# Danger in the Air:

## Acknowledgements

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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.

### **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

#### **Fine Particle Pollution**

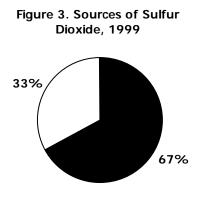
Solid particles and liquid droplets in the air are referred to as particle pollution. Some particles are large enough to be seen as dust or dirt; others are too small to be seen with the naked eye, though we see the haze that forms when particles obscure city skylines or scenic vistas in our national 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.<sup>4</sup>

"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<sub>2</sub>, are the dominant form of fine particles east of the Mississippi.<sup>5</sup> Power plants emit 67 percent of U.S. SO<sub>2</sub> emissions (see Figure 3).<sup>6</sup>



■ Power plants □ Other sources

### **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.<sup>7</sup> 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.<sup>8</sup> 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.<sup>9</sup> 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.<sup>10</sup>

Since 1997, more than 1,700 additional studies on the health and environmental effects of ozone have been published in peer-reviewed journals.<sup>11</sup> 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.<sup>12</sup> 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.<sup>14</sup> 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. Α 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.<sup>15</sup>

#### Hospital Admissions of Young Children

EPA concluded in 1997 that 10 to 20 percent of all summertime respiratoryrelated hospital visits in the Northeast U.S.zone n1sy 9e serious heart defects, including aortic artery and valve defects.<sup>18</sup>

#### 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.<sup>19</sup>

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.<sup>20</sup>

#### Fine Particle Pollution

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

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 24hour and annual standards for fine particles of 65 micrograms per cubic meter ( $\mu g/c^3$ ) and 15  $\mu$ g/c<sup>3</sup>, respectively.<sup>24</sup>

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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 longterm fine particle exposure to cardiopulmonary mortality but not to specific diseases.<sup>28</sup> 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

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.

#### Table 2. EPA's Air Quality Index for Fine Particles<sup>34</sup>

### **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.<sup>35</sup> Since 1980, 8-hour ozone levels have decreased by 21 percent nationally (see Figure 4).<sup>36</sup> However, in the

8-hour ozone levels declined 1990s. 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).<sup>37</sup>

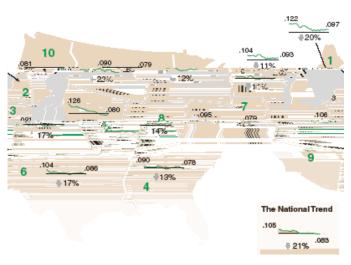
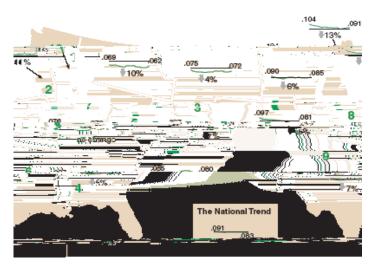


Figure 4. Trend in 8-Hour Ozone Levels Averaged Across EPA Regions, 1980–2003<sup>38</sup>

Figure 5. Trend in 8-Hour Ozone Levels Averaged Across EPA Regions, 1990–2003<sup>39</sup>



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 Fine Particle Pollution

## **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.<sup>48</sup> 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.<sup>49</sup>

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.<sup>50</sup>

#### '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. recommendations to EPA. In June 2004, EPA released its own recommendations.<sup>51</sup>

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.<sup>52</sup> While the EPA list is more complete, it excludes several areas that fail to meetEPA li

## **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 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

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

Table 4. 15 Most Ozone-Polluted Mid-Sized 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

## Table 6. Exceedances of Ozone Health Standards at Parks and Other AreasNot Located in Metropolitan Areas, 2003

## *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 8hour ozone concentration in 2003 with recorded values of 0.153 ppm, or almost

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



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-Norw(.(01.615.81o-Ontario, CA)-12	880(0.126) <b>T</b> JET104.5

68 6/25/03 Bridgeport-Stamford-Norw(.(01.615.81o-Ontario, CA)-12880(0.126)] JET 104.5nr0/refBT9 0 0 9 174011 Tw

#### 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.<sup>55</sup>

Table 10. Small Metropolitan Areas Plagued by Year-Round 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

#### Table 11. States Exceeding Health Standards for 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 13. Mid-Sized Metropolitan Areas with Spikes in Particle Pollution, 2003

#### 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

## *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<sup>3</sup>) on EPA's Air Quality Index in 2003 (see Table 16). When air is very unhealthy due to particle

## Preliminary 2004 Ozone Data

This report also examines preliminary 2004 data for 19 states and the District of

## **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 rewrite the rules, energy companies weakening rather strengthening than 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.<sup>59</sup> Within the first 60 days of the administration, President Bush reversed his campaign pledge to cap global warming pollution from power plant smokestacks.<sup>60</sup> The administration guickly 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.<sup>61</sup> 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.<sup>62</sup> 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 -5.6(8mTJin -5.aJ7the 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

**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.

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 I daho 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

#### 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

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#### North Dakota

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

Rank	State	8-Hour Ozone	8-Hour Ozone	Exceedances of 8-Hour Ozone Health Standard, 2001	1-Hour Ozone	1-Hour Ozone	1-Hour Ozone
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

## 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

				Exceedances	Exceedances	Maximum
			Number	of 8-Hour	of 1-Hour	Exceedance of
			of	Ozone	Ozone	8-Hour Ozone
			Smog	Health	Health	Health Standard
Rank	Metropolitan Statistical Area	Population	Days	Standard	Standard	

### 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



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



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

Metropolitan Statistical Area	Population	Number of Smog Days	8-Hour Ozone	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

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.

### **Endnotes**

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<sup>4</sup> Ibid., 34.

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<sup>6</sup> EPA, *National Air Quality and Emissions Trends Report, 1999*, March 2001, 153-155.

<sup>7</sup> EPA, Air Quality Criteria for Ozone and Related Photochemical Oxidants, 1996.

<sup>8</sup> American Lung Association (ALA), *State of the Air 2004*, April 2004.

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 <sup>10</sup> Ibid.

<sup>11</sup> EPA, *Final Regulatory Impact Analysis: Control of Emissions from Non-Road Diesel Engines*, May 2004, 2-90.

<sup>12</sup> Rob McConnell et al, "Asthma in Exercising Children Exposed to Ozone: A Cohort Study," *The Lancet*, 359, 386-391, 2 February 2002.

<sup>13</sup> Centers for Disease Control and Prevention, National Center for Environmental Health, Asthma's Impact on Children and Adolescents (fact sheet), downloaded from

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<sup>14</sup> George D. Thurston and David V. Bates, "Air Pollution as an Underappreciated Cause of Asthma Symptoms," *JAMA*, 290(14), 1915-1917, 8 October 2003.

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<sup>27</sup> C. Arden Pope et al, "Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Air Pollution, JAMA, 287(9), 1132-1141, 6 March 2002.

<sup>28</sup> C. Arden Pope et al, "Cardiovascular Mortality and Long-Term Exposure to Particulate Air Pollution: Epidemiological Evidence of General Pathophysiological Pathways of Disease," Circulation, 109, 71-77, 2004.

<sup>29</sup> EPA, Final Report to Congress on Benefits and Costs of the Clean Air Act, 1970 to 1990, October 1997, I-23, downloaded from www.epa.gov/air/sect812/copy.html, 2 September 2004.

<sup>30</sup> See Robert D. Brook et al. "Air Pollution and Cardiovascular Disease: A Statement for Healthcare Professionals from the Expert Panel on Population and Prevention Science of the American Heart Association," *Circulation*, 109, 2655-2671, 2004, 2666; and Comments of the American Lung Association on EPA's OAQPS Staff Paper - First Draft, on the Review of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM): Policy Assessment of Scientific and Technical Information, 11 November 2003.

<sup>31</sup> Luke Clancy et al, "Effect of Air-Pollution Control on Death Rates in Dublin, Ireland: An Intervention Study," *The Lancet*, 360, 1210-1214, 19 October 2002. <sup>32</sup> EPA, *Air Quality Index: A Guide to Air Quality and Your Health*, June 2000.

<sup>33</sup> EPA, *Guideline for Reporting of Daily Air Quality—Air Quality Index*, July 1999, 13.

<sup>34</sup> Ibid., 13.

<sup>35</sup> EPA, National Air Quality and Emissions Trends Report: 2003 Special Studies Edition, September 2003,

<sup>36</sup> EPA, *The Ozone Report: Measuring Progress Through 2003*, April 2004, 8.

<sup>37</sup> Ibid., 11-12.

<sup>38</sup> Ibid., 11.

<sup>39</sup> Ibid., 12.

<sup>40</sup> U.S. PIRG Education Fund, *Danger in the Air: Unhealthy Levels of Smog in 2002*, August 2003.

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<sup>47</sup> EPA, 8-Hour Ground-Level Ozone Designations, Fact Sheet, Clean Air Ozone Rules of 2004, Final Rule Designating and Classifying Areas Not Meeting the National Air Quality Standard For 8-Hour Ozone, downloaded from www.epa.gov/air/oaqps/glo/designations/finrulefs.htm, 2 September 2004.

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<sup>49</sup> EPA, 8-Hour Ground-Level Ozone Designations, Fact Sheet, Clean Air Ozone Rules of 2004, Final Rule Designating and Classifying Areas Not Meeting the National Air Quality Standard For 8-Hour Ozone,

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<sup>50</sup> Earthiustice, Weak Rules Leave Hundreds of Communities Breathing Dirty Air: Groups File Suit Challenging Inadequate Ozone Regulations (press release), 29 June 2004.

<sup>51</sup> EPA, Fine Particle (PM 2.5) Designations, Recommendations for Areas to Be Designated 'Nonattainment' for the Fine Particle National Air Quality Standards (fact sheet), downloaded from www.epa.gov/pmdesignations/documents/120/factsheet.htm, 2 September 2004.

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<sup>55</sup> See comments of the American Lung Association on EPA's OAQPS Staff Paper – First Draft, on the Review of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM): Policy Assessment of Scientific and Technical Information, 11 November 2003.

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57 Ibid.

<sup>58</sup> See, e.g., Abt Associates, *Power Plant Emissions: Particulate Matter-Related Health Damages and the Benefits of Alternative Emission Reduction Scenarios*, June 2004, available at

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<sup>59</sup> See, e.g., Bruce Barcott, "Up in Smoke: The Bush Administration, the Big Power Companies, and the Undoing of 30 Years of Clean-Air Policy," *New York Times Magazine*, 4 April 2004.

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<sup>62</sup> See U.S. PIRG Education Fund, *Reel Danger: Power Plant Mercury Pollution and the Fish We Eat*, August 2004.

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<sup>64</sup> See Natural Resources Defense Council, *Rewriting the Rules: The Bush Administration's Assault on the Environment*, 3rd Annual Edition, April 2004.

<sup>65</sup> Comments of the Clean Air Task Force et al, on Supplemental Proposal for the Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone, 26 July 2004, available at www.catf.us/advocacy/legal/IAQR/CATF CAIR Comments.pdf.

<sup>66</sup> The caps in the Bush's administration's proposal for the eastern U.S. of 3.9 million tons of SO<sub>2</sub> and 1.6 million tons of NOx in 2010 are approximately equivalent to 4.7 million- and 2.4 million-ton nationwide caps on SO<sub>2</sub> and NOx, respectively. The Bush regional caps of 2.7 million tons of SO<sub>2</sub> and 1.3 million tons of NOx in 2015 are approximately equivalent to 3.5 million- and 2.1 million-ton caps on SO<sub>2</sub> and NOx, respectively. For a discussion of existing Clean Air Act requirements, see page 10, "Comparison of Requirements Under Business-as-Usual and the Straw Proposal," of EPA's Discussion of Multi-Pollutant Strategy, meeting with the Edison Electric Institute, 18 September 2001, available at http://cta.policy.net/currentstatus.pdf.

<sup>67</sup> Comments of the Clean Air Task Force et al, on Supplemental Proposal for the Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone, 26 July 2004, available at www.catf.us/advocacy/legal/IAQR/CATF\_CAIR\_Comments.pdf.