern	EPA's Cautionary Statement
0.000–0.064	Good (Green)	None.
0.065–0.084	Moderate (Yellow)	Unusually sensitive people should consider limiting prolonged outdoor exertion.
0.085–0.104	Unhealthy for sensitive groups (Orange)	Active children and adults and people with respiratory diseases such as asthma should limit prolonged outdoor exertion.
0.105–0.124	Unhealthy (Red)	Active children and adults and people with respiratory diseases such as asthma should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
0.125–0.374	Very unhealthy (Purple)	Active children and adults and people with respiratory diseases such as asthma should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.

Table 2. EPA's Air Quality Index for Fine Particles[34]

24-Hour Fine Particle Concentration (micrograms per cubic meter)	Level of Health Concern	EPA's Cautionary Statement
0.0–15.4	Good (Green)	None.
15.5–40.4	Moderate (Yellow)	Unusually sensitive people should consider reducing prolonged or heavy outdoor exertion.
40.5–65.4	Unhealthy for sensitive groups (Orange)	People with heart or lung disease, older adults, and children should reduce prolonged or heavy outdoor exertion.
65.5–150.4	Unhealthy (Red)	People with heart or lung disease, older adults, and children should avoid prolonged or heavy outdoor exertion. Everyone else should reduce prolonged or heavy outdoor exertion.
150.5–250.4	Very unhealthy (Purple)	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy outdoor exertion.

Trends in Ozone and Fine Particle Pollution

Ozone

Of the six most common and widespread air pollutants, including nitrogen dioxide, ground-level ozone, sulfur dioxide, particulate matter, carbon monoxide, and lead, we have made the least progress reducing ozone.[35] Since 1980, 8-hour ozone levels have decreased by 21 percent nationally (see Figure 4).[36] However, in the 1990s, 8-hour ozone levels declined nationally by only nine percent, showing a leveling of progress. The West Coast and the Northeast have improved the most since 1990 with decreases of at least 10 percent, but the South and Midwest have experienced very little change in ozone levels, with no net change in the region encompassing Iowa, Kansas, Missouri, and Nebraska (see Figure 5).[37]

Figure 4. Trend in 8-Hour Ozone Levels Averaged Across EPA Regions, 1980–2003[38]

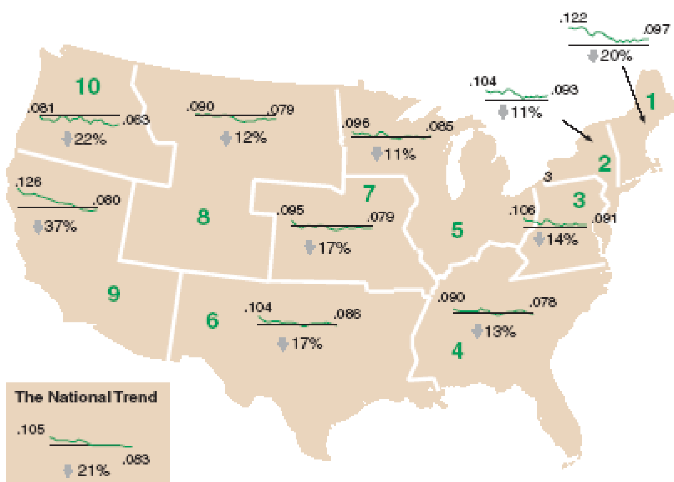
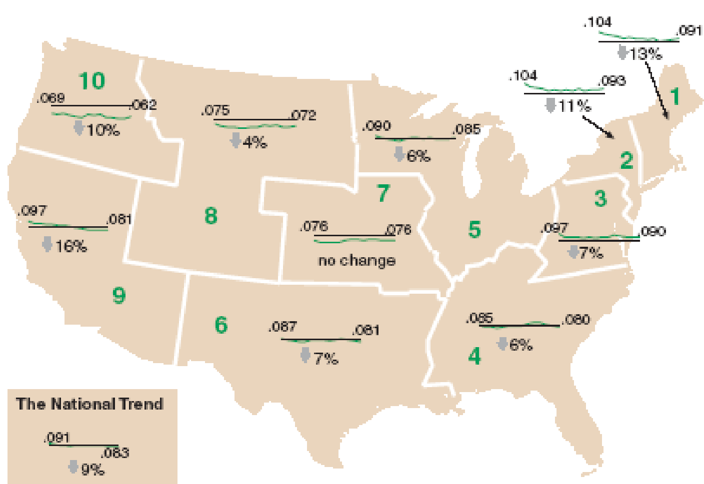


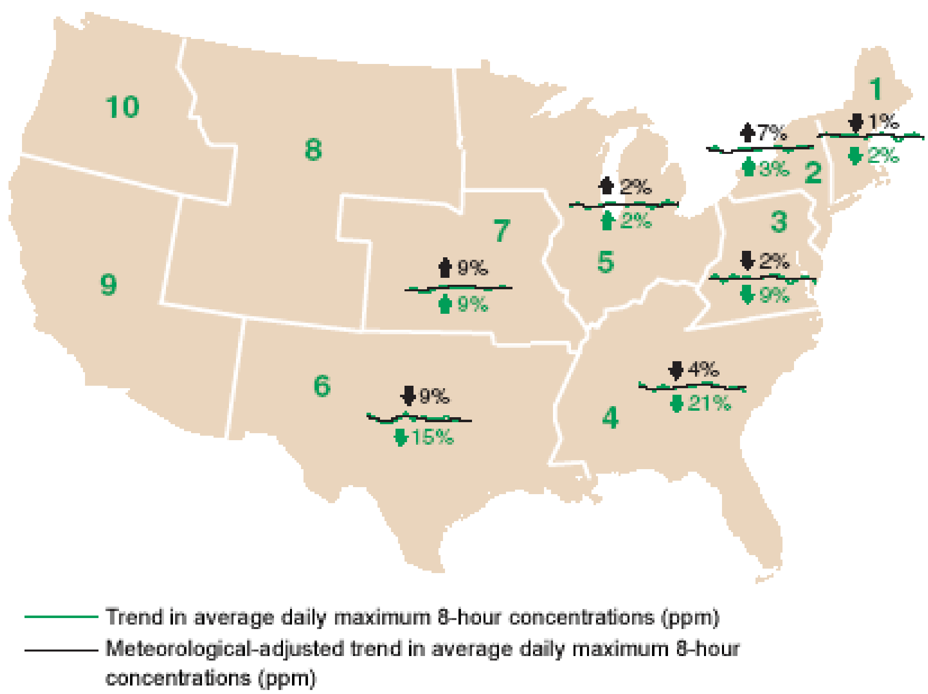
Figure 5. Trend in 8-Hour Ozone Levels Averaged Across EPA Regions, 1990–2003[39]



Lower levels of ozone do not necessarily mean that we have succeeded in reducing air pollution. Heat and sunlight are vital to convert NOx and VOCs into ozone. As a result, weather conditions play a large role in the amount of ground-level ozone on any given day. During cool, wet summers, such as that which occurred in 2003, ozone levels tend to be lower. During hot, dry summers, ozone levels tend to rise, as occurred in 2002, which was by far the worst ozone season in recent years.[40]

Figure 6 shows ozone trends for 35 cities in the eastern half of the U.S. from 1990 to 2003 adjusted for the effects of weather compared to the unadjusted trends. Note that because this analysis is based on a limited number of cities per region, the regional trends cannot be compared directly to the trends in Figure 5. Before adjusting for weather, ozone levels increased in three regions and declined in four regions. When weather is taken into account, all regions experienced a smaller decline or an increase in ozone levels during the 1990s. Region 4, which includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee, was most affected by weather, with a 21 percent decline in ozone levels reduced to a mere 4 percent decrease after taking weather out of the equation.[41]

Figure 6. Meteorologically Adjusted and Unadjusted Ozone Levels by EPA Region, 1990–2003[42]

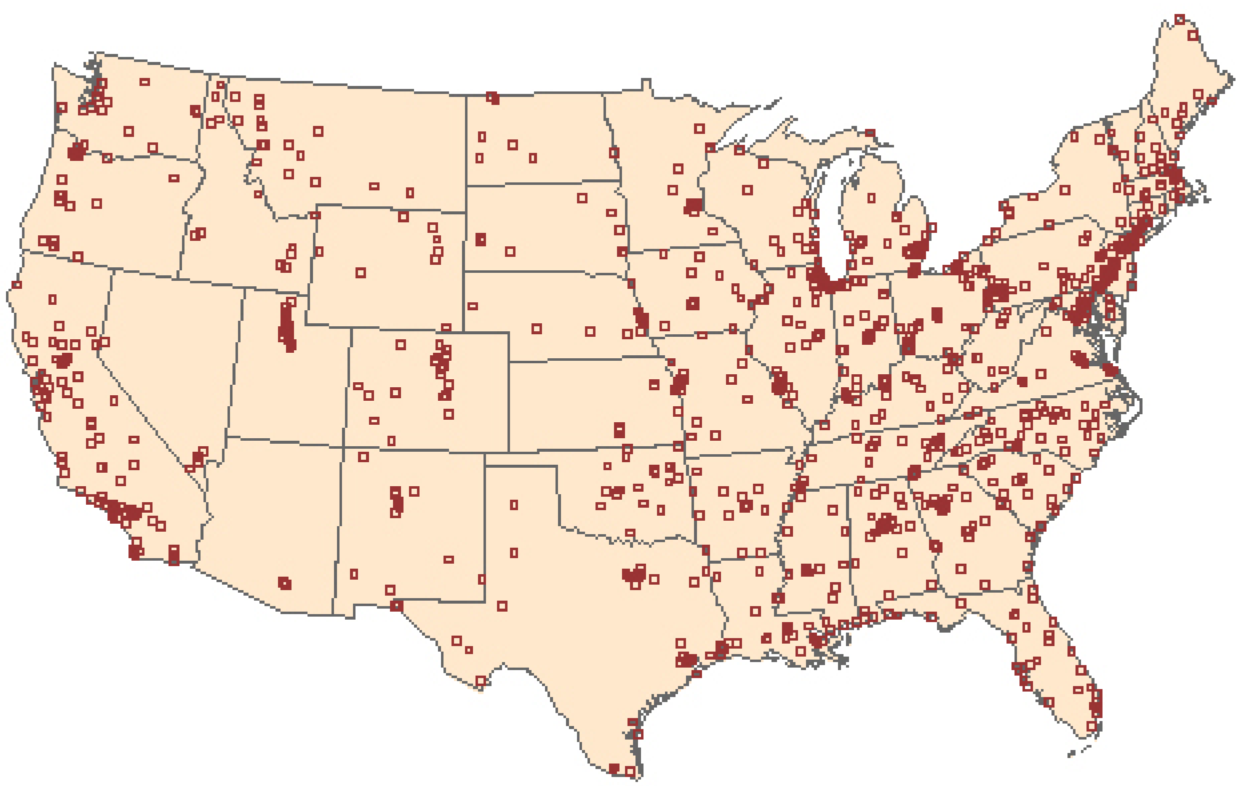


Fine Particle Pollution

EPA and the states did not establish a fine particle-monitoring network until 1999, which limits our analysis of recent trends. From 1999 to 2002, annual average fine particle levels dropped by 8 percent.[43]

However, as shown in Figure 7, there are significant gaps in the nation's network of fine particle monitors. Where data are unavailable, EPA basically assumes the areas are complying with the health standards. Moreover, in the April 2004 final draft of its revised monitoring strategy, EPA proposed reducing the number of both fine particle and ozone monitors as part of a "common sense initiative."[44] The program would reduce particle-monitoring sites by approximately 35 percent, though the sites were only established in the late 1990s. This strategy would undermine EPA and the states' ability to protect public health from unhealthy levels of fine particle pollution.

Figure 7. Location of Fine Particle Pollution Monitoring Stations, 2004[45]



Failing to Meet Health Standards

EPA establishes health-based air quality standards for the six criteria pollutants, including ozone and fine particles, and identifies areas that fail to meet the standards as "nonattainment" areas. Nonattainment areas must take certain steps to clean up their air and meet the standards, as determined by Congress and EPA.

Ozone

In April 2004, EPA determined that 474 counties violate or contribute to violations of the 8-hour health-based ozone standard. These counties – from large metropolitan areas like Los Angeles and Washington, D.C. to suburban and even rural areas like Lake County, Illinois, whose 470 square miles stretch from the Chicago suburbs to Wisconsin, and Christian County, a largely agricultural area in southwest Kentucky – are home to nearly 160 million people.[46] These nonattainment areas must submit plans to EPA in April 2007 as to how they will meet the ozone standard by 2007-2021, depending on the severity of their ozone pollution.[47]

In addition, 237 counties – home to 111 million Americans – continue to violate the 1-hour ozone standard.[48] Even though the 1-hour standard is designed to protect against dangerous spikes in ozone, EPA plans to revoke the standard in 2005. This means that some areas of the country classified as attaining the 8-hour ozone standard will still experience unhealthy short-term levels of ozone yet will not have to take action to reduce pollution.[49]

Also in April 2004 EPA finalized a rule detailing the steps and timetable 8-hour ozone nonattainment areas need to follow to meet the health standard. Unfortunately, the rule eliminates many of the mandatory control measures prescribed by Congress in 1990. The rule actually weakens existing cleanup requirements in some of the nation's most polluted cities, gives some areas too much time to clean up, and requires too few benchmarks be met along the way. As a result, public health and environmental groups challenged the weak rule in federal court in June 2004; the case is pending.[50]

'Pristine' Parks Fail to Meet National Health Standards

Ozone levels in national parks can rival or exceed those of the nation's most polluted cities. In April 2004, EPA determined that pollution levels in seven national parks and the Cape Cod National Seashore fail to meet the 8-hour national health standard for ozone. The parks include the Great Smoky Mountains National Park in North Carolina and Tennessee, Acadia National Park in Maine, Shenandoah National Park in Virginia, Rocky Mountain National Park in Colorado, and California's Yosemite, Sequoia-Kings Canyon, and Joshua Tree National Parks.

Source: National Parks Conservation Association, "Code Red: America's Five Most Polluted National Parks," June 2004.

Fine Particle Pollution

EPA is in the process of determining which areas fail to meet the health-based air quality standards for fine particles. In February 2004, states made their recommendations to EPA. In June 2004, EPA released its own recommendations.[51]

The EPA list is more thorough than the states' lists, encompassing 244 full and partial counties, with a combined population of 99 million people, as opposed to the states' recommendations of 142 full and partial counties covering 79 million people.[52] While the EPA list is more complete, it excludes several areas that fail to meet the standards. EPA is scheduled to finalize the designations in November 2004, and nonattainment areas are slated to submit plans to EPA in February 2008 as to how they will meet the fine particle standard by 2010-2015, depending on the severity of their particle pollution.[53]

EPA has yet to propose a rule detailing the steps fine particle nonattainment areas will have to take to meet the health standard.[54] EPA's recent 8-hour ozone implementation rule, which falls far short of what is needed to protect public health, should not be the model the administration follows. EPA should propose and finalize a strong rule to bring these areas into compliance with the health standards by the end of the decade, as the Clean Air Act requires.

Report Findings: 2003 Air Quality

This report examines ozone and fine particle levels in 2003 from the nation's networks of 1,197 ozone and 924 fine particle air quality monitors, as reported by the states and the District of Columbia.

The report looks at exceedances of the 8-hour and 1-hour national health standards for ozone and the year-round and 24-hour national health standards for fine particles. Because metropolitan areas differ in their number of air quality monitors, we also look at the number of smog and soot days, or days on which at least one air quality monitor in a given area exceeds the 8-hour or 1-hour ozone health standard or the 24-hour fine particle health standard, respectively. In order to compare cities of similar sizes, we divide metropolitan areas into three categories, including large metropolitan areas with populations above 1 million, mid-sized metropolitan areas with populations between 250,000 and 1 million, and small metropolitan areas with populations under 250,000.

Ozone

Ozone levels exceeded the 8-hour national health standard 4,583 times in 2003. These high ozone levels occurred in 40 states and the District of Columbia on 187 different days from March to October. In addition, ozone levels exceeded the 1-hour national health standard 684 times in 2003. Ten states did not record any unhealthy levels of ozone in 2003, including Alaska, Hawaii, Idaho, Montana, Nebraska, North Dakota, Oregon, South Dakota, Vermont, and Wyoming.

Nationally, ozone levels in 2003 were similar to those in 2000 and 2001. In contrast, 2002 was a hot and dry summer – conditions that are more conducive to ozone formation – leading to record ozone levels. However, 8-hour and/or 1-hour ozone levels were higher in 2003 than in 2002 in 13 states, including California, Colorado, Florida, Kansas, Louisiana, Michigan, Mississippi, Missouri, Nevada, New Mexico, Oklahoma, Texas, and Washington. In Colorado, the number of exceedances of the 8-hour and 1-hour health standards increased eight-fold over 2002; Colorado exceeded the 8-hour standard eight times in 2002, whereas the state exceeded the standard 60 times in 2003. Colorado ranked fourth in 2003 for the number of smog days (22), surpassed only by California, Texas, and Louisiana.

Appendix A compares ozone exceedances by state from 2001 to 2003. Appendix B details the number of smog days experienced by each state in 2003.

Bakersfield, California was the nation's most ozone-polluted city in 2003, with 116 smog days. Ozone levels in the city exceeded the 8-hour national health standard 374 times and the 1-hour health standard 29 times. With a population of 660,000, Bakersfield is a mid-sized city.

Of large metropolitan areas, or those with populations over 1 million people, Riverside-San Bernardino-Ontario (CA), Los-Angeles-Long Beach-Santa Ana (CA), Houston-Baytown-Sugar Land (TX), Sacramento-Arden Arcade-Roseville (CA), Dallas-Fort Worth-Arlington (TX), Philadelphia-Camden-Wilmington (PA-NJ-DE), New York-Northern New Jersey-Long Island (NY-NJ-PA), Kansas City (MO-KS), Providence-New Bedford-Fall River (RI-MA), and St. Louis (MO-IL) suffered the worst ozone problems in 2003 (see Table 3). In Riverside-San Bernardino-

Ontario, ozone levels exceeded the 8-hour health standard 675 times and the 1-hour health standard 211 times on 103 different days. The full list of smog days and ozone exceedances in large metropolitan areas is available in Appendix C.

Among mid-sized cities, or those with populations between 250,000 to 1 million people, California's Bakersfield, Fresno, Visalia-Porterville, Oxnard-Thousand Oaks-Ventura, and Modesto suffered the worst ozone problems in 2003 (see Table 4). Baton Rouge (LA), Bridgeport-Stamford-Norwalk (CT), Huntington-Ashland (WV-KY-OH), Knoxville (TN), New Haven-Milford (CT), and Youngstown-Warren-Boardman (OH-PA) also topped the list. Ozone levels in many of these mid-sized cities rivaled those of the nation's largest metropolitan areas. For example, central California's Visalia-Porterville metropolitan area, with a population of 368,000, had more smog days (92) than the Los Angeles-Long Beach-Santa Ana metropolitan area (88), which has a population of 12.4 million. See Appendix D for the full list of smog days and ozone exceedances by mid-sized metropolitan area.

Merced, California was the most ozone-polluted small city in 2003 (see Table 5). With 54 smog days, Merced far exceeded any other small city for its ozone pollution. In addition to Merced and California's Truckee-Grass Valley, Hanford-Corcoran, Madera, El Centro, Chico, and Phoenix Lake-Cedar Ridge metropolitan areas, Barnstable Town (MA), Salisbury (NC), Allegan (MI), Gulfport-Biloxi (MS), Traverse City (MI), Watertown-Fort Drum (NY), and Wilmington (OH) suffered the worst ozone problems among small cities in 2003. The full list of smog days and ozone exceedances in small metropolitan areas is available in Appendix E.

An additional 141 8-hour and five 1-hour ozone exceedances occurred at air monitors not located in metropolitan areas, including at Yosemite National Park in California, Shenandoah National Park in Virginia, Acadia National Park in Maine, and Seney National Wildlife Refuge in Michigan (see Table 6).

Table 3. 15 Most Ozone-Polluted Large Metropolitan Areas, 2003

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
1	Riverside-San Bernardino-Ontario, CA	3,254,821	103	675	211
2	Los Angeles-Long Beach-Santa Ana, CA	12,365,627	88	302	120
3	Houston-Baytown-Sugar Land, TX	4,715,407	47	257	119
4	Sacramento-Arden-Arcade-Roseville, CA	1,796,857	43	141	12
5	Dallas-Fort Worth-Arlington, TX	5,161,544	31	122	6
6	Philadelphia-Camden-Wilmington, PA-NJ-DE	5,687,147	29	64	5
7	New York-Northern New Jersey-Long Island, NY-NJ-PA	18,323,002	21	71	11
8	Kansas City, MO-KS	1,836,038	18	32	0
8	Providence-New Bedford-Fall River, RI-MA	1,582,997	18	21	2
8	St. Louis, MO-IL	2,698,687	18	66	9
11	Cincinnati-Middletown, OH-KY-IN	2,009,632	17	43	2
11	Denver-Aurora, CO	2,179,240	17	48	6
13	Washington-Arlington-Alexandria, DC-VA-MD	4,796,183	16	64	8
14	Atlanta-Sandy Springs-Marietta, GA	4,247,981	13	28	3
14	Chicago-Naperville-Joliet, IL-IN-WI	9,098,316	13	29	0

Table 4. 15 Most Ozone-Polluted Mid-Sized Metropolitan Areas, 2003

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
1	Bakersfield, CA	661,645	116	374	29
2	Fresno, CA	799,407	97	283	26
3	Visalia-Porterville, CA	368,021	92	198	3
4	Oxnard-Thousand Oaks-Ventura, CA	753,197	31	61	2
5	Baton Rouge, LA	705,973	21	56	12
6	Modesto, CA	446,997	18	19	0
7	Bridgeport-Stamford-Norwalk, CT	882,567	11	25	11
7	Huntington-Ashland, WV-KY-OH	288,649	11	12	0
7	Knoxville, TN	616,079	11	20	0
7	New Haven-Milford, CT	824,008	11	16	4
7	Youngstown-Warren-Boardman, OH-PA	602,964	11	19	2
12	Beaumont-Port Arthur, TX	385,090	10	23	2
13	Tulsa, OK	859,532	9	14	0
14	Dayton, OH	848,153	8	16	4
14	Fort Collins-Loveland, CO	251,494	8	8	0

Table 5. 21 Most Ozone-Polluted Small Metropolitan Areas, 2003

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
1	Merced, CA	210,554	54	54	0
2	Truckee-Grass Valley, CA	92,033	23	31	0
3	Hanford-Corcoran, CA	129,461	15	15	0
4	Madera, CA	123,109	14	14	0
5	El Centro, CA	142,361	11	9	3
6	Barnstable Town, MA	222,230	8	8	0
6	Chico, CA	203,171	8	8	0
6	Salisbury, NC	130,340	8	12	3
9	Allegan, MI	105,665	7	7	0
9	Gulfport-Biloxi, MS	246,190	7	17	0
9	Phoenix Lake-Cedar Ridge, CA	54,501	7	7	0
9	Traverse City, MI	131,342	7	7	0
9	Watertown-Fort Drum, NY	111,738	7	7	0
9	Wilmington, OH	40,543	7	7	0
15	Holland-Grand Haven, MI	238,314	6	6	0
15	Jamestown-Dunkirk-Fredonia, NY	139,750	6	10	2
15	Manitowoc, WI	82,887	6	8	1
15	Niles-Benton Harbor, MI	162,453	6	6	0
15	Redding, CA	163,256	6	6	0
15	Vineland-Millville-Bridgeton, NJ	146,438	6	6	1
15	Yuba City-Marysville, CA	139,149	6	6	0

Table 6. Exceedances of Ozone Health Standards at Parks and Other Areas Not Located in Metropolitan Areas, 2003

Area	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
Ashland, AL	1	0
Jerseydale, CA	27	1
San Andreas, CA	18	0
Yosemite National Park, CA	10	1
Jackson, CA	2	0
Bonifay, FL	1	0
Keosauqua, IA	1	0
Brownstown, IN	1	0
Grayson Lake, KY	1	0
St. James Parish, LA	1	0
Millington, MD	4	1
Acadia National Park, ME	7	0
Huron County, MI	5	0
Scottsville, MI	4	0
Seney National Wildlife Refuge, MI	2	1
Onamia, MN	1	0
Bonne Terre, MO	3	0
Mark Twain State Park, MO	1	0
Granville County, NC	5	0
Reidsville, NC	3	0
Martin County, NC	2	0
Yancey County, NC	1	0
Jackson County, NC	1	0
Essex County, NY	8	0
Arrietta, NY	2	0
Walters, OK	1	0
Tishomingo, OK	1	0
Tioga County, PA	3	0
Greene County, PA	3	0
McBee, SC	1	0
Due West, SC	1	0
Roundtop, TX	2	0
Shenandoah National Park, VA	6	0
Luray, VA	3	0
Wythe County, VA	2	0
Ellison Bay, WI	5	1
Greenbrier County, WV	1	0

Code Purple, Very Unhealthy Ozone Levels

Nationwide, ozone levels reached EPA's "very unhealthy" range (0.125-0.374 ppm) 79 times in 2003 (see Table 7). When ozone levels are very unhealthy, EPA warns everyone to limit outdoor activities and sensitive populations, including children, to avoid outdoor activities altogether.

The Baltimore-Towson, Maryland and Riverside-San Bernardino-Ontario, California metropolitan areas tied for the highest 8-hour ozone concentration in 2003 with recorded values of 0.153 ppm, or almost double the health standard. While this was Baltimore's only very unhealthy reading, 43 of the 79 very unhealthy concentrations occurred in the Riverside-San Bernardino-Ontario metropolitan area. Another 15 occurred elsewhere in California, with 14 in the Los Angeles-Long Beach-Santa Ana metropolitan area and one in Bakersfield.

Air quality monitors in the Houston-Baytown-Sugar Land, Texas metropolitan area recorded six very unhealthy ozone exceedances; Columbus, Ohio recorded four; the Washington-Arlington-Alexandria metropolitan area recorded three; and the New York-Northern New Jersey-Long Island metropolitan area had two very unhealthy readings.

Table 7. Very Unhealthy 8-Hour Ozone Exceedances, 2003

Rank	Date	Metropolitan Statistical Area	Very Unhealthy Exceedances of 8-Hour Ozone Standard (ppm)
1	6/26/03	Baltimore-Towson, MD	0.153
1	8/17/03	Riverside-San Bernardino-Ontario, CA	0.153
3	7/14/03	Los Angeles-Long Beach-Santa Ana, CA	0.152
4	7/13/03	Riverside-San Bernardino-Ontario, CA	0.148
5	7/9/03	Riverside-San Bernardino-Ontario, CA	0.146
5	7/10/03	Riverside-San Bernardino-Ontario, CA	0.146
7	8/17/03	Riverside-San Bernardino-Ontario, CA	0.145
8	7/5/03	Riverside-San Bernardino-Ontario, CA	0.144
9	6/28/03	Riverside-San Bernardino-Ontario, CA	0.142
10	8/24/03	Houston-Baytown-Sugar Land, TX	0.141
10	6/29/03	Riverside-San Bernardino-Ontario, CA	0.141
12	7/10/03	Los Angeles-Long Beach-Santa Ana, CA	0.140
12	7/11/03	Los Angeles-Long Beach-Santa Ana, CA	0.140
12	8/17/03	Riverside-San Bernardino-Ontario, CA	0.140
15	7/5/03	Riverside-San Bernardino-Ontario, CA	0.138
16	7/9/03	Los Angeles-Long Beach-Santa Ana, CA	0.137
16	7/10/03	Riverside-San Bernardino-Ontario, CA	0.137
16	5/28/03	Riverside-San Bernardino-Ontario, CA	0.137
16	8/17/03	Riverside-San Bernardino-Ontario, CA	0.137
16	7/14/03	Riverside-San Bernardino-Ontario, CA	0.137
21	6/26/03	Lancaster, PA	0.135
21	8/31/03	Los Angeles-Long Beach-Santa Ana, CA	0.135
21	7/13/03	Riverside-San Bernardino-Ontario, CA	0.135
21	7/13/03	Riverside-San Bernardino-Ontario, CA	0.135
25	7/13/03	Los Angeles-Long Beach-Santa Ana, CA	0.134
25	7/13/03	Riverside-San Bernardino-Ontario, CA	0.134
27	7/13/03	Los Angeles-Long Beach-Santa Ana, CA	0.133
27	7/17/03	Los Angeles-Long Beach-Santa Ana, CA	0.133
27	7/10/03	Riverside-San Bernardino-Ontario, CA	0.133
27	9/27/03	Riverside-San Bernardino-Ontario, CA	0.133
31	6/28/03	Riverside-San Bernardino-Ontario, CA	0.132
31	7/10/03	Riverside-San Bernardino-Ontario, CA	0.132
33	6/25/03	New York-Northern New Jersey-Long Island, NY-NJ-PA	0.131
33	6/26/03	Philadelphia-Camden-Wilmington, PA-NJ-DE	0.131
35	5/31/03	Dallas-Fort Worth-Arlington, TX	0.130
35	8/23/03	Houston-Baytown-Sugar Land, TX	0.130
35	7/5/03	Riverside-San Bernardino-Ontario, CA	0.130
35	5/28/03	Riverside-San Bernardino-Ontario, CA	0.130
35	7/11/03	Riverside-San Bernardino-Ontario, CA	0.130
35	6/25/03	Washington-Arlington-Alexandria, DC-VA-MD	0.130
41	6/24/03	Columbus, OH	0.129
41	8/22/03	Houston-Baytown-Sugar Land, TX	0.129
41	8/22/03	Houston-Baytown-Sugar Land, TX	0.129
41	6/15/03	Riverside-San Bernardino-Ontario, CA	0.129

Rank	Date	Metropolitan Statistical Area	Very Unhealthy Exceedances of 8-Hour Ozone Standard (ppm)
41	8/17/03	Riverside-San Bernardino-Ontario, CA	0.129
41	8/31/03	Riverside-San Bernardino-Ontario, CA	0.129
47	6/26/03	New York-Northern New Jersey-Long Island, NY-NJ-PA	0.128
47	7/10/03	Riverside-San Bernardino-Ontario, CA	0.128
47	6/15/03	Riverside-San Bernardino-Ontario, CA	0.128
50	5/28/03	Bakersfield, CA	0.127
50	7/10/03	Los Angeles-Long Beach-Santa Ana, CA	0.127
50	7/14/03	Riverside-San Bernardino-Ontario, CA	0.127
50	6/28/03	Riverside-San Bernardino-Ontario, CA	0.127
50	7/8/03	Riverside-San Bernardino-Ontario, CA	0.127
50	6/29/03	Riverside-San Bernardino-Ontario, CA	0.127
56	6/24/03	Columbus, OH	0.126
56	5/29/03	Houston-Baytown-Sugar Land, TX	0.126
56	9/8/03	Houston-Baytown-Sugar Land, TX	0.126
56	7/5/03	Los Angeles-Long Beach-Santa Ana, CA	0.126
56	9/28/03	Los Angeles-Long Beach-Santa Ana, CA	0.126
56	6/25/03	Parkersburg-Marietta, WV-OH	0.126
56	6/14/03	Riverside-San Bernardino-Ontario, CA	0.126
56	7/9/03	Riverside-San Bernardino-Ontario, CA	0.126
56	7/11/03	Riverside-San Bernardino-Ontario, CA	0.126
56	9/14/03	Riverside-San Bernardino-Ontario, CA	0.126
56	6/14/03	Riverside-San Bernardino-Ontario, CA	0.126
56	6/26/03	Washington-Arlington-Alexandria, DC-VA-MD	0.126
68	6/25/03	Bridgeport-Stamford-Norwalk, CT	0.125
68	6/24/03	Columbus, OH	0.125
68	6/24/03	Columbus, OH	0.125
68	8/31/03	Los Angeles-Long Beach-Santa Ana, CA	0.125
68	6/1/03	Los Angeles-Long Beach-Santa Ana, CA	0.125
68	8/17/03	Los Angeles-Long Beach-Santa Ana, CA	0.125
68	9/21/03	Riverside-San Bernardino-Ontario, CA	0.125
68	7/14/03	Riverside-San Bernardino-Ontario, CA	0.125
68	8/17/03	Riverside-San Bernardino-Ontario, CA	0.125
68	6/29/03	Riverside-San Bernardino-Ontario, CA	0.125
68	6/28/03	Riverside-San Bernardino-Ontario, CA	0.125
68	6/25/03	Washington-Arlington-Alexandria, DC-VA-MD	0.125

Note: Each metropolitan area has more than one ozone monitor.

Fine Particle Pollution

Although particle pollution is not as pervasive as ozone pollution, elevated levels of short-term or year-round particle pollution can have a deadly impact. In 2003, fine particle monitors in 53 metropolitan areas in 20 states exceeded the year-round national health standard. In these areas, fine particle levels were chronically high. In addition, fine particle pollution spiked above the 24-hour national health standard 106 times in 13 states in 2003. These dangerous, short-term spikes occurred on 39 different days from January to December. Unfortunately, research clearly indicates that current fine particle standards fail to adequately protect public health, meaning that the problem is even worse than these data suggest.[55]

Twenty-four states did not exceed the year-round or short-term fine particle standards; these states include Alaska, Arkansas, Arizona, Colorado, Florida, Hawaii, Iowa, Idaho, Kansas, Louisiana, Massachusetts, Maine, Minnesota, Nebraska, New Hampshire, North Dakota, South Carolina, South Dakota, Utah, Virginia, Vermont, Washington, Wisconsin, and Wyoming.

The Riverside-San Bernardino-Ontario, California metropolitan area suffered the worst year-round particle pollution of any metropolitan area in 2003. The maximum average year-round value in the area exceeded the standard by nearly 10 $\mu g/c^3$. Long-term exposure to fine particle pollution at levels well below 15 $\mu g/c^3$, the value of the current standard, is associated with an increased risk of premature death.[56]

In addition to the Riverside-San Bernardino-Ontario metropolitan area, other large metropolitan areas, or those with populations over 1 million people, with the highest year-round particle pollution in 2003 included Los Angeles-Long Beach-Santa Ana (CA), Detroit-Warren-Livonia (MI), New York-Northern New Jersey-Long Island (NY-NJ-PA), Pittsburgh (PA), Cleveland-Elyria-Mentor (OH), St. Louis (MO-IL), Atlanta-Sandy Springs-Marietta (GA), Indianapolis (IN), and Chicago-Naperville-Joliet (IL-IN-WI). See Table 8 for the full list of large metropolitan areas that exceeded the annual health standard for fine particles in 2003.

Among mid-sized cities, or those with populations between 250,000 to 1 million people, Dayton, Ohio experienced the highest year-round particle pollution in 2003 (see Table 9). Also topping the list were the Bakersfield (CA), El Paso (TX), Fresno (CA), Visalia-Porterville (CA), Lancaster (PA), York-Hanover (PA), Canton-Massillon (OH), New Haven-Milford (CT), and Chattanooga (TN-GA) metropolitan areas.

The Weirton-Steubenville, West Virginia-Ohio metropolitan area suffered the worst year-round particle pollution among small cities, or those with populations under 250,000 people (see Table 10). The other small metropolitan areas with year-round fine particle pollution above the health standard in 2003 were Monroe (MI), Hanford-Corcoran (CA), Hagerstown-Martinsburg (MD-WV), Rome (GA), Merced (CA), Jasper (IN), Johnstown (PA), Talladega-Sylacauga (AL), Wheeling (WV-OH), Lexington-Thomasville (NC), Laurel (MS), and Point Pleasant (WV-OH).

Table 8. Large Metropolitan Areas Plagued by Year-Round Particle Pollution, 2003

Rank	Metropolitan Statistical Area	Population	Maximum Average Year-Round Fine Particle Value (micrograms per cubic meter)
1	Riverside-San Bernardino-Ontario, CA	3,254,821	24.8
2	Los Angeles-Long Beach-Santa Ana, CA	12,365,627	22.1
3	Detroit-Warren-Livonia, MI	4,452,557	21.1
4	New York-Northern New Jersey-Long Island, NY-NJ-PA	18,323,002	20.3
5	Pittsburgh, PA	2,431,087	20.2
6	Cleveland-Elyria-Mentor, OH	2,148,143	18.6
7	St. Louis, MO-IL	2,698,687	18.1
8	Atlanta-Sandy Springs-Marietta, GA	4,247,981	17.6
9	Indianapolis, IN	1,525,104	17.5
10	Chicago-Naperville-Joliet, IL-IN-WI	9,098,316	17.4
11	Cincinnati-Middletown, OH-KY-IN	2,009,632	17.3
12	Baltimore-Towson, MD	2,552,994	16.8
13	Birmingham-Hoover, AL	1,052,238	16.6
13	Philadelphia-Camden-Wilmington, PA-NJ-DE	5,687,147	16.6
15	Columbus, OH	1,612,694	16.4
16	Louisville, KY-IN	1,161,975	15.7
17	San Diego-Carlsbad-San Marcos, CA	2,813,833	15.5
18	Buffalo-Niagara Falls, NY	1,170,111	15.1

Table 9. Mid-Sized Metropolitan Areas Plagued by Year-Round Particle Pollution, 2003

Rank	Metropolitan Statistical Area	Population	Maximum Average Year-Round Fine Particle Value (micrograms per cubic meter)
1	Dayton, OH	848,153	19.9
2	Bakersfield, CA	661,645	19.7
3	El Paso, TX	679,622	19.5
4	Fresno, CA	799,407	18.5
5	Visalia-Porterville, CA	368,021	18.2
6	Lancaster, PA	470,658	17.6
7	York-Hanover, PA	381,751	17.4
8	Canton-Massillon, OH	406,934	17.1
9	New Haven-Milford, CT	824,008	17.0
10	Chattanooga, TN-GA	476,531	16.5
11	Harrisburg-Carlisle, PA	509,074	16.2
12	Reading, PA	373,638	16.1
12	Charleston, WV	309,635	16.1
14	Knoxville, TN	616,079	16.0
15	Lexington-Fayette, KY	408,326	15.6
16	Huntington-Ashland, WV-KY-OH	288,649	15.5
17	Akron, OH	694,960	15.4
17	Columbus, GA-AL	281,768	15.4
19	Evansville, IN-KY	342,815	15.3
20	Ann Arbor, MI	322,895	15.2
21	Hickory-Morganton-Lenoir, NC	341,851	15.04
22	Allentown-Bethlehem-Easton, PA-NJ	740,395	15.02

Table 10. Small Metropolitan Areas Plagued by Year-Round Particle Pollution, 2003

Rank	Metropolitan Statistical Area	Population	Maximum Average Year-Round Fine Particle Value (micrograms per cubic meter)
1	Weirton-Steubenville, WV-OH	132,008	17.7
2	Monroe, MI	145,945	17.0
3	Hanford-Corcoran, CA	129,461	16.3
4	Hagerstown-Martinsburg, MD-WV	222,771	16.2
4	Rome, GA	90,565	16.2
6	Merced, CA	210,554	15.7
6	Jasper, IN	52,511	15.7
8	Johnstown, PA	152,598	15.5
9	Talladega-Sylacauga, AL	80,321	15.4
9	Wheeling, WV-OH	153,172	15.4
11	Lexington-Thomasville, NC	147,246	15.2
12	Laurel, MS	83,107	15.1
12	Point Pleasant, WV-OH	57,026	15.1

Spikes in Fine Particle Pollution

The 24-hour fine particle standard is critical to limit spikes in fine particle pollution. Exposure to the high, short-term levels of fine particles can result in illness and death, even when the year-round average is within the current standard.[57] Fine particle pollution exceeded the 24-hour national health standard 106 times on 39 different days in 13 states in 2003.

Among the states, California led the nation with 42 spikes in fine particle pollution above the health standard on 16 different days in 2003 (see Table 11). Spikes in particle pollution occurred on 10 different days in Pennsylvania, six days in Montana, five days in Texas, three days in New Mexico, two days in New York, and on one day in each Delaware, Michigan, Missouri, Oklahoma, Oregon, and Rhode Island.

The Riverside-San Bernardino-Ontario (CA), Los Angeles-Long Beach-Santa Ana (CA), and Pittsburgh (PA) metropolitan areas were the most plagued by spikes in particle pollution in 2003 (see Table 12). In the Los Angeles-Long Beach metropolitan area, short-term fine particle levels exceeded the national health standard 19 times on nine different days. The New York-Northern New Jersey-Long Island (NY-NJ-PA), Philadelphia-Camden-Wilmington (PA-NJ-DE), San Diego-Carlsbad-San Marcos (CA), Detroit-Warren-Livonia (MI), Houston-Baytown-Sugar Land (TX), Kansas City (MO-KS), Las Vegas-Paradise (NV), Providence-New Bedford-Fall River (RI-MA), and San Antonio (TX) metropolitan areas also experienced dangerous spikes in fine particle pollution in 2003.

Of mid-sized metropolitan areas, El Paso, Texas suffered four dangerous spikes in particle pollution on three different days in 2003 (see Table 13). Nine other mid-sized metropolitan area experienced one day in which fine particle pollution exceeded the 24-hour health standard in 2003.

Three small metropolitan areas in Montana, two in Delaware, and one in each New Mexico, California, Oklahoma, and Texas suffered dangerous spikes in particle pollution in 2003 (see Table 14). Missoula topped the list with six spikes in particle pollution above the health standard on four different days.

Table 11. States Exceeding Health Standards for Particle Pollution, 2003

State	Number of Soot Days	Exceedances of 24-Hour Fine Particle Health Standard	Maximum 24-Hour Fine Particle Value (micrograms per cubic meter)	Maximum Average Year-Round Fine Particle Value (micrograms per cubic meter)
California	16	42	239.2	24.8
Pennsylvania	10	18	102.0	20.2
Montana	6	14	213.7	17.0
Texas	5	8	131.0	19.5
New Mexico	3	8	146.5	below standard
New York	2	2	86.0	20.3
Delaware	1	7	72.3	15.5
Michigan	1	1	70.3	21.1
Missouri	1	1	71.4	below standard
Nevada	1	1	84.6	below standard
Oklahoma	1	1	75.0	below standard
Oregon	1	1	69.0	below standard
Rhode Island	1	2	77.1	below standard
Alabama	0	0	below standard	16.6
Connecticut	0	0	below standard	17.0
Georgia	0	0	below standard	17.6
Illinois	0	0	below standard	18.1
Indiana	0	0	below standard	17.5
Kentucky	0	0	below standard	15.6
Maryland	0	0	below standard	16.8
Mississippi	0	0	below standard	15.1
New Jersey	0	0	below standard	17.0
North Carolina	0	0	below standard	15.2
Ohio	0	0	below standard	19.9
Tennessee	0	0	below standard	16.5
West Virginia	0	0	below standard	17.5

Table 12. Large Metropolitan Areas with Spikes in Particle Pollution, 2003

Rank	Metropolitan Statistical Area	Population	Number of Soot Days	Exceedances of 24-Hour Fine Particle Health Standard	Maximum 24-Hour Fine Particle Value (micrograms per cubic meter)
1	Riverside-San Bernardino-Ontario, CA	3,254,821	10	14	104.3
2	Los Angeles-Long Beach-Santa Ana, CA	12,365,627	9	19	121.2
2	Pittsburgh, PA	2,431,087	9	9	102.0
4	New York-Northern New Jersey-Long Island, NY-NJ-PA	18,323,002	2	2	86.0
4	Philadelphia-Camden-Wilmington, PA-NJ-DE	5,687,147	2	5	73.0
4	San Diego-Carlsbad-San Marcos, CA	2,813,833	2	5	239.2
7	Detroit-Warren-Livonia, MI	4,452,557	1	1	70.3
7	Houston-Baytown-Sugar Land, TX	4,715,407	1	1	67.6
7	Kansas City, MO-KS	1,836,038	1	1	71.4
7	Las Vegas-Paradise, NV	1,375,765	1	1	84.6
7	Providence-New Bedford-Fall River, RI-MA	1,582,997	1	2	77.1
7	San Antonio, TX	1,711,703	1	2	126.1

Table 13. Mid-Sized Metropolitan Areas with Spikes in Particle Pollution, 2003

Rank	Metropolitan Statistical Area	Population	Number of Soot Days	Exceedances of 24-Hour Fine Particle Health Standard	Maximum 24-Hour Fine Particle Value (micrograms per cubic meter)
1	El Paso, TX	679,622	3	4	131.0
2	Allentown-Bethlehem-Easton, PA-NJ	740,395	1	2	69.0
2	Bakersfield, CA	661,645	1	1	67.9
2	Eugene-Springfield, OR	322,959	1	1	69.0
2	Harrisburg-Carlisle, PA	509,074	1	2	71.0
2	Lancaster, PA	470,658	1	1	72.0
2	Oxnard-Thousand Oaks-Ventura, CA	753,197	1	2	116.1
2	Reading, PA	373,638	1	1	76.0
2	Scranton-Wilkes Barre, PA	560,625	1	1	70.0
2	York-Hanover, PA	381,751	1	1	72.0

Table 14. Small Metropolitan Areas with Spikes in Particle Pollution, 2003

Rank	Metropolitan Statistical Area	Population	Number of Soot Days	Exceedances of 24-Hour Fine Particle Health Standard	Maximum 24-Hour Fine Particle Value (micrograms per cubic meter)
1	Missoula, MT	95,802	4	6	213.7
2	Las Cruces, NM	174,682	3	8	146.5
3	Kalispell, MT	74,471	2	2	83.2
4	Dover, DE	126,697	1	2	69.0
4	El Centro, CA	142,361	1	1	65.1
4	Helena, MT	65,765	1	1	70.2
4	Lubbock, TX	249,700	1	1	76.7
4	Ponca City, OK	48,080	1	1	75.0
4	Seaford, DE	156,638	1	1	72.3

Air monitors at three additional locations not in metropolitan areas in Montana experienced high levels of fine particle pollution in 2003 (see Table 15). Year-round particle pollution in Libby exceeded the health standard, while Polson and Ravalli County experienced short-term spikes in particle pollution above the 24-hour health standard.

Table 15. Exceedances of Fine Particle Health Standards at Monitors Not Located in Metropolitan Areas, 2003

Location	Exceedances of 24-Hour Fine Particle Health Standard	Maximum 24-Hour Fine Particle Value (micrograms per cubic meter)	Maximum Average Year-Round Fine Particle Value (micrograms per cubic meter)
Libby, MT	0	below standard	16.99
Polson, MT	3	108.5	below standard
Ravalli Co, MT	2	72.3	below standard

Code Purple, Very Unhealthy Particle Levels

Nationwide, four 24-hour fine particle concentrations fell within the very unhealthy range (150.5-250.4 $\mu g/c^3$) on EPA's Air Quality Index in 2003 (see Table 16). When air is very unhealthy due to particle pollution, EPA warns people with heart or lung disease, older adults, and children to avoid all physical activity outdoors, and everyone else to avoid prolonged or heavy outdoor activities.

The San Diego-Carlsbad-San Marcos, California and Missoula, Montana metropolitan areas recorded very unhealthy concentrations of fine particle pollution in 2003.

Table 16. Very Unhealthy Spikes in Fine Particle Pollution, 2003

Rank	Date	Metropolitan Statistical Area	Very Unhealthy Exceedances of 24-Hour Fine Particle Standard (micrograms per cubic meter)
1	10/27/03	San Diego-Carlsbad-San Marcos, CA	239.2
2	8/22/03	Missoula, MT	213.7
3	10/27/03	San Diego-Carlsbad-San Marcos, CA	170.2
4	10/27/03	San Diego-Carlsbad-San Marcos, CA	170.1

Preliminary 2004 Ozone Data

This report also examines preliminary 2004 data for 19 states and the District of Columbia through early September 2004. Note that 1-hour ozone levels were not available for South Carolina or the New England states, which include Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

Like 2003, 2004 has been a relatively mild and wet summer. Yet, in the areas examined, ozone levels still exceeded the 8-hour health standard 602 times and the 1-hour standard 84 times so far in 2004.

Ozone levels were higher in 2004 than in 2003 in three of the 19 states, including Georgia, New Hampshire, and Vermont (see Table 17). New Hampshire has exceeded the 8-hour health standard for ozone seven times so far in 2004 compared with one time in 2003.

Appendix F lists the 2004 8-hour and 1-hour ozone exceedances in the 19 states and the District of Columbia by metropolitan area.

Table 17. Preliminary 2004 Data on Exceedances of Ozone Health Standards by State

State	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
Connecticut	19	*
Delaware	6	0
District of Columbia	5	0
Florida	22	1
Georgia	45	4
Maine	2	*
Maryland	37	1
Massachusetts	19	*
New Hampshire	9	*
New Jersey	37	0
New York	19	1
North Carolina	14	0
Oklahoma	1	0
Pennsylvania	34	0
Rhode Island	8	*
South Carolina	11	*
Texas	273	72
Vermont	1	*
Virginia	39	5
West Virginia	1	0

* 1-hour data not available.

Bush Administration Rewrites the Rules for Industry

Until policymakers require tough cleanup standards for power plant smokestacks, Americans will continue to suffer serious health problems from ozone and fine particle pollution. Power plant pollution causes tens of thousands of premature deaths and many more asthma attacks, respiratory, and cardiovascular illnesses each year as well as a host of other health and environmental problems.[58] Instead of taking action to solve this problem, the Bush administration is helping powerful energy companies rewrite the rules, weakening rather than strengthening existing protections and making Americans even more vulnerable to the health effects of harmful pollutants.

The Bush administration's record on air pollution reads like an industry wish list. In some cases, industry admits that the administration has far exceeded its highest expectations.[59] Within the first 60 days of the administration, President Bush reversed his campaign pledge to cap global warming pollution from power plant smokestacks.[60] The administration quickly refused to enforce a critical Clean Air Act program that requires energy companies to install modern pollution controls when otherwise upgrading old, outdated power plants. In 2003, the Bush administration then gutted that program, finalizing the most significant rollback of the Clean Air Act in the law's more than 30-year history.[61] In January 2004, the Bush administration proposed a rule to delay for at least 10 years critically needed cuts in power plant smokestack emissions of toxic mercury, which can cause neurological and developmental problems in children whose mothers eat contaminated fish when pregnant or nursing.[62] In April 2004, the Bush administration finalized a major rule – nearly 10 years in the making – to implement the 1997 national health standard for ozone smog that actually weakens cleanup requirements in some of the nation's most polluted cities.[63] The list goes on.[64]

Now, the Bush administration has proposed weak and delayed caps on smog- and soot-forming pollutants from power plant smokestacks in the eastern U.S., while creating new loopholes in the law that will prevent future cleanup efforts.[65] Dubbed the "Clean Air Interstate Rule," the rule would cap sulfur dioxide (SO_2) and nitrogen oxide (NOx) emissions from power plant smokestacks in 29 states and the District of Columbia at 2.7 million tons and 1.3 million tons, respectively, in 2015. These weak caps would let power plants emit more than 1.5 times more soot-forming SO_2 and smog-forming NOx than the Clean Air Act allows and come too late to allow many polluted areas to meet national ambient air quality standards by Clean Air Act deadlines.[66]

Moreover, the proposed rule would open up new loopholes in the law, chief among them a provision that would prevent future administrations from requiring cuts in air pollution that crosses state borders unless the action would bring 16 additional counties into compliance with a national health standard – a threshold that would be nearly impossible to satisfy.[67] In addition, the rule would eliminate vital protections for air quality in our National Parks and wilderness areas, replacing rigorous plant-by-plant protections with an emissions-trading program that cannot guarantee the emissions reductions needed to protect parks and wilderness areas from haze created by nearby power plants.

The Bush administration should play it straight – drop the loopholes and finalize a rule that caps SO_2 and NOx emissions from power plant smokestacks in the eastern U.S. at 1.8 million tons and 1 million tons, respectively, by the end of the decade, as the law requires. Technologies to reduce ozone and particle pollution have been available for years.

Given the extent of our air pollution problem, we need much stronger, not weaker, clean air protections. The Bush administration should:

- Substantially strengthen, accelerate, and finalize its proposal to cap smog- and soot-forming pollutants from power plant smokestacks in the eastern U.S. to adequately protect public health and comply with the law.

- Designate all areas where people breathe unhealthy levels of fine particles as nonattainment areas and propose and finalize a strong rule to bring these areas into compliance with the health standards by the end of this decade, as required by the Clean Air Act.

State environmental agencies and other policymakers should:

- Continue to reject the Bush administration's "Clear Skies" plan, which would replace the Clean Air Act's power plant cleanup programs with far weaker programs.

- Adopt a comprehensive program to reduce emissions of smog- and soot-forming pollutants, as well as carbon dioxide and mercury, from power plant smokestacks.

- Ensure that states continue to have the authority to set clean air standards that are more protective than federal standards.

Methodology

From June to August 2004, we collected 2003 ozone and fine particle data directly from all 50 state environmental agencies and the District of Columbia. The environmental agencies in Mississippi and the District of Columbia did not return our multiple requests for information on fine particle levels; as a result, we obtained their fine particle data from EPA. In early September 2004, we collected preliminary 2004 ozone data from a limited number of states that post the data on their websites. Our state-specific sources are detailed below.

For each ozone-monitoring site, we obtained maximum daily 8-hour ozone concentrations of 0.085 parts per million (ppm) and above and maximum daily 1-hour ozone concentrations of 0.125 ppm and above. We defined a "smog day" as a day on which at least one monitor in a given area exceeds the 8-hour or 1-hour ozone standard.

For each fine particle-monitoring site, we obtained maximum daily 24-hour fine particle concentrations exceeding 65.0 micrograms per cubic meter ($\mu g/c^3$) and annual average fine particle concentrations exceeding 15.0 $\mu g/c^3$. We defined a "soot day" as a day on which at least one monitor in a given area exceeds the 24-hour fine particle standard.

We obtained data on metropolitan statistical areas, defined by the Office of Management and Budget as of June 6, 2003, from the U.S. Census at
www.census.gov/population/cen2000/phc-t29/tab01a.xls and
www.census.gov/population/estimates/metro-city/03mfips.txt.

Note that the Cassopolis ozone monitor is located in Michigan but monitors air quality in Indiana; we did not include it in the statistics for Michigan.

Data Sources by State

Alabama

Ozone: Personal communication with Alabama Department of Environmental Management, 28 June 2004.

Fine particles: Alabama Department of Environmental Management, Air Division, accessed at www.adem.state.al.us/AirDivision/Ozone/Daily%20Data/PMFineData.htm, 8 July 2004.

Alaska

Ozone and fine particles: Personal communication with Alaska Department of Environmental Conservation, 22 July 2004.

Arizona

Ozone and fine particles: Personal communication with Arizona Department of Environmental Quality, 7 July 2004.

Arkansas

Ozone: Personal communication with Arkansas Department of Environmental Quality, 25 June 2004.

Fine particles: Personal communication with Arkansas Department of Environmental Quality, 14 July 2004.

California
Ozone: Personal communication with California Air Resources Board, Air Quality Data Section, 28 June 2004.
Fine particles: Personal communication with California Air Resources Board, Air Quality Data Department, 14 July 2004.

Colorado
Ozone: Personal communication with Colorado Air Pollution Control Division, 30 July 2004.
Fine particles: Personal communication Colorado Air Pollution Control Division, 28 July 2004.

Connecticut
Ozone: *For 2003 8-hour data*: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/oms/index.html, 25 June 2004. *For 2003 1-hour data*: Personal communication with EPA's Region I Department of Air Quality, 9 July 2004. *For 2004 8-hour data:* EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/airquality/o3exceed-04.html, 9 September 2004.
Fine particles: Personal communication with Connecticut Department of Environmental Protection, Bureau of Air Management, 14 July 2004.

Delaware
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with Delaware Department of Natural Resources and Environmental Control, 16 July 2004.

District of Columbia
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: EPA, AirData, accessed at www.epa.gov/air/data/reports.html, 4 August 2004. (Obtained from EPA rather than the state agency.)

Florida
Ozone: *For 2003 and 2004 data*: Florida Department of Environmental Protection, accessed at www.dep.state.fl.us/air/flaqs/Ozn_MonthlyReport.asp, 7 July 2004 and 9 September 2004.
Fine particles: Florida Department of Environmental Protection accessed at www.dep.state.fl.us/Air/flaqs/PM_SelectReport.asp and www.dep.state.fl.us/air/publications/techrpt/quick/quick03.pdf, 17 July 2004.

Georgia
Ozone: *For 2003 data*: Personal communication with Georgia Department of Natural Resources, 29 June 2004. *For 2004 data*: Georgia Department of Natural Resources,

Environmental Protection Division, Air Protection Branch, accessed at www.air.dnr.state.ga.us/tmp/exceedances/index.php, 9 September 2004.
Fine particles: Personal communication with Georgia Environmental Protection Division, 22 July 2004.

Hawaii
Ozone and fine particles: Personal communication with Hawaii Department of Health, Environmental Health Division, 13 July 2004.

Idaho
Ozone and fine particles: Personal communication with Idaho Department of Environmental Quality, 7 July 2004.

Illinois
Ozone: Personal communication with Illinois Environmental Protection Agency, 28 June 2004.
Fine particles: Personal communication with Illinois Environmental Protection Agency, 14 July 2004.

Indiana
Ozone: Personal communication with Indiana Department of Environmental Management, 25 June 2004.
Fine particles: Personal communication with Indiana Department of Environmental Management, 13 July 2004.

Iowa
Ozone: Personal communication with Iowa Department of Natural Resources, 25 June 2004.
Fine particles: Personal communication with Iowa Department of Natural Resources, 7 July 2004.

Kansas
Ozone: Personal communication with Kansas Department of Health and Environment, 30 June 2004.
Fine particles: Personal communication with Kansas Department of Health and Environment, 14 July 2004.

Kentucky
Ozone: Personal communication with Kentucky Division for Air Quality, 25 June 2004.
Fine particles: Personal communication with Kentucky Division for Air Quality, 14 July 2004.

Louisiana
Ozone and fine particles: Personal communication with Louisiana Department of Environmental Quality, 8 July 2004.

Maine
Ozone: *For 2003 8-hour data*: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/oms/index.html, 25 June 2004. *For 2003 1-hour data*: Personal communication with EPA's Region I Department of Air Quality, 9 July 2004. *For 2004 8-hour*

data: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/airquality/o3exceed-04.html, 9 September 2004.
Fine particles: Personal communication with Maine Department of Environment Protection, 13 July 2004.

Maryland
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with Maryland Department of the Environment, 29 July 2004.

Massachusetts
Ozone: *For 2003 8-hour data*: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/oms/index.html, 25 June 2004. *For 2003 1-hour data*: Personal communication with EPA's Region I Department of Air Quality, 9 July 2004. *For 2004 8-hour data:* EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/airquality/o3exceed-04.html, 9 September 2004.
Fine particles: Personal communication with Massachusetts Department of Environmental Protection, 26 July 2004.

Michigan
Ozone: *For 8-hour data*: Michigan Department of Environmental Quality, accessed at www.deq.state.mi.us/aqi/content/deq-aqd-ozone-8hr_highest.pdf, 6 July 2004. *For 1-hour data*: Michigan Department of Environmental Quality, accessed at www.deq.state.mi.us/aqi/content/1hr_elevated.shtm, 6 July 2004.
Fine particles: Personal communication with Michigan Department of Environmental Quality, 19 July 2004.

Minnesota
Ozone and fine particles: Personal communication with Minnesota Pollution Control Agency, 19 July 2004.

Mississippi
Ozone: Personal communication with Mississippi Department of Environmental Quality, 6 July 2004.
Fine particles: EPA, AirData, accessed at www.epa.gov/air/data/reports.html, 4 August 2004. (Obtained from EPA rather than the state agency.)

Missouri
Ozone: Personal communication with Missouri Department of Natural Resources, 28 June 2004.
Fine particles: Personal communication with Missouri Department of Natural Resources, 14 July 2004.

Montana
Ozone and fine particles: Personal communication with Montana Department of Environmental Quality, 13 July 2004.

Nebraska
Ozone and fine particles: Personal communication with Nebraska Department of Environmental Quality, 13 July 2004.

Nevada
Ozone: *For 2003 data*: Personal communication with Clark County Department of Air Quality, 7 July 2004 and Washoe County Department of Air Quality, 25 June 2004.
Fine particles: Personal communication with Nevada Division of Environmental Protection, Bureau of Air Quality Planning, 14 July 2004.

New Hampshire
Ozone: *For 2003 8-hour data*: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/oms/index.html, 25 June 2004. *For 2003 1-hour data*: Personal communication with EPA's Region I Department of Air Quality, 9 July 2004. *For 2004 8-hour data:* EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/airquality/o3exceed-04.html, 9 September 2004.
Fine particles: Personal communication with New Hampshire Department of Environmental Services, 27 July 2004.

New Jersey
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with New Jersey Department of Environmental Protection, 15 July 2004.

New Mexico
Ozone: Personal communication with New Mexico Environment Department, 25 June 2004.
Fine particles: Personal communication with New Mexico Environment Department, Air Quality Bureau, 13 July 2004.

New York
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with New York State Department of Environmental Conservation, 21 July 2004.

North Carolina
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with North Carolina Department of Environment and Natural Resources, 15 July 2004.

North Dakota
Ozone and fine particles: Personal communication with North Dakota Department of Health, 13 July 2004.

Ohio
Ozone: Personal communication with Ohio Environmental Protection Agency, 25 June 2004.
Fine particles: Personal communication with Ohio Environmental Protection Agency, 22 July 2004.

Oklahoma
Ozone and fine particles: Personal communication with Oklahoma Department of Environmental Quality, 13 July 2004. *For 2004 ozone data*: Air Quality Division of the Department of Environmental Quality, accessed at www.deq.state.ok.us/AQDNew/monitoring/charts/oz8hr2004.htm, 10 September 2004.

Oregon
Ozone: Oregon Department of Environmental Quality, accessed at www.deq.state.or.us/aq/forms/2003ar/2003AQAnnualR.pdf, 25 June 2004.
Fine particles: Oregon Department of Environmental Quality, accessed at www.deq.state.or.us/aq/forms/2003ar/2003AQAnnualR.pdf, accessed 7 July 2004.

Pennsylvania
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with Pennsylvania Department of Environmental Protection, 28 July 2004.

Rhode Island
Ozone: *For 2003 8-hour data*: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/oms/index.html, 25 June 2004. *For 2003 1-hour data*: Personal communication with EPA's Region I Department of Air Quality, 9 July 2004. *For 2004 8-hour data:* EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/airquality/o3exceed-04.html, 9 September 2004.
Fine particles: Personal communication with Rhode Island Department of Environmental Management, 28 July 2004.

South Carolina
Ozone: *For 2003 data*: South Carolina Department of Health and Environment Control, accessed at www.scdhec.net/eqc/baq/pubs/03summry.xls, 25 June 2004. *For 2004 8-hour data*: South Carolina Department of Health and Environment Control, accessed at www.scdhec.net/eqc/baq/pubs/04summry.xls, 9 September 2004.
Fine particles: Personal communication with South Carolina Department of Health and Environmental Control, 20 July 2004.

South Dakota
Ozone and fine particles: Personal communication with South Dakota Department of Environment and Natural Resources, 13 July 2004.

Tennessee
Ozone: Tennessee Department of Environment and Conservation, accessed at www.state.tn.us/environment/apc/ozone/ozonedata.php, 7 July 2004.
Fine particles: Personal communication with Tennessee Department of Environment and Conservation, 14 July 2004.

Texas
Ozone: *For 2003 and 2004 data*: Texas Natural Resource Conservation Commission, accessed at www.tnrcc.state.tx.us/air/monops/ozoneindx.html and www.tnrcc.state.tx.us/cgi-bin/monops/8hr_exceed, 25 June 2004 and 9 September 2004.
Fine particles: Personal communication with Texas Commission on Environmental Quality, Office of Environmental Policy, 27 July 2004.

Utah
Ozone: Personal communication with Utah Department of Environmental Quality, 25 June 2004.
Fine particles: Personal communication with Utah Department of Environmental Quality, 13 July 2004.

Vermont
Ozone: *For 2003 8-hour data*: EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/oms/index.html, 25 June 2004. *For 2003 1-hour data*: Personal communication with EPA's Region I Department of Air Quality, 9 July 2004. *For 2004 8-hour data:* EPA's Region I Air Quality Index website, accessed at www.epa.gov/region01/airquality/o3exceed-04.html, 9 September 2004.
Fine particles: Personal communication with Vermont Department of Environmental Conservation, 16 July 2004.

Virginia
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Virginia Department of Environmental Quality, accessed at www.deq.virginia.gov/airmon/pm2003.html and www.deq.virginia.gov/airmon/pm2003a.html, 15 July 2004.

Washington
Ozone and fine particles: Personal communication with Washington Department of Ecology, 8 July 2004.

West Virginia
Ozone: *For 2003 data*: Mid-Atlantic Regional Air Management Association website, accessed at www.marama.org/ozone/2003/listByState.html, 25 June 2004. *For 2004 data*: Mid-Atlantic

Regional Air Management Association website, www.marama.org/ozone/2004/listByState.html, 9 September 2004.
Fine particles: Personal communication with West Virginia Department of Environmental Protection, 15 July 2004.

Wisconsin
Ozone and fine particles: Personal communication with Wisconsin Department of Natural Resources, 9 July 2004.

Wyoming
Ozone and fine particles: Personal communication with Wyoming Department of Environmental Quality, 23 July 2004.

Appendix A. Unhealthy Levels of Ozone by State, 2001-2003

Rank	State	Exceedances of 8-Hour Ozone Health Standard, 2003	Exceedances of 8-Hour Ozone Health Standard, 2002	Exceedances of 8-Hour Ozone Health Standard, 2001	Exceedances of 1-Hour Ozone Health Standard, 2003	Exceedances of 1-Hour Ozone Health Standard, 2002	Exceedances of 1-Hour Ozone Health Standard, 2001
1	California	2,298	2,306	1,359	410	326	241
2	Texas	449	397	310	127	83	108
3	Ohio	205	800	250	22	22	2
4	Pennsylvania	156	594	393	14	26	14
5	Michigan	122	221	159	7	6	5
6	North Carolina	110	602	182	4	19	6
7	New York	103	290	143	7	29	10
8	Indiana	93	422	104	2	24	2
9	Louisiana	89	10	41	12	5	1
10	Wisconsin	80	147	169	5	15	8
11	New Jersey	79	291	190	11	38	26
12	Missouri	75	174	14	6	5	1
13	Virginia	73	264	149	7	29	3
14	Colorado	60	8	3	7	0	0
15	Connecticut	59	179	105	18	51	38
16	Maryland	57	275	214	11	44	22
17	Tennessee	50	320	95	1	1	1
18	Arizona	42	68	27	0	0	0
19	Georgia	36	166	64	3	14	4
20	Florida	34	3	60	0	0	2
21	Massachusetts	33	122	125	2	22	10
22	Illinois	30	217	40	3	7	2
23	Nevada	28	23	11	0	0	0
24	Kentucky	27	225	54	0	3	1
25	Mississippi	26	15	10	0	1	0
26	Oklahoma	23	20	24	0	0	1
27	Delaware	20	74	53	4	6	2
28	Maine	19	69	58	0	12	3
28	West Virginia	19	80	24	0	2	0
30	Alabama	15	57	31	0	1	3
30	Utah	15	19	15	0	0	1
32	Rhode Island	13	29	34	1	3	8
33	Kansas	11	5	5	0	0	0
33	South Carolina	11	189	48	0	0	0
35	District of Columbia	8	44	24	0	9	3
36	Arkansas	7	24	14	1	2	1
37	Washington	3	0	1	0	0	0
38	Minnesota	2	2	3	0	0	1
39	Iowa	1	7	1	0	0	0
39	New Hampshire	1	51	23	0	5	3
39	New Mexico	1	0	2	0	0	0
42	Idaho	0	1	1	0	0	0
42	Oregon	0	1	0	0	0	0
42	Vermont	0	7	2	0	1	0

* Alaska, Hawaii, Montana, Nebraska, North Dakota, South Dakota, and Wyoming did not exceed the ozone health standards from 2001-2003.

Appendix B. Smog Days by State, 2003

Rank	State	Number of Smog Days
1	California	149
2	Texas	69
3	Louisiana	28
4	Colorado	22
5	Indiana	20
6	Georgia	19
6	Missouri	19
6	New Jersey	19
6	Ohio	19
10	Tennessee	17
11	Michigan	16
11	Pennsylvania	16
13	Arizona	15
14	Connecticut	14
14	North Carolina	14
16	New York	13
16	Oklahoma	13
18	Wisconsin	12
19	Florida	11
19	Illinois	11
19	Massachusetts	11

Rank	State	Number of Smog Days
19	Nevada	11
19	Virginia	11
24	Rhode Island	10
25	Kentucky	9
25	Maryland	9
25	Mississippi	9
28	Kansas	8
29	Alabama	7
29	Arkansas	7
29	Delaware	7
29	Utah	7
33	South Carolina	6
33	West Virginia	6
35	Maine	5
36	District of Columbia	3
36	Washington	3
38	Minnesota	2
39	Iowa	1
39	New Hampshire	1
39	New Mexico	1

Appendix C. Smog Days and Exceedances of 8-Hour and 1-Hour Ozone Health Standards in Large Metropolitan Areas, 2003

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
1	Riverside-San Bernardino-Ontario, CA	3,254,821	103	675	211	0.153
2	Los Angeles-Long Beach-Santa Ana, CA	12,365,627	88	302	120	0.152
3	Houston-Baytown-Sugar Land, TX	4,715,407	47	257	119	0.141
4	Sacramento-Arden Arcade-Roseville, CA	1,796,857	43	141	12	0.122
5	Dallas-Fort Worth-Arlington, TX	5,161,544	31	122	6	0.13
6	Philadelphia-Camden-Wilmington, PA-NJ-DE	5,687,147	29	64	5	0.131
7	New York-Northern New Jersey-Long Island, NY-NJ-PA	18,323,002	21	71	11	0.131
8	Kansas City, MO-KS	1,836,038	18	32	0	0.106
8	Providence-New Bedford-Fall River, RI-MA	1,582,997	18	21	2	0.117
8	St. Louis, MO-IL	2,698,687	18	66	9	0.116
11	Cincinnati-Middletown, OH-KY-IN	2,009,632	17	43	2	0.121
11	Denver-Aurora, CO	2,179,240	17	48	6	0.119
13	Washington-Arlington-Alexandria, DC-VA-MD	4,796,183	16	64	8	0.13
14	Atlanta-Sandy Springs-Marietta, GA	4,247,981	13	28	3	0.108
14	Chicago-Naperville-Joliet, IL-IN-WI	9,098,316	13	29	0	0.099
16	Phoenix-Mesa-Scottsdale, AZ	3,251,876	12	37	0	0.103
17	San Antonio, TX	1,711,703	11	23	0	0.096
18	Indianapolis, IN	1,525,104	10	39	0	0.103
18	Las Vegas-Paradise, NV	1,375,765	10	27	0	0.094
20	Baltimore-Towson, MD	2,552,994	9	26	6	0.153
20	Memphis, TN-MS-AR	1,205,204	9	9	1	0.108
20	New Orleans-Metairie-Kenner, LA	1,316,510	9	15	0	0.103
20	Pittsburgh, PA	2,431,087	9	45	10	0.122
24	Milwaukee-Waukesha-West Allis, WI	1,500,741	8	32	1	0.112
25	Cleveland-Elyria-Mentor, OH	2,148,143	7	27	2	0.12
25	Columbus, OH	1,612,694	7	30	4	0.129
25	Detroit-Warren-Livonia, MI	4,452,557	7	36	6	0.123
25	Hartford-West Hartford-East Hartford, CT	1,148,618	7	8	1	0.111
25	Louisville, KY-IN	1,161,975	7	7	0	0.096
25	San Jose-Sunnyvale-Santa Clara, CA	1,735,819	7	12	0	0.101
31	Buffalo-Niagara Falls, NY	1,170,111	6	11	0	0.11
31	San Diego-Carlsbad-San Marcos, CA	2,813,833	6	6	1	0.103
31	Tampa-St. Petersburg-Clearwater, FL	2,395,997	6	6	0	0.093
34	Richmond, VA	1,096,957	5	15	1	0.107
35	Austin-Round Rock, TX	1,249,763	4	6	0	0.096
35	Birmingham-Hoover, AL	1,052,238	4	6	0	0.096
35	Boston-Cambridge-Quincy, MA-NH	4,391,344	4	11	1	0.109
35	Charlotte-Gastonia-Concord, NC-SC	1,330,448	4	10	1	0.114
35	Nashville-Davidson--Murfreesboro, TN	1,311,789	4	5	0	0.095
35	San Francisco-Oakland-Fremont, CA	4,123,740	4	6	1	0.094

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
35	Virginia Beach-Norfolk-Newport News, VA-NC	1,576,370	4	8	2	0.112
42	Rochester, NY	1,037,831	3	5	0	0.101
42	Seattle-Tacoma-Bellevue, WA	3,043,878	3	3	0	0.097
44	Oklahoma City, OK	1,095,421	2	5	0	0.093
45	Miami-Fort Lauderdale-Miami Beach, FL	5,007,564	1	1	0	0.091
45	Minneapolis-St. Paul-Bloomington, MN-WI	2,968,806	1	1	0	0.085
45	Orlando, FL	1,644,561	1	1	0	0.086

Appendix D. Smog Days and Exceedances of 8-Hour and 1-Hour Ozone Health Standards in Mid-Sized Metropolitan Areas, 2003

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
1	Bakersfield, CA	661,645	116	374	29	0.127
2	Fresno, CA	799,407	97	283	26	0.116
3	Visalia-Porterville, CA	368,021	92	198	3	0.115
4	Oxnard-Thousand Oaks-Ventura, CA	753,197	31	61	2	0.114
5	Baton Rouge, LA	705,973	21	56	12	0.119
6	Modesto, CA	446,997	18	19	0	0.1
7	Bridgeport-Stamford-Norwalk, CT	882,567	11	25	11	0.125
7	Huntington-Ashland, WV-KY-OH	288,649	11	12	0	0.106
7	Knoxville, TN	616,079	11	20	0	0.1
7	New Haven-Milford, CT	824,008	11	16	4	0.124
7	Youngstown-Warren-Boardman, OH-PA	602,964	11	19	2	0.116
12	Beaumont-Port Arthur, TX	385,090	10	23	2	0.114
13	Tulsa, OK	859,532	9	14	0	0.094
14	Dayton, OH	848,153	8	16	4	0.121
14	Fort Collins-Loveland, CO	251,494	8	8	0	0.092
16	Flint, MI	436,141	7	11	0	0.103
16	South Bend-Mishawaka, IN-MI	316,663	7	17	0	0.094
16	Trenton-Ewing, NJ	350,761	7	7	0	0.11
19	Greensboro-High Point, NC	643,430	6	9	0	0.111
19	Toledo, OH	659,188	6	25	0	0.104
19	Winston-Salem, NC	421,961	6	12	0	0.106
22	Albany-Schenectady-Troy, NY	825,875	5	11	0	0.1
22	Ann Arbor, MI	322,895	5	5	0	0.107
22	Canton-Massillon, OH	406,934	5	16	2	0.116
22	Durham, NC	426,493	5	7	0	0.098
22	Grand Rapids-Wyoming, MI	740,482	5	9	0	0.107
22	Green Bay, WI	282,599	5	8	1	0.111
22	Norwich-New London, CT	259,088	5	5	1	0.113
22	Raleigh-Cary, NC	797,071	5	19	0	0.115
22	Salt Lake City, UT	968,858	5	8	0	0.091
22	Santa Barbara-Santa Maria-Goleta, CA	399,347	5	7	0	0.102
22	Syracuse, NY	650,154	5	9	0	0.109
33	Akron, OH	694,960	4	8	2	0.123
33	Allentown-Bethlehem-Easton, PA-NJ	740,395	4	11	0	0.108
33	Atlantic City, NJ	252,552	4	4	0	0.11
33	Charleston, WV	309,635	4	4	0	0.096
33	Erie, PA	280,843	4	4	0	0.109
33	Fayetteville, NC	336,609	4	7	0	0.091
33	Kalamazoo-Portage, MI	314,866	4	4	0	0.092
33	Lansing-East Lansing, MI	447,728	4	8	0	0.096
33	Pensacola-Ferry Pass-Brent, FL	412,153	4	10	0	0.104
33	Poughkeepsie-Newburgh-Middletown, NY	621,517	4	4	0	0.091
43	Chattanooga, TN-GA	476,531	3	5	0	0.103

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
43	Harrisburg-Carlisle, PA	509,074	3	7	0	0.108
43	Hickory-Morganton-Lenoir, NC	341,851	3	3	0	0.088
43	Lancaster, PA	470,658	3	3	1	0.135
43	Mobile, AL	399,843	3	4	0	0.098
43	Reading, PA	373,638	3	4	1	0.106
43	Sarasota-Bradenton-Venice, FL	589,959	3	7	0	0.097
43	Scranton--Wilkes-Barre, PA	560,625	3	9	0	0.094
43	Shreveport-Bossier City, LA	375,965	3	3	0	0.093
43	Spartanburg, SC	253,791	3	3	0	0.094
43	Springfield, MA	680,014	3	3	0	0.099
43	York-Hanover, PA	381,751	3	3	0	0.107
55	Boulder, CO	269,814	2	2	0	0.086
55	Columbia, SC	647,158	2	2	0	0.093
55	Corpus Christi, TX	403,280	2	3	0	0.093
55	El Paso, TX	679,622	2	2	0	0.097
55	Fort Wayne, IN	390,156	2	2	0	0.093
55	Ogden-Clearfield, UT	442,656	2	2	0	0.092
55	Portland-South Portland, ME	487,568	2	6	0	0.093
55	Provo-Orem, UT	376,774	2	3	0	0.103
55	Stockton, CA	563,598	2	3	0	0.089
55	Tallahassee, FL	320,304	2	2	0	0.085
55	Utica-Rome, NY	299,896	2	4	0	0.099
66	Asheville, NC	369,171	1	1	0	0.088
66	Cape Coral-Fort Myers, FL	440,888	1	1	0	0.088
66	Colorado Springs, CO	537,484	1	0	1	n/a
66	Evansville, IN-KY	342,815	1	3	0	0.091
66	Lexington-Fayette, KY	408,326	1	2	0	0.09
66	Little Rock-North Little Rock, AR	610,518	1	1	0	0.086
66	Madison, WI	501,774	1	1	0	0.087
66	Manchester-Nashua, NH	380,841	1	1	0	0.085
66	McAllen-Edinburg-Pharr, TX	569,463	1	1	0	0.085
66	Ocala, FL	258,916	1	2	0	0.088
66	Reno-Sparks, NV	342,885	1	1	0	0.09
66	Roanoke, VA	288,309	1	1	0	0.091
66	Springfield, MO	368,374	1	1	0	0.085
66	Tucson, AZ	843,746	1	1	0	0.087
66	Wichita, KS	571,166	1	1	0	0.089
66	Worcester, MA	750,963	1	1	0	0.089

Appendix E. Smog Days and Exceedances of 8-Hour and 1-Hour Ozone Health Standards in Small Metropolitan Areas, 2003

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
1	Merced, CA	210,554	54	54	0	0.11
2	Truckee-Grass Valley, CA	92,033	23	31	0	0.103
3	Hanford-Corcoran, CA	129,461	15	15	0	0.1
4	Madera, CA	123,109	14	14	0	0.102
5	El Centro, CA	142,361	11	9	3	0.097
6	Barnstable Town, MA	222,230	8	8	0	0.11
6	Chico, CA	203,171	8	8	0	0.091
6	Salisbury, NC	130,340	8	12	3	0.116
9	Allegan, MI	105,665	7	7	0	0.106
9	Gulfport-Biloxi, MS	246,190	7	17	0	0.098
9	Phoenix Lake-Cedar Ridge, CA	54,501	7	7	0	0.088
9	Traverse City, MI	131,342	7	7	0	0.098
9	Watertown-Fort Drum, NY	111,738	7	7	0	0.107
9	Wilmington, OH	40,543	7	7	0	0.103
15	Holland-Grand Haven, MI	238,314	6	6	0	0.102
15	Jamestown-Dunkirk-Fredonia, NY	139,750	6	10	2	0.118
15	Manitowoc, WI	82,887	6	8	1	0.113
15	Niles-Benton Harbor, MI	162,453	6	6	0	0.103
15	Redding, CA	163,256	6	6	0	0.096
15	Vineland-Millville-Bridgeton, NJ	146,438	6	6	1	0.12
15	Yuba City-Marysville, CA	139,149	6	6	0	0.099
22	Adrian, MI	98,890	5	5	0	0.112
22	Anderson, IN	133,358	5	5	1	0.102
22	Ashtabula, OH	102,728	5	5	1	0.109
22	Bloomington, IN	175,506	5	5	0	0.092
22	Dalton, GA	120,031	5	5	0	0.099
22	Hagerstown-Martinsburg, MD-WV	222,771	5	5	0	0.101
22	Lake Charles, LA	193,568	5	7	0	0.1
22	Lima, OH	108,473	5	5	0	0.103
22	Lincolnton, NC	63,780	5	5	0	0.095
22	Muskegon-Norton Shores, MI	170,200	5	5	0	0.109
22	Parkersburg-Marietta, WV-OH	164,624	5	5	1	0.126
22	Seaford, DE	156,638	5	8	2	0.122
22	Torrington, CT	182,193	5	5	0	0.098
22	Weirton-Steubenville, WV-OH	132,008	5	5	0	0.107
36	DuBois, PA	83,382	4	4	0	0.102
36	Marshall, TX	62,110	4	4	0	0.097
36	Morristown, TN	123,081	4	4	1	0.1
36	Sheboygan, WI	112,646	4	8	1	0.113
36	State College, PA	135,758	4	7	0	0.107
36	Williamsport, PA	120,044	4	5	0	0.1
42	Altoona, PA	129,144	3	3	1	0.104
42	Chambersburg, PA	129,313	3	3	0	0.096

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
42	Greenville, NC	152,772	3	3	0	0.095
42	Harrison, AR	42,556	3	3	0	0.093
42	Kingsport-Bristol, TN-VA	230,014	3	5	0	0.098
42	Kingston, NY	177,749	3	3	0	0.094
42	Kinston, NC	59,648	3	3	0	0.092
42	Lafayette, LA	239,086	3	3	0	0.088
42	Michigan City-La Porte, IN	110,106	3	3	1	0.098
42	Mount Vernon, OH	54,500	3	3	0	0.112
42	Muncie, IN	118,769	3	3	0	0.095
42	Natchez, MS-LA	54,587	3	3	0	0.09
42	Panama City-Lynn Haven, FL	148,217	3	3	0	0.099
42	Pascagoula, MS	150,564	3	5	0	0.096
42	Payson, AZ	51,335	3	3	0	0.093
42	Red Bluff, CA	56,039	3	3	0	0.088
42	Rockland, ME	39,618	3	3	0	0.107
42	Rocky Mount, NC	143,026	3	3	0	0.097
42	Sevierville, TN	71,170	3	5	0	0.098
42	Springfield, OH	144,742	3	6	2	0.12
42	Wheeling, WV-OH	153,172	3	3	0	0.111
63	Alexandria, LA	145,035	2	2	0	0.088
63	Brigham City, UT	42,745	2	2	0	0.099
63	Cadillac, MI	44,962	2	2	0	0.095
63	Clarksville, TN-KY	232,000	2	2	0	0.086
63	Dover, DE	126,697	2	2	1	0.104
63	Elizabeth City, NC	53,150	2	2	0	0.091
63	Florence, SC	193,155	2	2	0	0.087
63	Gettysburg, PA	91,292	2	2	0	0.099
63	Greeley, CO	180,926	2	2	0	0.093
63	Johnstown, PA	152,598	2	2	0	0.101
63	Lawrence, KS	99,962	2	2	0	0.099
63	Longview, TX	194,042	2	2	0	0.087
63	Morgantown, WV	111,200	2	2	0	0.097
63	New Castle, PA	94,643	2	2	1	0.122
63	Pittsfield, MA	134,953	2	2	0	0.104
63	Roanoke Rapids, NC	79,456	2	2	0	0.087
63	Terre Haute, IN	170,943	2	4	0	0.09
63	Victoria, TX	111,663	2	2	0	0.095
63	Whitewater, WI	93,759	2	2	0	0.086
82	Americus, GA	36,966	1	1	0	0.086
82	Anderson, SC	165,740	1	1	0	0.085
82	Appleton, WI	201,602	1	1	0	0.085
82	Ardmore, OK	54,452	1	1	0	0.085
82	Athens-Clarke County, GA	166,079	1	1	0	0.085
82	Augusta-Waterville, ME	117,114	1	1	0	0.086
82	Bangor, ME	144,919	1	2	0	0.11
82	Beaver Dam, WI	85,897	1	1	0	0.085
82	Bowling Green, KY	104,166	1	1	0	0.09
82	Daphne-Fairhope, AL	140,415	1	1	0	0.095
82	Decatur, AL	145,867	1	2	0	0.093
82	Elmira, NY	91,070	1	1	0	0.091

Rank	Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard	Maximum Exceedance of 8-Hour Ozone Health Standard (ppm)
82	Florence, AL	142,950	1	1	0	0.086
82	Gaffney, SC	52,537	1	1	0	0.087
82	Granbury, TX	47,909	1	1	0	0.086
82	Houma-Bayou Cane-Thibodaux, LA	194,477	1	1	0	0.085
82	Huntington, IN	38,075	1	1	0	0.085
82	Lafayette, IN	178,541	1	1	0	0.087
82	Las Cruces, NM	174,682	1	1	0	0.09
82	Lawrenceburg, TN	39,926	1	1	0	0.085
82	Lawton, OK	114,996	1	1	0	0.086
82	Macon, GA	222,368	1	1	0	0.089
82	Mayfield, KY	37,028	1	1	0	0.087
82	Monroe, LA	170,053	1	1	0	0.088
82	Owensboro, KY	109,875	1	1	0	0.087
82	Paducah, KY-IL	98,765	1	2	0	0.087
82	San Luis Obispo-Paso Robles, CA	246,681	1	1	0	0.089
82	Tyler, TX	174,706	1	1	0	0.087
82	Winchester, VA-WV	102,997	1	1	0	0.094
82	Yuma, AZ	160,026	1	1	0	0.091

Appendix F. Preliminary 2004 Data on Exceedances of Ozone Health Standards by Metropolitan Area

Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
Albany-Schenectady-Troy, NY	825,875	2	6	0
Allentown-Bethlehem-Easton, PA-NJ	740,395	8	10	0
Athens-Clarke County, GA	166,079	2	2	1
Atlanta-Sandy Springs-Marietta, GA	4,247,981	11	37	3
Augusta-Richmond County, GA-SC	499,684	3	4	0
Austin-Round Rock, TX	1,249,763	2	3	0
Baltimore-Towson, MD	2,552,994	10	22	1
Barnstable Town, MA	222,230	3	3	*
Beaumont-Port Arthur, TX	385,090	8	11	2
Bennington, VT	36,994	1	1	*
Berlin, NH-VT	39,570	1	1	*
Big Meadows, VA**	**	1	1	0
Boston-Cambridge-Quincy, MA-NH	4,391,344	4	11	*
Bridgeport-Stamford-Norwalk, CT	882,567	5	9	*
Charlotte-Gastonia-Concord, NC-SC	1,330,448	4	8	0
Chesterfield, SC**	**	1	1	*
Claremont, NH**	**	1	1	*
Columbia, SC	647,158	4	5	*
Concord, NH	136,225	1	1	*
Dallas-Fort Worth-Arlington, TX	5,161,544	20	68	3
Due West, SC**	**	1	1	*
El Paso, TX	679,622	1	0	1
Fayette County, TX**	**	4	4	0
Florence, SC	193,155	1	1	*
Graham County, NC**	**	2	2	0
Granbury, TX	47,909	1	1	0
Greensboro-High Point, NC	643,430	1	1	0
Hagerstown-Martinsburg, MD-WV	222,771	1	2	0
Harrisburg-Carlisle, PA	509,074	1	1	0
Hartford-West Hartford-East Hartford, CT	1,148,618	4	4	*
Houston-Baytown-Sugar Land, TX	4,715,407	36	165	65
Jacksonville, FL	1,122,750	3	4	0
Jamestown-Dunkirk-Fredonia, NY	139,750	4	4	0
Lakeland-Winter Haven, FL	483,924	1	0	1
Lancaster, PA	470,658	1	1	0
Longview, TX	194,042	3	3	0
Macon, GA	222,368	3	3	0
Manchester-Nashua, NH	380,841	3	4	*
Marshall, TX	62,110	1	1	0
Miami-Fort Lauderdale-Miami Beach, FL	5,007,564	1	1	0
Millington, MD**	**	2	2	0
New Haven-Milford, CT	824,008	3	3	*
New York-Northern New Jersey-Long Island, NY-NJ-PA	18,323,002	11	26	1
Norwich-New London, CT	259,088	1	1	*
Orlando, FL	1,644,561	2	2	0
Panama City-Lynn Haven, FL	148,217	1	1	0

Metropolitan Statistical Area	Population	Number of Smog Days	Exceedances of 8-Hour Ozone Health Standard	Exceedances of 1-Hour Ozone Health Standard
Pensacola-Ferry Pass-Brent, FL	412,153	3	4	0
Philadelphia-Camden-Wilmington, PA-NJ-DE	5,687,147	9	37	0
Pittsburgh, PA	2,431,087	2	2	0
Pittsfield, MA	134,953	1	1	*
Portland-South Portland, ME	487,568	1	2	*
Poughkeepsie-Newburgh-Middletown, NY	621,517	2	3	0
Providence-New Bedford-Fall River, RI-MA	1,582,997	4	9	*
Raleigh-Cary, NC	797,071	1	1	0
Reading, PA	373,638	1	1	0
Richmond, VA	1,096,957	2	2	0
Salisbury, NC	130,340	2	2	0
San Antonio, TX	1,711,703	8	17	1
Sarasota-Bradenton-Venice, FL	589,959	5	10	0
Seaford, DE	156,638	2	2	0
Spartanburg, SC	253,791	2	2	*
Springfield, MA	680,014	3	5	*
Tishomingo, OK**	**	1	1	*
Torrington, CT	182,193	2	2	*
Trenton-Ewing, NJ	350,761	1	1	0
Vineland-Millville-Bridgeton, NJ	146,438	2	2	0
Virginia Beach-Norfolk-Newport News, VA-NC	1,576,370	1	2	0
Washington-Arlington-Alexandria, DC-VA-MD	4,796,183	8	47	5
Watertown-Fort Drum, NY	111,738	1	1	0
Winchester, VA-WV	102,997	1	1	0
York-Hanover, PA	381,751	1	1	0
Youngstown-Warren-Boardman, OH-PA	602,964	1	1	0

* 1-hour data not available.

** Not located in a Metropolitan Statistical Area; population not available.

Endnotes

[1] U.S. Environmental Protection Agency (EPA), *National Air Quality and Emissions Trends Report, 1999*, March 2001, 138-141.
[2] Ibid., 142-147.
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