

Particulate Air Pollution in Chicago

**Human Mortality, Pollution Sources
And the Case for Tougher Clean Air Standards**



**Richard Wiles
Jacqueline Savitz
Brian A. Cohen**

Executive Summary

On Nov. 27, 1996, the Clinton Administration proposed new regulations to clean up an especially deadly form of air pollution—tiny particles that penetrate deep into human lungs, claiming the lives of more than 64,000 Americans every year (EPA 1993, NRDC 1996). The rule also proposes new standards for ground-level ozone, an issue which is not addressed in this study.

The Clinton Administration proposal represents an important step in protecting public health from particulate air pollution. According to EPA (EPA 1996d), “if finalized as proposed, the new standard would:

- Cut premature deaths linked with particulate air pollution by 50%, or approximately 20,000 deaths; with acid rain controls currently underway, an additional 20,000 deaths will be avoided;
- Reduce aggravated asthma episodes by more than a quarter million cases each year;
- Reduce incidence of acute childhood respiratory problems by more than a quarter million occurrences each year, including aggravated coughing and painful breathing;
- Reduce chronic bronchitis by an estimated 60,000 cases each year;
- Reduce hospital admissions due to respiratory problems by 9,000 each year, as well as reduce emergency room visits and overall childhood illnesses in general;
- Cut haze and visibility problems by as much as 77% in some areas, such as national parks.”

Table 1. EPA’s proposal will reduce deaths caused by particulate pollution in Illinois, but the regulations need to be strengthened to save even more lives.

Metropolitan Statistical Area	Estimated Number of Deaths Attributed to Particulate Pollution Per Year	Estimated Number of Premature Deaths Avoided by New EPA Standard Per Year	Estimated Number of Premature Deaths Under New EPA Standard Per Year
Chicago	3,767	1,856	1,911
Champaign/Urbana/Rantoul	42	11	31
Davenport/Rock Is./Moline (IA/IL)	163	50	113
Decatur	78	37	41
Peoria	110	14	97
Rockford	52	0	52
Springfield	56	0	56
St. Louis (MO/IL)	1,302	574	727
Total	5,570	2,542	3,028

Source: Environmental Working Group, based on PM10 data from 1990-1994 and mortality data provided by Natural Resources Defense Council, 1996. Methods discussed in Chapter One.

Table 2. The steel industry creates more than half of all particulate pollution generated in the Chicago Metropolitan area.

Factory Name	State	City	Annual PM10 Emissions (Tons/Year)	Industry Type	Data Year
U.S. Steel Company, Gary Works	Indiana	Gary	51,752	Blast Furnaces And Steel	1994
Amoco Oil Company, Whiting Refinery	Indiana	Whiting	5,428	Petroleum Refining	1994
Acme Steel Company	Illinois	Riverdale	2,326	Blast Furnaces And Steel	1995
Bethlehem Steel Corp.	Indiana	Burns Harbor	2,168	Blast Furnaces And Steel	1994
Cargill Inc - Commodity Marketing Division	Illinois	Chicago	1,889	Grain	1995
Cargill, Inc.- Oilseeds Division	Illinois	Chicago	1,831	No Classification	1995
Inland Steel Company	Indiana	East Chicago	1,740	Blast Furnaces And Steel	1994
LTV Steel Company, Inc. (Republic)	Illinois	Chicago	1,653	Blast Furnaces And Steel	1995
LTV Steel Company	Indiana	East Chicago	1,234	Blast Furnaces And Steel	1994
Continental Grain Comapny - Elevator C	Illinois	Chicago	1,198	Grain	1995
Reynolds Metals Company	Illinois	Mccook	1,099	Aluminum Sheet Plate & Foil	1995
Republic Engineered Steels, Inc.	Illinois	Chicago	650	Blast Furnaces And Steel	1995
Horsehead Resource Development Co., Inc.	Illinois	Chicago	584	Secondary Nonferrous Metals	1995
Material Service Corp. - Yard 41	Illinois	Thornton	524	Crushed And Broken Limestone	1995
Acme Steel Company-Chicago Coke Plant	Illinois	Chicago	523	Blast Furnaces And Steel	1995
Commonwealth Edison Company Units 7&8	Illinois	Rockdale	498	Electric Services	1995
Rhone-Poulenc Basic Chemicals Co.	Illinois	Chicago Heights	442	Industrial Inorganic Chemicals	1995
Com Ed - Will County Generating Station	Illinois	Romeoville	395	Electric Services	1995
Nalco Chemical Co.- Clearing Plant	Illinois	Bedford Park	370	Chemical Preparations, Nec	1995
CPC International Inc	Illinois	Bedford Park	342	Wet Corn Milling	1995
Uno-ven Company	Illinois	Romeoville	313	Petroleum Refining	1995
Com Ed - Collins Station	Illinois	Morris	311	Electric Services	1995
Mobil Joliet Refining Corp	Illinois	Joliet	311	Petroleum Refining	1995
115th Street Corporation	Illinois	Chicago	273	Industrial Organic Chemicals	1995
Owens-Corning Fiberglas Corp.	Illinois	Summit	261	Paving Mixtures And Block	1995
Com Ed - Joliet Generating Station	Illinois	Joliet	243	Electric Services	1995
Acme Steel Company	Illinois	Chicago	227	Blast Furnaces And Steel	1995
Com Ed - Fisk Station	Illinois	Chicago	219	Electric Services	1995
Com Ed - Crawford Station	Illinois	Chicago	205	Electric Services	1995
Katalco-Division Of ICI	Illinois	Chicago	198	Industrial Inorganic Chemicals	1995
Quaker Oats Company-Pet Food Division	Illinois	Kankakee	193	Dog, Cat And Other Pet Foods	1995
Meyer Material Co	Illinois	Aurora	171	Paving Mixtures And Block	1995
Unocal Diversified Businesses	Illinois	Lemont	166	Petroleum And Coal Production	1995
Northwest Waste To Energy	Illinois	Chicago	162	Refuse Systems	1995
J R Short Milling Co. Kankakee Division	Illinois	Kankakee	162	Flour & Other Grain Mill	1995
J-pitt Steel Melt Shop, Inc.	Illinois	Chicago	154	Cold Finishing Of Steel Shapes	1995
Nipsco-Dean H Mitchell Station - Gary	Indiana	Gary	146	Electric Services	1994
Nipsco - Bailly	Indiana	Chesterton	146	Electric Services	1994
General Mills,Inc.-Package Food Division	Illinois	West Chicago	144	Cereal Breakfast Foods	1995
Lehigh Portland Cement Co	Indiana	Gary	139	Cement, Hydraulic	1994
Vulcan Materials Corp-Lehigh Plant	Illinois	Kankakee	134	Crushed And Broken Limestone	1995
General Mills Inc	Illinois	Chicago	116	Flour & Other Grain Mill	1995
3M Industrial Tape	Illinois	Bedford Park	112	Paper Coated And Laminate	1995
Manteno Limestone Co	Illinois	Manteno	111	Crushed And Broken Limestone	1995
Anchor Glass Container-Plant #16	Illinois	Gurnee	111	Glass Containers	1995
Abbott Labs - N. Chicago Plant	Illinois	North Chicago	110	Pharmaceutical Preparation	1995
Boughton Trucking & Materials, Inc	Illinois	Plainfield	110	Crushed And Broken Limestone	1995
Amoco Chemical Corp - Joliet Plant	Illinois	Channahon	109	Cyclic Crudes And Intermediates	1995
Koch Minerals	Indiana	Gary	102	Minerals, Ground Or Treated	1994

Source: Environmental Working Group, compiled from the U.S. Environmental Protection Agency's AIRS database.

Table 3. Monitoring hot spots where particulate pollution will likely exceed EPA’s proposed health standards.

County	Estimated Three Year Annual PM2.5 Average (Converted from PM10 Monitoring Data)	Street Address
Madison	28.34	15th & Madison
Cook	26.82	Mayfair Pump Station, 4850 Wilson Avenue
Cook	26.12	50th Street and Glencoe
Madison	25.90	VFW Building, 2044 Washington Avenue
Cook	24.55	Graves Elementary School 60th Street & 74th Avenue
Cook	23.22	Roosevelt H.S., 15th St. & 50th Avenue
Cook	21.88	Marsh School, 9810 S. Exchange
Cook	21.74	3535 E. 114th Street
Cook	21.69	Farr Dormitory 3300 S. Michigan Avenue
Madison	21.69	23rd & Madison
Cook	21.38	13100 S. Doty
St. Clair	20.96	13th & Tudor Raps Site
Cook	20.72	Chicago Ave. Pump Station, 805 N. Michigan
Cook	20.24	Eisenhower High School, 12700 Sacramento Ave.
Randolph	20.19	Site B., Cnty Rds. 00.0 N & 25.0 E
Cook	20.04	4043 Joliet Ave.
LaSalle	19.73	308 Portland Ave.
Madison	19.70	2420 Nameoki Rd., Plaza Furniture
Cook	18.99	170th St. & S. Park Avenue
Madison	18.77	211 Sinclair, City Hall
Madison	18.45	409 Main Street, Clara Barton School
Will	18.40	Midland & Otis, Rockdale
Madison	18.10	54 N. Walcott
Macon	17.81	Grant Elementary School, 2300 Geddes
Cook	16.67	Hoffman Estates H.S. 1100 W. Higgins Rd.

Source: *Environmental Working Group, compiled from the U.S. Environmental Protection Agency’s AIRS database.*

Before the rule was even announced virtually every major oil company, power utility and steel manufacturer in the nation had banded together as the “Air Quality Standards Coalition,” with the avowed goal of killing the new clean air rule.

The administration proposal was supported “by an overwhelming majority of independent scientists who reviewed the standard for EPA, based on 86 new health studies that indicate the need for a stronger standard,” according to the agency. The polluter coalition has dismissed this EPA review and gone on the attack.

Congressional opponents of the rule may seek to block it, using a new law designed to protect small business, or through a legislative rider. Air quality will also be a major issue in this year’s reauthorization of the multi-billion dollar transportation law (the Intermodal Surface Transportation Efficiency Act, ISTEA).

The Need for Public Comment

Release of the proposed rule marked the beginning of a public comment period, where “EPA will seek broad public comment on its recommended approach and on the need for any changes to the particulate matter [and ozone] proposal.” (EPA 1996d).

The premise of this study is that the public has a right to know, and an obligation to comment on, the public health strengths and shortcomings of the particulate pollution proposal. Questions about how much particulate pollution will be reduced, how much illness will be prevented, and how many lives will be saved, ultimately are moral and political questions that demand broad public awareness and input.

This report supports the Clinton administration's goal of reducing health risks from particulate pollution. Our analysis, however, makes clear that several aspects of the proposal, notably its monitoring provisions, should be strengthened, and we support lower limits on particulate pollution in order to save even more lives.

Now it's time for the people of Illinois to make their views known to Washington. Will the polluters win? Or will Americans get cleaner air, live longer lives, and cut the nation's annual medical bill by between \$50 billion and \$100 billion per year?

Lives on the Line

The link between air pollution and human disease is extraordinarily well demonstrated in the peer reviewed scientific literature. A series of studies from across the country and around the world have shown repeatedly that polluted air increases premature mortality rates (Schwartz 1993, Pope et al. 1995, Schwartz 1994, Dockery et al. 1993, Schwartz and Dockery 1992, Pope 1991, EPA 1993, EPA 1996c) and it is associated with hundreds of thousands of cases of respiratory diseases and tens of thousands of premature deaths each year (EPA 1996c, NRDC 1996).

Analysis of data from air pollution monitoring stations in Illinois and the surrounding area found that under current rules, nearly 5,000 residents of the state die prematurely every year because of particulate matter in the air. The Clinton Administration's proposal, effectively implemented and enforced, would prolong the lives of an estimated 2,500 people, but would have to be strengthened significantly to prevent the premature death of an estimated 3,000 people in Illinois each year (Table 1). Problems with EPA's proposed monitoring and enforcement provisions may further compromise the potential health benefits of the new rule.

Top Polluters

Nationwide, the traditionally inventoried sources of particulate emissions are industrial processes (46.5%), electric utilities (10%), transportation (27.4%), and other fuel combustion (14%) (EPA 1996e). In the Chicago Area, the Steel Industry accounts for more than half of all particulate pollution generated in the state (Table 2). The figures do not include emissions of particulate matter precursors such as sulfur and nitrogen oxides, which in themselves are a major indirect contributor to ambient PM_{2.5} levels. The top particulate polluters in the Chicago area is U.S. Steel, Gary Works, in Gary Indiana. It is followed by Amoco's Whiting Refinery, also in Indiana, and Acme Steel Company in Riverdale, Illinois.

Sacrifice Zones

The Clinton Administration proposal recommends a new monitoring initiative called spatial averaging. This new scheme could create "sacrifice zones" where polluted air in yet undefined spatial averaging zones could be "cleaned up" simply by averaging pollution levels from new monitors placed in adjacent communities with cleaner air. If not modified during the public comment period, spatial averaging will very likely undermine the otherwise significant health protections that the new rule is designed to

achieve.

Our analysis of state, local and national air monitoring data identified 40 counties with just one particulate (PM) monitor, where the past three years of pollution would exceed the proposed standard for PM_{2.5} of 15 µg/m³ by 2.5 µg/m³ or less. Under the Clinton Administration proposal, these counties could easily comply with the new PM_{2.5} standard, simply by adding an additional monitor at a cleaner location in the county. None of these counties would have violated the proposed 24-hour PM_{2.5} standard of 50µg/m³.

Hot Spots

As drafted, EPA's proposal has no plan to target pollution reduction efforts toward areas with high particulate pollution levels, or "hot spots". Indeed, the administration plan provides strong incentives for statistical manipulation of monitoring results as opposed to actual reductions of particulate levels in the air.

As a result, it is quite possible that people living in heavily polluted areas may continue to suffer the serious ill effects of particulate pollution, as polluters push for phony pollution reductions based on more monitors placed in cleaner locations.

There are 41 particulate monitors in Illinois. Estimated three-year average PM_{2.5} levels (1993-1995) at a total of twenty-five monitors in Cook, Madison, St. Clair, Randolph, LaSalle, and Will counties would likely exceed the EPA proposed level of 15 µg/m³ (Table 3). These hot spots need immediate relief from particulate pollution, but may not receive it under the Clinton Administration proposal.

Recommendations

More Protective Health Standards

The Clinton Administration's proposed PM_{2.5} standard for particulates represents a significant improvement in the status quo. But in order to fully protect the public health, and particularly the health of the most vulnerable individuals in the population, it must be strengthened substantially. By the EPA's own calculations, the proposed rule would reduce premature mortality from airborne particulates by 50 percent, while tens of thousands of premature deaths will continue even after the proposed health standards are met (EPA 1996d).

To better protect public health, the Environmental Working Group supports the annual average PM_{2.5} standard of 10µg/m³ as recommended by the American Lung Association and the Natural Resources Defense Council. This goal will provide dramatic health benefits when achieved, and puts the agency more squarely in compliance with the basic requirements and intent of the law. To guard against the adverse health effects of peak particulate exposures, we recommend a 24-hour PM_{2.5} standard of 20µg/m³.

Better Monitoring

The current network of state, local, and national PM monitors does not provide a scientifically representative picture of particulate levels in the air in most major U.S. cities. In spite of this major flaw in the current system, there is no requirement in the proposed rule that additional monitoring be statistically reliable, or that additional monitoring increase the ability of the EPA to target pollution reduction efforts toward highly polluted areas.

To the contrary, the agency's proposed spatial averaging scheme could easily skew monitoring in a manner that creates sacrifice zones, where unsafe air is not cleaned up, but instead is averaged together with cleaner air from somewhere else to create the statistical illusion of clean air within an arbitrary spatial averaging zone. We strongly oppose the use of statistical techniques to hide pollution and avoid cleaning up unsafe air breathed by millions of Americans. Instead, EWG recommends tough health standards that are backed up by a scientifically valid system of airborne particulate monitoring. In most major U.S. cities many more monitoring sites are needed to achieve this goal.

To ensure that representative monitoring occurs, all major particulate polluters, as currently defined by EPA, should be required to contribute to a fund, administered by local air quality officials, that is dedicated to statistically valid particulate monitoring in all metropolitan statistical areas in the United States. Spatial averaging techniques must not be used in any metropolitan region that does not have a representative particulate monitoring network in place.

In addition, we oppose any plan that achieves compliance with the new health standard by:

- moving existing monitors to cleaner locations,
- adding monitors only at cleaner locations, and
- dispersing the pollution source (for example, a bus transfer station) and thus increasing pollution in cleaner areas.

Cleaning Up Hot Spots

The current monitoring system, while not fully representative of local and regional pollution levels, does identify specific locations, or hot spots, where airborne particulates are at unsafe levels. There is no reason to delay pollution reduction measures at these sites yet EPA's proposed changes to monitoring criteria could easily have that effect. Until such time as a representative monitoring system is in place, EWG recommends that the EPA maintain the current rules for monitoring and enforcement where exceeding the standard in one location triggers a violation.

Right to Know

The public has a fundamental right to know about pollution in the air they breathe. EWG's experience in gathering the particulate emissions and monitoring data used in this report shows that the public, and to a significant degree, federal regulators, have no practical way to find out about levels of deadly particulate pollution released in their communities.

We recommend, therefore, that the EPA maintain an up-to-date national database of particulate emissions and ambient concentrations, and that these data be available to the public in a manner consistent with data already widely available in the Toxic Release Inventory.

Particulate Pollution Kills

We further recommend that citizens in polluted communities be given the right to petition for and receive in their communities the monitoring equipment needed to detect particulate and other air pollution, and a timely public notification of monitoring results.

Particulate matter is the generic name for a broad class of toxic air pollution made up of substances that exist as discrete particles, suspended in the air in either liquid or solid form. This can include various metals such as lead, copper, and cadmium, sulfate and nitrate particles, and particle forming organic compounds such as PCBs and aromatic compounds.

The current EPA particulate standard, referred to as the PM_{10} standard, regulates particles smaller than 10 microns in diameter. A micron is one millionth of a meter. Particles less than 10 microns in diameter are targeted because these small particles can easily penetrate into the deepest regions of the lungs (Bascom et al. 1996). More recent studies, however, strongly indicate that the smallest particles, those less than 2.5 microns in diameter, present the greatest risk to human health and particularly to children's health (EPA 1996c). More than 20 epidemiological studies from around the world confirm the high hazards of breathing fine particles at concentrations typically found in ambient air in U.S. cities (EPA 1996c).

The current PM_{10} standard does little to control fine particles because it is enforced based on the total weight of the particles per cubic meter, expressed as micrograms of PM_{10} per cubic meter of air. This enforcement mechanism creates an inherent bias in favor of measures that control larger particles because reducing larger particles in the air provides a far greater reduction in the overall weight of the PM_{10} per cubic meter of air. Reducing the amount of smaller particles, in contrast, has a more negligible effect on the total mass of PM_{10} , but contributes to a greater reduction in health risks from particulate pollution.

Recognizing this limitation with the current regulations, and the distinct health benefit of regulating fine particles, the EPA has proposed that the new standard be designed to measure "fine" particles, or $PM_{2.5}$, rather than PM_{10} . This simple change in the way particulate levels are monitored could provide the basis for much more effective and targeted regulation of particulate sources in the future. Combustion of fossil fuels in power generation, manufacturing, and transportation are the primary sources of fine particle pollution (Dockery et al., 1993).

The Clear Health Threat From Particulates

The Clean Air Act (CAA) directs the EPA to set air quality standards that protect the public's health, including sensitive individuals within the population. Congress further instructed EPA to ensure that health standards sufficiently protect these populations by

including an adequate margin of safety (42 U.S.C.A. §7409 (b)(1)). In other words, the law requires that air pollution be reduced enough so that breathing polluted air does not directly kill people or contribute to the incidence of disease, even for those that are susceptible to these diseases.

There is a broad scientific consensus that the current particulate standard fails this test — that it does not protect the public health, that it does not provide any margin of safety for susceptible populations, and that it should be changed (Wolff 1996, EPA 1996a).

The science supporting the hazards of breathing particulate pollution is exceptionally powerful and consistent. According to the U.S. EPA, more than 60 peer-reviewed community epidemiological studies have found positive, statistically significant associations between short and long term concentrations of various PM indicators (total particulates, PM₁₀, PM_{2.5}) and death and morbidity (EPA 1996c). Indeed, although scientists have not yet identified a precise mechanism by which particulate levels increase death rates, scientists also have not identified a level of airborne particulate pollution that does not cause at least some increase in premature death, asthma, and other human health problems.

Several factors within these studies and others (Ostro 1993, Schwartz 1992) strengthen the conclusion that particulates, not other pollutants, are causing the premature death and increased illness found in these studies. First, regardless of the type or level of co-pollutants involved, mortality rates consistently correlate with fluctuations of particulate levels in the air. Second, the actual kind of health effect linked to particulate exposure is consistent between mortality and morbidity data: particulate levels in the air are closely linked with increases in respiratory and cardiovascular related hospital admissions, as well as death rates from lung and heart disease (EPA 1996c).

Both short and long term exposure to particulate levels are strongly associated with increases in mortality and morbidity rates. This concordance strengthens the conclusion that particulates shorten lives by several years for the average affected individuals (EPA 1996a).

Based on the wealth of research linking particulate pollution to premature mortality in cities across the United States and around the world, various institutions and independent experts have calculated the impact of current PM levels on death rates in metropolitan areas in the United States (Schwartz 1993, Pope et al. 1995, Schwartz 1994, Dockery et al. 1993, Schwartz and Dockery 1992, Pope 1991). These calculations typically relate the fluctuations in cardiopulmonary death rates in specific cities to airborne PM levels.

In 1993, the U.S. EPA estimated that 70,000 premature deaths are caused each year by particulate pollution in the air (EPA 1993). This prediction is based on a series of studies, over several decades, using different statistical techniques, in different U.S. cities that have all confirmed a direct link between PM₁₀ pollution and elevated incidence of death. These studies all show a direct relationship between rising PM₁₀ levels in the air and deaths from cardiopulmonary disease.

In perhaps the most unique study, in the Utah Valley, medical researchers were able to track cardiopulmonary death rates as a direct function of the operations of the lone particulate polluter in the region, Geneva Steel. When the plant stopped operations, death rates in the valley dropped dramatically. When the plant started up again, death rates increased in direct proportion to particulate levels in the air. In the Utah Valley, a 16 percent increase in total deaths occurred for every 100 µg/m³ increase in PM₁₀ (Pope et al. 1992).

Supporting this finding, in Birmingham, Alabama, between 1985 and 1988, an 11% increase in the death rate was seen for every 100 µg/m³ of “inhalable particles,” (Schwartz

1993). In Cincinnati, the death rate increased by 6 percent for every 100 $\mu\text{g}/\text{m}^3$ increase in total particulates (Schwartz 1994).

A major study in Philadelphia showed that deaths between 1973 and 1980, increased by 7 percent for every increase in total particulate levels of 100 μg per cubic meter (Schwartz and Dockery 1992). In that study, particulate pollution caused a 19% increase in mortality due to chronic obstructive pulmonary disease even though PM_{10} levels were below current standards for all but one day during the study (Dickey 1996).

The Harvard Six City Study, published in 1993 in the *New England Journal of Medicine*, followed 8,000 adults in six small to medium sized cities over a fourteen year period beginning in 1979. Consistent with the findings from other peer-reviewed studies analyzing particulates and mortality over shorter periods of time, differences in particulate levels in the air from city to city almost directly tracked death rates over the entire period of the study. After controlling for sex, age, smoking status, educational level, and occupational exposure to dust, gases, and fumes, the authors concluded that the average person in the most polluted city studied, Steubenville, Ohio, had a 26% greater chance of premature death than the average person in Portage, Wisconsin, the least polluted city in the study (Dockery, et al. 1993).

A major 1995 study of particulate pollution analyzed the relationship between $\text{PM}_{2.5}$ levels in the air, and the health of 295,000 people tracked by the American Cancer Society (ACS) from 1982 through 1989. This study, which because of its size has substantial statistical power, added further weight to the finding that death rates from heart and lung disease rise and fall in direct correlation with particulate levels in the air (Pope et al. 1995). As with the Six City Study, the study authors concluded that particulate air pollution increases the risk of premature death by about 17%.

Building on this unusually consistent and statistically powerful data, in 1996 the Natural Resources Defense Council (NRDC) estimated the number of lives that would be prolonged under various particulate standards likely to be proposed by the EPA (NRDC 1996).

The NRDC analysis, which was extremely cautious in its use of existing data, is based on PM_{10} monitoring data maintained by the U.S. EPA, and data on adult cardiopulmonary deaths from the National Center for Health Statistics (NCHS 1992). These mortality data were corrected to eliminate individuals under 25 years of age. Deaths from lung cancer, though exacerbated by airborne particulates, also are not included in the analysis. PM_{10} levels in a given metropolitan region were averaged over a five year period, *and* over entire metropolitan statistical areas (MSAs). This averaging technique, while valid and illustrative, can mask large areas within MSA's where death rates from especially serious particulate pollution are significantly elevated.

PM_{10} figures were then converted in the NRDC study to a $\text{PM}_{2.5}$ level using a nationwide conversion factor of 60 percent (i.e., NRDC assumed that $\text{PM}_{2.5}$ concentrations equaled approximately 60 percent of the PM_{10} concentrations). The authors then applied risk factors based on the ACS studies to these particulate levels. The risk factors used are the lowest of the two long-term studies in the peer-reviewed literature (e.g. Pope et al. 1995). The NRDC report showed that a strong standard of 10 $\mu\text{g}/\text{m}^3$ for fine particulate matter ($\text{PM}_{2.5}$) could prevent over 56,000 premature deaths every year (NRDC 1996).

Clinton Administration Proposal

Health Standards

The first standard for particulates in air was established in 1971. This standard, which measured total particulates in the air, was set at 260 micrograms (μg) of particles per cubic meter of air ($\mu\text{g}/\text{m}^3$) over a 24 hour period, and 75 $\mu\text{g}/\text{m}^3$ annual average. In 1987, under the Clean Air Act, EPA replaced the original standard with a new standard for PM_{10} at 150 $\mu\text{g}/\text{m}^3$ over a 24 hour period, and an annual average of 50 $\mu\text{g}/\text{m}^3$. California has established stricter PM_{10} standards: a 24 hour standard of 50 $\mu\text{g}/\text{m}^3$, and an annual average of 30 $\mu\text{g}/\text{m}^3$. Under the 1990 Clean Air Act amendments, EPA was required to review the adequacy of major health standards, including the particulate standard, every five years. The EPA failed to meet the statutory deadline, and was sued by the American Lung Association (ALA). ALA won the suit, and the court established a deadline of November 29, 1996 for EPA to set the new standard.

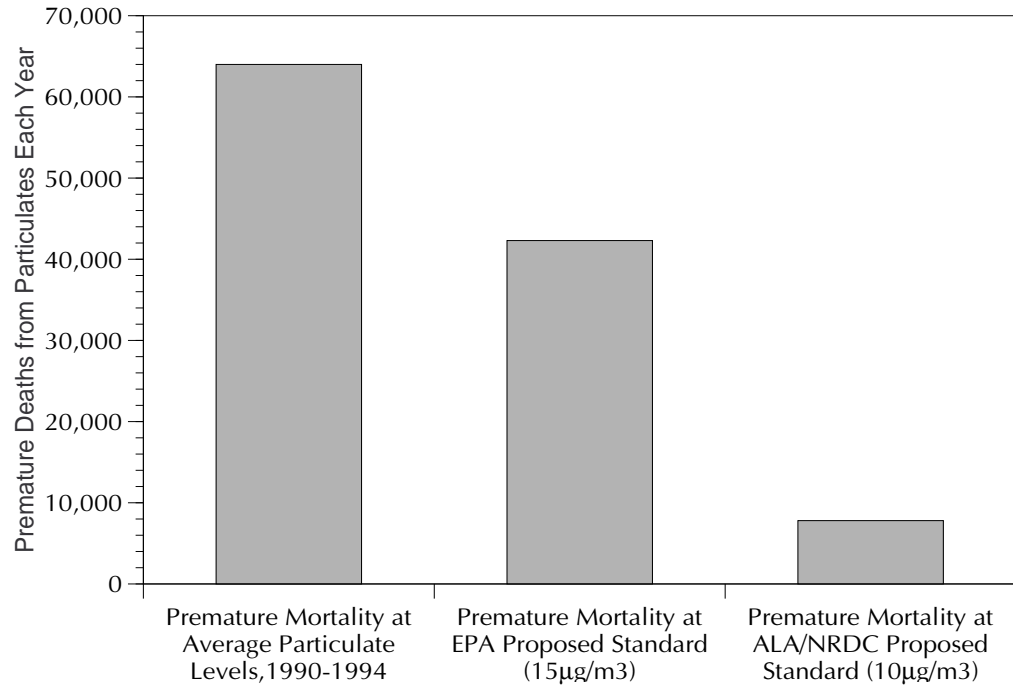
The Clinton Administration's proposed rule, released on November 27, 1996 establishes new, tougher health standards for $\text{PM}_{2.5}$. These standards represent a significant improvement over the current public health goals. The draft rules recommend a three-year average $\text{PM}_{2.5}$ limit of 15 $\mu\text{g}/\text{m}^3$, and propose retaining the annual PM_{10} standard of 50 $\mu\text{g}/\text{m}^3$. According to EPA (EPA 1996d), "If finalized as proposed the new standard would:

- Cut premature deaths linked with particulate air pollution by 50%, or approximately 20,000 deaths; with acid rain controls currently underway, an additional 20,000 deaths will be avoided;
- Reduce aggravated asthma episodes by more than a quarter million cases each year;
- Reduce incidence of acute childhood respiratory problems by more than a quarter million occurrences each year, including aggravated coughing and painful breathing;
- Reduce chronic bronchitis by an estimated 60,000 cases each year;
- Reduce hospital admissions due to respiratory problems by 9,000 each year, as well as reduce emergency room visits and overall childhood illnesses in general;
- Cut haze and visibility problems by as much as 77% in some areas, such as national parks."

In addition, however, the proposal would weaken the 24-hour PM_{10} standard in favor of a daily $\text{PM}_{2.5}$ limit of 50 $\mu\text{g}/\text{m}^3$ (not counting the top 2 percent of concentrations).

Release of the proposed rule marked the beginning of a public comment period

Figure 1. The PM_{2.5} standard proposed by the EPA will substantially reduce premature deaths, but stronger protection is needed.



Source: Environmental Working Group, compiled from Natural Resources Defense Council data.

where “EPA will seek broad public comment on its recommended approach and on the need for any changes to the particulate matter [and ozone] proposal.” (EPA 1996d).

The administration proposal was supported by “an overwhelming majority of independent scientists who reviewed the standard for EPA, based on 86 new health studies that indicate the need for a stronger standard,” according to the agency. The polluter coalition has dismissed this EPA review as “junk science,” and has gone on the attack.

This report supports the Clinton administration’s goal of reducing health risks from particulate pollution. Our analysis makes clear that several aspects of this proposal, notably its monitoring provisions, should be strengthened, and we support a lower limit on particulate pollution in order to save even more lives.

The premise of this study is that the public has a right to know, and an obligation to comment on, the public health strengths and shortcomings of the particulate pollution proposal. Questions about how much particulate pollution will be reduced, how much illness will be prevented, and how many lives will be saved, ultimately are moral and political questions that demand broad public awareness and support.

In fairness, it must be noted that even when these new goals are ultimately met, they will still allow tens of thousands of premature deaths every year from airborne

Table 4. EPA's proposed spatial averaging technique could allow unsafe levels of particulate pollution to continue unchecked.

Annual Mean (% data completeness)					
Year	Site 1	Site 2	Site 3	Site 4	Spatial Mean
1	12.7 (80%)	No data	No Data	No Data	12.70
2	13.3 (90%)	17.4 (63%)	9.8 (40%)	No Data	15.35
3	12.9 (90%)	16.7 (80%)	12.3 (85%)	20.1 (50%)	15.50
				3-Year Mean	14.52

Bold = Levels above proposed standard.

Source: Environmental Protection Agency 1996a.

particulates (Figure 1). Of even greater concern, however, are EPA's proposed changes to current monitoring and enforcement procedures which could seriously undermine the advances in public health protection that the standards are designed to achieve.

Monitoring and Enforcement

Several features of the Clinton Administration's proposed PM_{2.5} monitoring and enforcement provisions severely compromise the potential health protections that the new rule is designed to achieve.

Under the EPA's current enforcement scheme, when particulate levels exceed the PM₁₀ standard in one monitoring location, action is required to reduce pollution and bring that area into compliance with the standard. The November 1996 EPA proposal dramatically changes this approach by proposing health standard enforcement based on a method of averaging together pollution monitoring results from different locations. This new monitoring and enforcement scheme is strongly supported by major polluters because it would dramatically reduce the need for many of the nation's worst polluters to control their toxic emissions.

This method, called spatial averaging, will allow polluted areas to comply with health standards for particulates, not by actually reducing pollution levels, but by averaging high levels of pollution in one community with lower levels of pollution in an adjacent community. In this fashion, the unhealthy air in a city center, for example, could comply with clean air regulations if pollution levels from cleaner air in the suburbs are averaged with the monitoring from the polluted area. This statistical technique creates *a number* that complies with the new standard. It does nothing, however, to prevent the public from breathing polluted air that would otherwise be deemed unsafe under the new standard.

EPA's proposed PM rule provides two examples of how heavily-polluted communities are permitted to live with air that exceeds health standards under the new regulations.

In order to violate the proposed PM_{2.5} standard the three year *average* of all monitoring sites in a spatial averaging zone must exceed 15 µg/m³. In EPA's example (Table 4), the three year mean (or average) over the four sites is 14.52 µg/m³. Within

Table 5. High levels of particulate pollution are likely to be maintained in these counties under EPA’s new monitoring plan.

Etowah County, Alabama	Richland County, Ohio
Washington County, Georgia	Carter County, Oklahoma
Canyon County, Idaho	Comanche County, Oklahoma
Macon County, Illinois	Kay County, Oklahoma
Johnson County, Kansas	Mayes County, Oklahoma
Sherman County, Kansas	Blair County, Pennsylvania
Floyd County, Kentucky	Bucks County, Pennsylvania
Madison County, Kentucky	Cambria County, Pennsylvania
Marshall County, Kentucky	Delaware County, Pennsylvania
Whitley County, Kentucky	Lackawanna County, Pennsylvania
Garrett County, Maryland	Lycoming County, Pennsylvania
Washington County, Maryland	Montgomery County, Pennsylvania
Calhoun County, Michigan	Grand County, Utah
Lancaster County, Nebraska	Bristol City, Virginia
Otoe County, Nebraska	Covington City, Virginia
Mercer County, New Jersey	Fayette County, West Virginia
Warren County, New Jersey	Ohio County, West Virginia
Mitchell County, North Carolina	Putnam County, West Virginia
Noble County, Ohio	Wayne County, West Virginia
Ottawa County, Ohio	Wood County, West Virginia

Source: Environmental Working Group.

the spatial averaging zone, however the three-year average $PM_{2.5}$ levels exceed the new standard at two of the four monitoring locations (Site 2 and Site 4), indicating that the air in communities near the monitor would not meet federal safety standards. According to the EPA, in spite of this poor air quality, no pollution reduction would be required under the new $PM_{2.5}$ rule, because spatial averaging would bring the entire area into compliance, even as particulate pollution remained at unsafe levels at half of the monitoring sites in the region.

To identify sacrifice zones that could be created under the Clinton Administration monitoring proposal, EWG analyzed data from AIRS including the state and local air monitoring stations (SLAMS) and the national air monitoring stations (NAMS) for the 490 counties across the country with valid PM monitoring data for 1993 through 1995. We then analyzed this information by county, based on EPA’s proposal that county boundaries might delineate averaging zones under the new rule. If broader areas were used, even more hot spots could be ignored.

Our analysis found 35 counties that have more than one PM monitor, where the three year average $PM_{2.5}$ levels were below $15 \mu\text{g}/\text{m}^3$, but where the three-year average for one monitoring site exceeded the new $PM_{2.5}$ standard. In this scenario, if the county becomes the spatial averaging zone, then under the new $PM_{2.5}$ rule, the people living near the monitors with high pollution levels will receive no relief from what the EPA deems to be unsafe levels of particulate pollution in their air. If the same analysis is modified to look at one-year average $PM_{2.5}$ levels, 77 counties are affected.

EPA has argued that people living in these areas will be protected by the new daily PM_{2.5} standard of 50µg/m³. Our analysis of state, local, and national monitoring data for the three most recent years available, however, shows that none of the affected counties would trigger an enforcement action under the proposed 24 hour PM_{2.5} standard of 50µg/m³, calculated at the 98th percentile.

In order to facilitate spatial monitoring, the Clinton Administration's proposed implementation plan provides for additional monitors within spatial averaging zones. These monitors must be placed near populated areas, but they are not required to be placed systematically in "hot spots" where the pollution is the worst, nor are they required to be placed in such a way that provides a representative picture of pollution within the spatial averaging zone. Without major revisions, this proposal will create a strong incentive to place new monitors in clean locations to lower "average" pollution levels in the spatial zone — again creating a lower number but doing nothing to clean the air.

To demonstrate how additional monitoring might be used to avoid pollution reduction via averaging, we analyzed the AIRS data for counties with just one monitoring site, where particulate levels at that site exceed the proposed PM_{2.5} standard. Our analysis revealed 40 counties with just one monitoring site, where particulate levels currently exceed the proposed PM_{2.5} standard by less than 2.5µg/m³ (Table 5). In any of these 40 counties, compliance could be achieved easily by adding a monitor at a less polluted location, as opposed to reducing pollution levels at the polluted site.

Most worrisomely, the Clinton Administration is proposing to allow independent parties to construct "special purpose monitors", with the promise that data showing poor air quality will not be used for regulatory purposes. Under the EPA proposal, if the data from these special monitors bring an area into a violation of the PM_{2.5} health standard, there is a three-year moratorium on the use of such data. If the data bring an area into compliance, however, there is no similar explicit moratorium on the use of the information. While the draft rule does not specifically state that these data will be used, the absence of a prohibition on its use creates the strong supposition that only data that would moderate regulatory burdens from these special monitors will be used in the regulatory process. As drafted, this loophole provides major polluters with a risk-free incentive to set up monitors in clean areas of spatial monitoring zones, as it simultaneously eviscerates independent efforts to monitor air where it is the most polluted. Any potential for such a double standard must be eliminated from the final rule.

Polluters' Attack on Clinton Proposal

The Clinton EPA's proposed new standard for PM_{2.5} levels, while a clear improvement over the current standard, would allow polluters to maintain levels of particulate pollution across the United States that would continue to cause tens of thousands of premature deaths each year. For some of the nation's worst air polluters, however, any reduction in current pollution levels is perceived as too onerous. These polluters have funded an aggressive high profile political and lobbying effort to ensure that new standards are not implemented.

The campaign to foil the new PM_{2.5} standard is being coordinated by the National Association of Manufacturers (NAM) (Śkrzycki 1996). This multimillion dollar campaign includes:

- The formation of the NAM "Air Quality Standards Coalition", with a \$1.5 million

dollar war chest to spend campaigning against tough air quality standards.

- Millions more for industry-oriented “sound science” to challenge the peer-reviewed science relied on by EPA.
- The formation and active use of phony grassroots front groups to pressure governors and local officials.
- Hiring expensive Washington lobbyists, including C. Boyden Gray, former counsel to President Bush, and public relations firms such as Burston-Marsteller, to lobby for weaker standards.

The membership of the National Association of Manufacturers Air Quality Standards Coalition reads like a “Who’s Who” of America’s worst particulate polluters, including the American Petroleum Institute, the American Automobile Manufacturers Association, the Chemical Manufacturers Association, the Edison Electric Institute, the National Mining Association, the American Forest and Paper Association, and virtually all of their member corporations. The rallying cry of these big polluters is that if the EPA proposal is put into effect, then millions of Americans will lose their right to barbecue and millions more will be forced to carpool (Skrzycki 1996). In reality, restrictions on personal activities will be necessary only if major polluters are unwilling to implement inexpensive pollution control measures.

Particulate Pollution in Illinois

The EWG analysis of premature deaths due to particulate pollution is modeled after the analysis published by the Natural Resources Defense Council (NRDC) in May 1996. The principal modification is the use of regional conversion factors for PM₁₀. Rather than assuming that PM_{2.5} accounts for 60 percent of PM₁₀ nationwide, we utilize regional conversion factors, for different sections of the country, based on actual monitoring of PM_{2.5} and PM₁₀ by the EPA. For the east coast the data indicate that on average PM_{2.5} accounts for a greater percentage of total PM₁₀ than assumed by NRDC. For the midwest, the west, and particularly the northwest, average PM_{2.5} levels are a lesser percentage of total PM₁₀ than assumed by NRDC. There are important exceptions to these regional figures. In certain locations, at certain times of the year, for example, PM_{2.5} can account for up to 85% of total PM₁₀ in major cities in the western United States. Nationwide, the average percentage of PM₁₀ accounted for by PM_{2.5} is about 0.56. With this one modification, we then apply the NRDC/American Cancer Society methodology and project the impact of the EPA proposed PM_{2.5} standard for the nation and selected metropolitan regions.

This specific quantitative risk factor used in this analysis is based on the relationship between PM_{2.5} and mortality rates in a study of 250,000 individuals in 50 U.S. cities tracked by the American Cancer Society (Pope et al. 1995). This study assumes a threshold for the mortality effects of particulate pollution of 9 µg/m³, *not* because no

Table 6. EPA’s proposal will reduce deaths caused by particulate pollution in Illinois, but the regulations need to be strengthened to save even more lives.

Metropolitan Statistical Area	Estimated Number of Deaths Attributed to Particulate Pollution Per Year	Estimated Number of Premature Deaths Under New EPA Standard Per Year	Estimated Number of Premature Deaths Under ALA/NRDC Standard Per Year
Chicago	3,767	1,911	328
Champaign/Urbana/Rantoul	42	31	6
Davenport/Rock Is./Moline (IA/IL)	163	113	20
Decatur	78	41	7
Peoria	110	97	16
Rockford	52	52	13
Springfield	56	56	10
St. Louis (MO/IL)	1,302	727	125
Total	5,570	3,028	525

Source: Environmental Working Group, based on PM10 data from 1990-1994 and mortality data provided by Natural Resources Defense Council, 1996. Methods discussed in Chapter One.

effects have been demonstrated below $9 \mu\text{g}/\text{m}^3$, but because the cleanest city in the study had a $\text{PM}_{2.5}$ level of $9 \mu\text{g}/\text{m}^3$. In fact, no threshold has been determined below which mortality rates are unaffected by $\text{PM}_{2.5}$.

Based on the most recent AIRS data on PM_{10} , $9 \mu\text{g}/\text{m}^3 \text{PM}_{2.5}$ is a reasonable estimate of fine particulate levels in the least polluted areas in the United States. Further EWG analysis shows that about 50 of 600 counties currently monitoring PM would have levels below $9 \mu\text{g}/\text{m}^3 \text{PM}_{2.5}$. Given the demonstrated mortality effects at low levels of $\text{PM}_{2.5}$, our recommended annual $\text{PM}_{2.5}$ standard of $10 \mu\text{g}/\text{m}^3$ represents a level of particulate pollution that is at least 10 percent above background levels in cleaner areas of the country. As a part of the final rule, EWG recommends that EPA determine background $\text{PM}_{2.5}$ levels in representative regions of the country. This study should not delay implementation of the health standards recommended in this report.

Lives on the Line

Nationwide, the EPA proposed annual $\text{PM}_{2.5}$ Standard of $15 \mu\text{g}/\text{m}^3$, if achieved, would prevent approximately 20,000 premature deaths each year (EPA 1996d). It would, however, need to be significantly strengthened to prevent the 45,000 premature deaths from particulate pollution that would continue to occur each year.

In the Chicago area, EPA's proposal will prevent the premature death of an estimated 1,800 individuals each year. At the same time, 1,900 people would continue to die prematurely from airborne particles (Table 6). In comparison, the $\text{PM}_{2.5}$ standard proposed by the American Lung Association (ALA) and the Natural Resources Defense Council (NRDC) ($10 \mu\text{g}/\text{m}^3$), would avoid about 3,400 premature deaths in the Chicago area each year.

In the St. Louis metropolitan area, EPA's standard is estimated to cut premature death by about 570 people annually (Table 6). An estimated 720 individuals in that area, however, would continue to die prematurely each year from particulate pollution. The $\text{PM}_{2.5}$ level proposed by the ALA and NRDC ($10 \mu\text{g}/\text{m}^3$), on the other hand, would save over 1,100 lives each year in the St. Louis area.

Statewide, the EPA's proposal will avoid 2,500 premature deaths from particulate pollution in Illinois each year. The draft rule will need to be significantly strengthened, however, to prevent an estimated 3,000 residents of Illinois from dying prematurely every year due to airborne particulate pollution (Table 6). The standard proposed by the EPA, while setting the stage for important improvements in air quality, is clearly a moderate proposal that leaves substantial room for further reductions in particulate levels.

Moreover, the benefits of the new $\text{PM}_{2.5}$ standard will be achieved only if the monitoring proposals in the proposed EPA rule are radically revised. If the proposed spatial averaging and percentile adjustments are not scrapped, then even the moderate public health gains projected here will likely not be attained.

Top Particulate Polluters in Illinois

To quantify and analyze particulate pollution by facility for Illinois and the nation, the Environmental Working Group obtained facility emissions data for particulate matter from the Environmental Protection Agency. Although other pollutants serve as precursors (i.e. NO_x and SO_x) this analysis focuses on direct emissions of particulate matter.

Table 7. The U.S. Steel Gary Works was the top emitter of PM₁₀ particles in the Chicago metropolitan area.

Factory Name	State	City	Annual PM10 Emissions (Tons/Year)	Industry Type	Data Year
U.S. Steel Company, Gary Works	Indiana	Gary	51,752	Blast Furnaces And Steel	1994
Amoco Oil Company, Whiting Refinery	Indiana	Whiting	5,428	Petroleum Refining	1994
Acme Steel Company	Illinois	Riverdale	2,326	Blast Furnaces And Steel	1995
Bethlehem Steel Corp.	Indiana	Burns Harbor	2,168	Blast Furnaces And Steel	1994
Cargill Inc - Commodity Marketing Division	Illinois	Chicago	1,889	Grain	1995
Cargill, Inc.- Oilseeds Division	Illinois	Chicago	1,831	No Classification	1995
Inland Steel Company	Indiana	East Chicago	1,740	Blast Furnaces And Steel	1994
LTV Steel Company, Inc. (Republic)	Illinois	Chicago	1,653	Blast Furnaces And Steel	1995
LTV Steel Company	Indiana	East Chicago	1,234	Blast Furnaces And Steel	1994
Continental Grain Comapny - Elevator C	Illinois	Chicago	1,198	Grain	1995
Reynolds Metals Company	Illinois	Mccook	1,099	Aluminum Sheet Plate & Foil	1995
Republic Engineered Steels, Inc.	Illinois	Chicago	650	Blast Furnaces And Steel	1995
Horsehead Resource Development Co., Inc.	Illinois	Chicago	584	Secondary Nonferrous Metals	1995
Material Service Corp. - Yard 41	Illinois	Thornton	524	Crushed And Broken Limestone	1995
Acme Steel Company-Chicago Coke Plant	Illinois	Chicago	523	Blast Furnaces And Steel	1995
Commonwealth Edison Company Units 7&8	Illinois	Rockdale	498	Electric Services	1995
Rhone-Poulenc Basic Chemicals Co.	Illinois	Chicago Heights	442	Industrial Inorganic Chemicals	1995
Com Ed - Will County Generating Station	Illinois	Romeoville	395	Electric Services	1995
Nalco Chemical Co.- Clearing Plant	Illinois	Bedford Park	370	Chemical Preparations, Nec	1995
CPC International Inc	Illinois	Bedford Park	342	Wet Corn Milling	1995
Uno-ven Company	Illinois	Romeoville	313	Petroleum Refining	1995
Com Ed - Collins Station	Illinois	Morris	311	Electric Services	1995
Mobil Joliet Refining Corp	Illinois	Joliet	311	Petroleum Refining	1995
115th Street Corporation	Illinois	Chicago	273	Industrial Organic Chemicals	1995
Owens-Corning Fiberglas Corp.	Illinois	Summit	261	Paving Mixtures And Block	1995
Com Ed - Joliet Generating Station	Illinois	Joliet	243	Electric Services	1995
Acme Steel Company	Illinois	Chicago	227	Blast Furnaces And Steel	1995
Com Ed - Fisk Station	Illinois	Chicago	219	Electric Services	1995
Com Ed - Crawford Station	Illinois	Chicago	205	Electric Services	1995
Katalco-Division Of ICI	Illinois	Chicago	198	Industrial Inorganic Chemicals	1995
Quaker Oats Company-Pet Food Division	Illinois	Kankakee	193	Dog, Cat And Other Pet Foods	1995
Meyer Material Co	Illinois	Aurora	171	Paving Mixtures And Block	1995
Unocal Diversified Businesses	Illinois	Lemont	166	Petroleum And Coal Production	1995
Northwest Waste To Energy	Illinois	Chicago	162	Refuse Systems	1995
J R Short Milling Co. Kankakee Division	Illinois	Kankakee	162	Flour & Other Grain Mill	1995
J-pitt Steel Melt Shop, Inc.	Illinois	Chicago	154	Cold Finishing Of Steel Shapes	1995
Nipsco-Dean H Mitchell Station - Gary	Indiana	Gary	146	Electric Services	1994
Nipsco - Bailly	Indiana	Chesterton	146	Electric Services	1994
General Mills,Inc.-Package Food Division	Illinois	West Chicago	144	Cereal Breakfast Foods	1995
Lehigh Portland Cement Co	Indiana	Gary	139	Cement, Hydraulic	1994
Vulcan Materials Corp-Lehigh Plant	Illinois	Kankakee	134	Crushed And Broken Limestone	1995
General Mills Inc	Illinois	Chicago	116	Flour & Other Grain Mill	1995
3M Industrial Tape	Illinois	Bedford Park	112	Paper Coated And Laminate	1995
Manteno Limestone Co	Illinois	Manteno	111	Crushed And Broken Limestone	1995
Anchor Glass Container-Plant #16	Illinois	Gurnee	111	Glass Containers	1995
Abbott Labs - N. Chicago Plant	Illinois	North Chicago	110	Pharmaceutical Preparation	1995
Boughton Trucking & Materials, Inc	Illinois	Plainfield	110	Crushed And Broken Limestone	1995
Amoco Chemical Corp - Joliet Plant	Illinois	Channahon	109	Cyclic Crudes And Intermediates	1995
Koch Minerals	Indiana	Gary	102	Minerals, Ground Or Treated	1994

Source: Environmental Working Group, compiled from the U.S. Environmental Protection Agency's AIRS database.

Table 8. In the Chicago metropolitan area, the Blast Furnace and Steel Industry was responsible for the most PM₁₀ emissions.

Industry	Number of Facilities	Total Annual PM10 Emissions (Tons/Year)
Blast Furnaces And Steel	9	62,273
Petroleum Refining	4	6,085
Grain	4	3,183
Electric Services	11	2,342

Source: Environmental Working Group, compiled from the U.S. Environmental Protection Agency's AIRS database.

All data in this section of the report are presented as direct PM₁₀ emissions, because PM_{2.5} data are not collected by the state. Although the exact percentages may vary, PM_{2.5} are generally proportionate to total particulate emissions (CARB 1991). Thus while ranks might change slightly if PM_{2.5} data were available, as a general rule large particulate polluters will also be among the largest direct PM_{2.5} emitters. Perhaps of greater concern is that these data do not include major emitters of the precursors to particulate matter (SO_x and NO_x). These precursors are converted to PM_{2.5} and contribute to a large part of the particulate problem nationwide. The major emitters of these pollutants will be discussed in a forthcoming EWG report.

Nationwide, about 3.5 billion pounds of PM₁₀ are spewed into the air each year by stationary pollution sources. Cars and trucks, which emit about 25 percent of PM₁₀ each year, are not included in these estimates, nor are the many tons of precursors (NO_x and SO_x). Electric utilities and concrete producers are the top point source emitters of particulate pollution in the United States, followed by steel mills and industrial blast furnaces, iron ore production, and grain milling operations. The major sources of PM_{2.5} "precursors" — SO_x and NO_x — are power plants, oil refineries, and automobiles.

In Illinois and including the Chicago Metropolitan Area, U.S. Steel Company, Gary Works, in Gary Indiana, was the worst particulate polluter emitting 51,752 tons of PM₁₀ particulates in 1994 (Table 7). They were followed by the Amoco Oil Company, Whiting Refinery (5,428 tons), Acme Steel Company, in Riverdale (2,326 tons), Bethlehem Steel, in Burns Harbor Indiana, (2,168 tons), and Cargill, Inc. whose two divisions in Chicago totaled over 3,700 tons.

In Illinois and the surrounding areas, there were a total of eleven facilities emitting more than 1,000 tons of total particulates, and 38 facilities emitting more than 100 tons — EPA's definition of a "major" source. In the Chicago metropolitan area, the five largest particulate polluters are responsible for 68% of emissions.

The largest emitters were members of the Steel Industry. As an industry, they were responsible for 62,273 tons of particulate emissions. They were followed by Petroleum Refining (6,085 tons), Grain (3,183 tons), and Electric Services (2,342 tons) (Table 8).

Table 9. Monitoring hot spots where particulate pollution will likely exceed EPA’s proposed standards.

County	Estimated Three Year Annual PM2.5 Average (Converted from PM10 Monitoring Data)	Street Address
Madison	28.34	15th & Madison
Cook	26.82	Mayfair Pump Station, 4850 Wilson Avenue
Cook	26.12	50th Street and Glencoe
Madison	25.90	VFW Building, 2044 Washington Avenue
Cook	24.55	Graves Elementary School 60th Street & 74th Avenue
Cook	23.22	Roosevelt H.S., 15th St. & 50th Avenue
Cook	21.88	Marsh School, 9810 S. Exchange
Cook	21.74	3535 E. 114th Street
Cook	21.69	Farr Dormitory 3300 S. Michigan Avenue
Madison	21.69	23rd & Madison
Cook	21.38	13100 S. Doty
St. Clair	20.96	13th & Tudor Raps Site
Cook	20.72	Chicago Ave. Pump Station, 805 N. Michigan
Cook	20.24	Eisenhower High School, 12700 Sacramento Ave.
Randolph	20.19	Site B., Cnty Rds. 00.0 N & 25.0 E
Cook	20.04	4043 Joliet Ave.
LaSalle	19.73	308 Portland Ave.
Madison	19.70	2420 Nameoki Rd., Plaza Furniture
Cook	18.99	170th St. & S. Park Avenue
Madison	18.77	211 Sinclair, City Hall
Madison	18.45	409 Main Street, Clara Barton School
Will	18.40	Midland & Otis, Rockdale
Madison	18.10	54 N. Walcott
Macon	17.81	Grant Elementary School, 2300 Geddes
Cook	16.67	Hoffman Estates H.S. 1100 W. Higgins Rd.

Source: Environmental Working Group, compiled from the U.S. Environmental Protection Agency’s AIRS database.

Hot Spots and Sacrifice Zones

As drafted, EPA’s proposal needs significant strengthening to prevent the premature death of many residents of Illinois from particulate pollution. Efficient solutions to this pressing public health problem will be even harder to come by due to the lack of a scientifically based monitoring plan. Given the nearly random nature of existing monitoring locations, the high spatial variability in air quality, and the use of spatial averaging, some areas with high annual average particulate levels could be ignored by the regulatory process, simply because they may be grouped together with lower PM areas. EPA’s proposal to allow “special purpose monitors” will make it even more likely for this to occur. In this scenario, heavily polluted areas where PM levels hover just below the 24-hour standard for long periods of time will essentially become sacrifice zones.

In Illinois, out of 41 monitors, there are twenty-five where the three-year average PM_{2.5} levels exceeded the EPA proposed standard, based on our analysis of data from 1993 through 1995. These hot spots in Cook, Madison, St. Clair, Randolph, LaSalle, and

Will counties could become sacrifice zones if the EPA proposal is implemented (Table 9).

The Clinton Administration proposal is nearly silent on the placement of monitors. While they suggest that they be placed near populations, there is no requirement for scientifically validated monitoring that clearly delineates hot spots and cleaner areas within the state. In essence, the proposal suggests that the air in some areas may remain heavily polluted, as long as the air in other areas meets the new standard.

Recommendations

More Protective Health Standards

The Clinton Administration's proposed PM_{2.5} standard for particulates represents a significant improvement in the status quo. In order to fully protect the public health, and particularly the health of the most vulnerable individuals in the population, however, it must be strengthened substantially. By the EPA's own calculations, the proposed rule would reduce premature mortality from airborne particulates by 50 percent, while tens of thousands of premature deaths will continue even after the proposed health standards are met (EPA 1996d).

Moreover, the proposed particulate standard is more accurately viewed as a goal than an enforceable health standard. Historic enforcement of Clean Air Act requirements suggests that attainment of any new particulate standard will be achieved only over a number of decades, during which time millions of people will suffer the health consequences of unsafe air as EPA fights to bring polluters into compliance.

Given these realities, we strongly support the PM_{2.5} standard of 10µg/m³ as recommended by the American Lung Association and the Natural Resources Defense Council. This goal will provide dramatic health benefits when achieved, and puts the agency more squarely in compliance with the basic requirements and intent of the law. To guard against the adverse health effects of peak particulate exposures, we recommend a 24-hour PM_{2.5} standard of 20µg/m³.

Better Monitoring

The proposed rule could create sacrifice zones, where unsafe air is not cleaned up, but instead is averaged together with cleaner air from an adjacent community to create the statistical illusion of clean air within an arbitrary spatial averaging zone. We strongly oppose the used of statistical techniques to hide pollution and avoid cleaning up unsafe air breathed by millions of Americans.

Instead, EWG recommends tough health standards that are backed up by a scientifically valid system of airborne particulate monitoring. In most major U.S. cities many more monitoring sites are needed to achieve this goal.

EWG supports scientifically validated monitoring so that regulators can characterize accurately the spatial distribution of particulate pollution. The purpose of identifying hot spots is to clean them up, not to fake pollution reductions through statistical techniques that leave people at risk, or through dispersing pollution sources throughout cleaner areas, a maneuver that might actually place more people at greater risk than is currently the case.

To ensure that representative monitoring occurs, all major particulate polluters, as currently defined by EPA, should be required to contribute to a fund, administered by local air quality officials, that is dedicated to statistically valid particulate monitoring in all metropolitan statistical areas in the United States. Spatial averaging techniques must not be used in any metropolitan region that does not have a representative particulate monitoring network in place.

With better monitoring and delineation of hot spots the EPA can achieve two goals. It can aim its regulatory efforts at the biggest polluters in the most polluted locations, and it can minimize the number of times that clean areas are dragged into noncompliance due to arbitrary political distinctions such as a county or township boundaries.

Finally, we oppose any plan that achieves compliance with the new health standard by:

- moving existing monitors to cleaner locations
- adding monitors only at cleaner locations, and
- dispersing the pollution source (e.g. a bus transfer station) and thus increasing pollution in cleaner areas.

Hot Spots

The current monitoring system, while not fully representative of local and regional pollution levels, does identify specific locations, or hot spots, where airborne particulates are at unsafe levels. There is no reason to delay pollution reduction measures at these sites. Therefore, until such time as a representative monitoring system is in place, EWG recommends that the EPA maintain the current rules for monitoring, where exceeding the standard in one location triggers a violation.

Right to Know

The public has a fundamental right to know about pollution in the air they breathe. EWG's experience in gathering the particulate monitoring data used in this report shows that the public, and to a significant degree, federal regulators, have no practical way to find out about levels of deadly particulate pollution in their communities.

We recommend, therefore, that the EPA maintain an up-to-date database of particulate pollution levels nationwide, and that these data be available to the public in a manner consistent with data already widely available in the Toxic Release Inventory.

We further recommend that citizens in polluted communities be given the right to petition for and receive in their communities the monitoring equipment needed to detect particulate and other air pollution, and a timely public notification of monitoring results.

References

Bascom, R., P.A. Bromberg, D.A. Costa, R. Devlin, D.W. Dockery, M.W. Frampton, W. Lambert, J.M. Samet, F.E. Speizer, and M. Utell. 1996. Health Effects of Outdoor Air Pollution. *Am. J. Respir. Crit. Care Med.* 153:3-50.

California Air Resources Board. 1991. Identification of Particulate Matter Species Profiles. ARB Speciation Manual, Second Edition.

Dickey, J.H. 1996. No Room to Breathe: Particulate Air Pollution and Excess Mortality. Greater Boston Physicians for Social Responsibility. 23 pp.

Dockery, D.W., C.A. Pope, X. Xu, J.D. Spengler, J.H. Ware, M.E. Fay, B.G. Ferris and F.E. Speizer. 1993. An Association Between Air Pollution and Mortality in Six U.S. Cities. *The New England Journal of Medicine.* Vol.329 No.24, pp.1753-9.

National Center for Health Statistics. 1992. Vital Statistics of the United States, 1989, Volume II-Mortality, Part B, Hyattsville, Maryland.

Natural Resources Defense Council. 1996. Breath Taking: Premature Mortality due to Particulate Air Pollution in 239 American Cities. 154 pp. May, 1996.

Ostro, B. 1993. The Association of Air Pollution and Mortality: Examining the Case for Inference. *Archives of Environmental Health.* Vol.48 No.5 336-342.

Pope, C.A. 1991. Respiratory Hospital Admissions Associated with PM₁₀ Pollution in Utah, Salt Lake and Cache Valleys. *Archives of Environmental Health.* Vol. 46 No. 2 pp.90-97.

Pope, C.A., J. Schwartz, and M.R. Ransom. 1992. Daily Mortality and PM₁₀ Pollution in Utah Valley. *Archives of Environmental Health.* Vol. 47 No.3, 211-217.

Pope, C.A, M.J. Thun, M.M. Namboodiri, D.W. Dockery, J.S. Evans, F.E. Speizer, C.W. Heath, Jr. 1995. Particulate Air Pollution as a Predictor of Mortality in a Prospective Study of U.S. Adults. *Am. J. Resp. Crit. Care Med.* 151:669-74.

Schwartz, J. 1992. What are People Dying of on High Air Pollution Days? *Env. Res.* 64:26-35.

Schwartz, J. and D.W. Dockery. 1992. Particulate Air Pollution and Daily Mortality in Steubenville, Ohio. *Am. J. Epidemiol.* 145:600-604.

Schwartz, J. 1993. Air Pollution and Daily Mortality in Birmingham, Alabama. *Am. J. Epidemiol.* 137:1136-47.

- Schwartz, J. 1994. Air Pollution and Hospital Admissions for the Elderly in Birmingham, Alabama. *Am. J. Epidemiol.* 139:589-98.
- Skrzyski, C. 1996. Air Standards Brouhaha: EPA Finds a Way to Make the Grassroots Grow. *Washington Post* Article. November 1, 1996.
- Speizer, F.E., M.E. Fay, D.W. Dockery, and B.G. Ferris, Jr. 1989. Chronic Obstructive Pulmonary Disease Mortality in Six U.S. Cities. *Am. Rev. Respir. Dis.* 140:S49-S55.
- Systems Applications International. 1996. Median Ratios. In: Draft Final Report to EPA. April 1996. Provided by John Bachmann of EPA.
- U.S. Department of Transportation. Federal Highway Administration.
- U.S. E.P.A. 1993. Memorandum. Priority Revision of the PM₁₀ NAAQS. From David Gardiner, Gary Foley, and Michael Shapiro to the Administrator. July 19, 1993. As cited in NRDC, 1996.
- U.S. E.P.A. 1996a. National Ambient Air Quality Standards for Particulate Matter: Proposed Decision. 40 CFR Part 50.
- U.S. E.P.A. 1996b. Proposed Requirements for Designation of Reference and Equivalent Methods for PM_{2.5} and Ambient Air Quality Surveillance for Particulate Matter. Proposed Rule. 40 CFR Parts 53 and 58. *Federal Register*: December 13, 1996 (Volume 61, Number 241) pp. 65779-65872
- U.S. E.P.A. 1996c. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information. November, 1995.
- U.S. E.P.A. 1996d. EPA Proposes Air Standards for Particulate Matter and Ozone. *Environmental News*. Wednesday, November 27, 1996.
- U.S. E.P.A. 1996e. National Air Quality and Emissions Trends Report, 1995. United States Environmental Protection Agency. December, 1996.
- Wolff, G.T. 1996. Letter from George T. Wolff, Chair, Clean Air Scientific Advisory Committee, to Administrator Carol M. Browner. Closure letter on draft OAQPS Staff Paper. June 13, 1996. As cited in EPA 1996a.