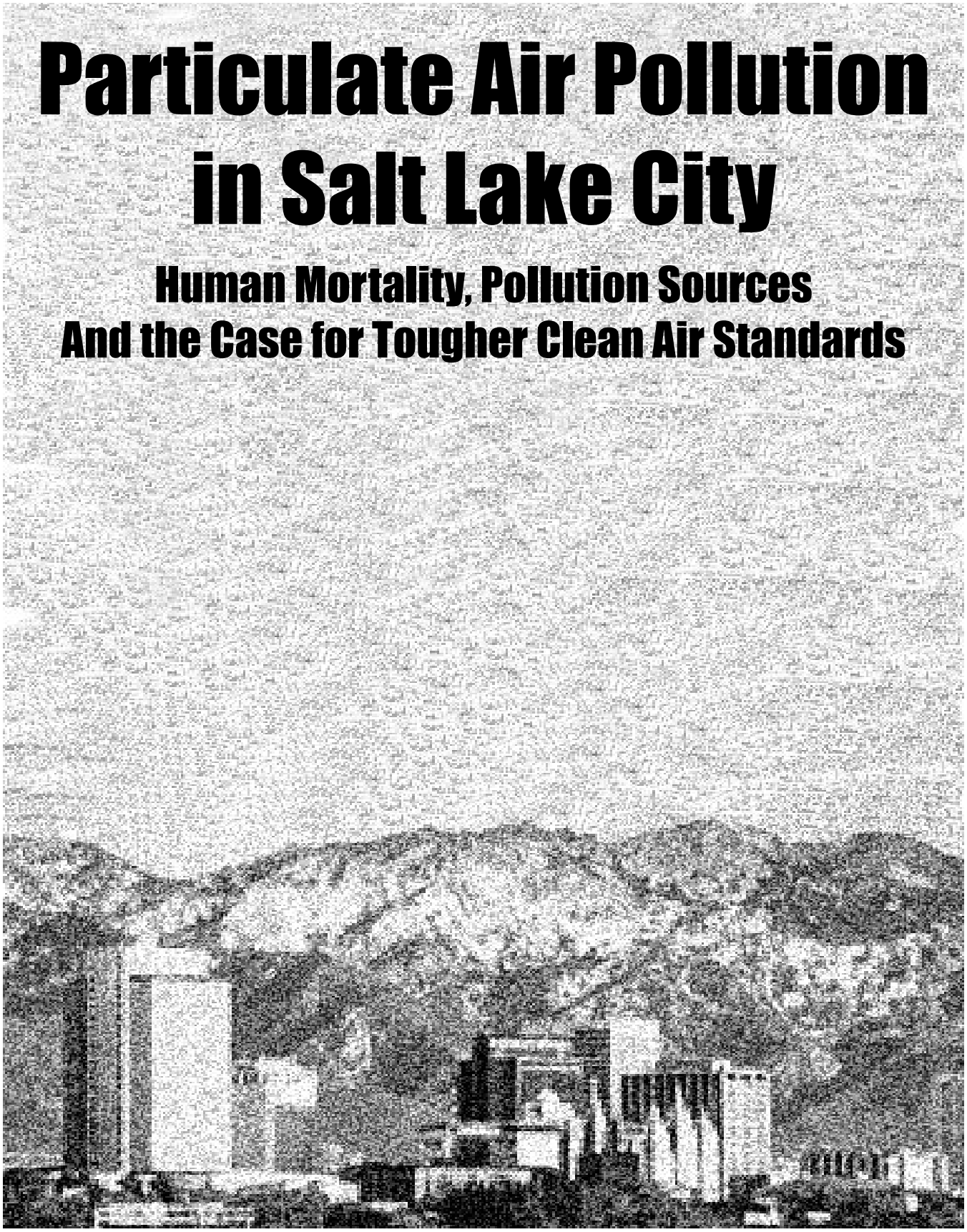
# Particulate Air Pollution in Salt Lake City

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



ENVIRONMENTAL WORKING GROUP™

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# 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). This 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."

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 is 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).

**Table 1. The Oil and Gas Exploration Service industry generates the most particulate pollution in Utah.**

| Plant Name | City | Annual PM10 Emissions (Tons/Year) | Industry Type |
|---|---|---|---|
| CNG Producing Company | Roosevelt | 3,987 | Oil And Gas Exploration Services |
| Kennecott - Copperton Concentrator | Bingham Canyon | 2,096 | Primary Copper |
| Pacificorp Hunter | Castledale | 1,704 | Electric Services |
| Magcorp | Rowley Junction | 1,369 | Primary Nonferrous Metals |
| Geneva Steel | Orem | 1,043 | Blast Furnaces And Steel |
| Kennecott Main Stack, Smelter And | Bingham Canyon | 896 | Primary Copper |
| Pacificorp Huntington | Huntington | 611 | Electric Services |
| Dugway Proving Grounds | Dugway | 382 | National Security |
| Continental Lime | Delta | 330 | Crushed And Broken Limestone |
| Holnam Inc. | Morgan | 316 | Cement, Hydraulic |
| Thiokol Corporations Strategic Op. | Promontory | 287 | Guided Missiles And Space Vehicles |
| Sigurd Plant | Sigurd | 229 | Gypsum Products |
| Kennecott - Utah Power Plant And | Magna/Bingham Canyon | 217 | Primary Copper |
| Deseret - Bonanza | Bonanza | 187 | Electric Services |
| Great Salt Lake Mineral | Little Mountain | 186 | Rock Salt |
| Salt & Potash Production Facility | Moab | 169 | Alkalies And Chlorine |
| Barney's Canyon Mine | Bingham Canyon | 138 | Gold Ores |
| Barrick Minerals | Mercur | 137 | Gold Ores |
| Sunnyside Cogeneration Associates | East Carbon City | 137 | Electric Services |
| S.F. Phosphates | Vernal | 129 | Phosphate Rock |
| Ashgrove Cement | Leamington | 124 | Cement, Hydraulic |
| Pineview Field | Coalville | 114 | Petroleum Refining |
| Westroc - Concrete Batch Plants | Springville | 101 | Construction Machinery |

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

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 Utah 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).

The Clinton Administration's proposal, effectively implemented and enforced, would prolong the lives of many people, but would have to be strengthened significantly to prevent the premature death of many more people in Utah each year (NRDC 1996). Problems with EPA's proposed monitoring and enforcement provisions may compromise even these modest health benefits.

### 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 Utah, the Oil and Gas Exploration Services were the single greatest direct contributor of particulate pollution in the state. The top direct PM10 polluters in the state of Utah are CNG Producing Company, near Roosevelt, Kennecott-Copperton Concentrator, and Pacificorp-Hunter in Castledale (Table 1).

Numerous other industrial facilities emit large amount of "particulate precursors" — sulfur and nitrogen compounds that form particulates after emission. The largest $NO_2$ emitter in the state was Geneva Steel, which emitted 5,067 tons in 1995. The largest $SO_X$ emitters were the Kennecott Smelter, followed by Pacificorp Huntington, Hunter, and Castlegate plants.

### 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 $\mu g/m^3$ by 2.5 $\mu g/m^3$ 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 an cleaner location in the county. None of these counties would have violated the proposed 24-hour $PM_{2.5}$ standard of 50$\mu g/m^3$.

### 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.

## 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 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 reduces pre-

mature mortality from airborne particulates by 50 percent while tense 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/$m^3$ 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/$m^3$.

## 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 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.

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.

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.

Chapter One

# Particulate Pollution Kills

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) amendments direct 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 of 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, $PM_{10}$, $PM_{2.5}$) 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 $PM_{10}$ pollution and elevated incidence of death. These studies all show a direct relationship between rising $PM_{10}$ 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 $\mu g/m^3$ increase in $PM_{10}$ (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 $\mu g/m^3$ of "inhalable particles," (Schwartz 1993). In Cincinnati, the death rate increased by 6 percent for every 100$\mu g/m^3$ 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 $PM_{2.5}$ 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 $PM_{2.5}$ level using a nationwide conversion factor of 60 percent (i.e., NRDC assumed that $PM_{2.5}$ 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 $10\mu g/m^3$ for fine particulate matter ($PM_{2.5}$) could prevent over 56,000 premature deaths every year (NRDC 1996).

## Chapter Two

# 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 (μg/m$^3$) over a 24 hour period, and 75 μg/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 μg/m$^3$ over a 24 hour period, and an annual average of 50 μg/m$^3$. California has established stricter $PM_{10}$ standards: a 24 hour standard of 50 μg/m$^3$, and an annual average of 30 μg/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.

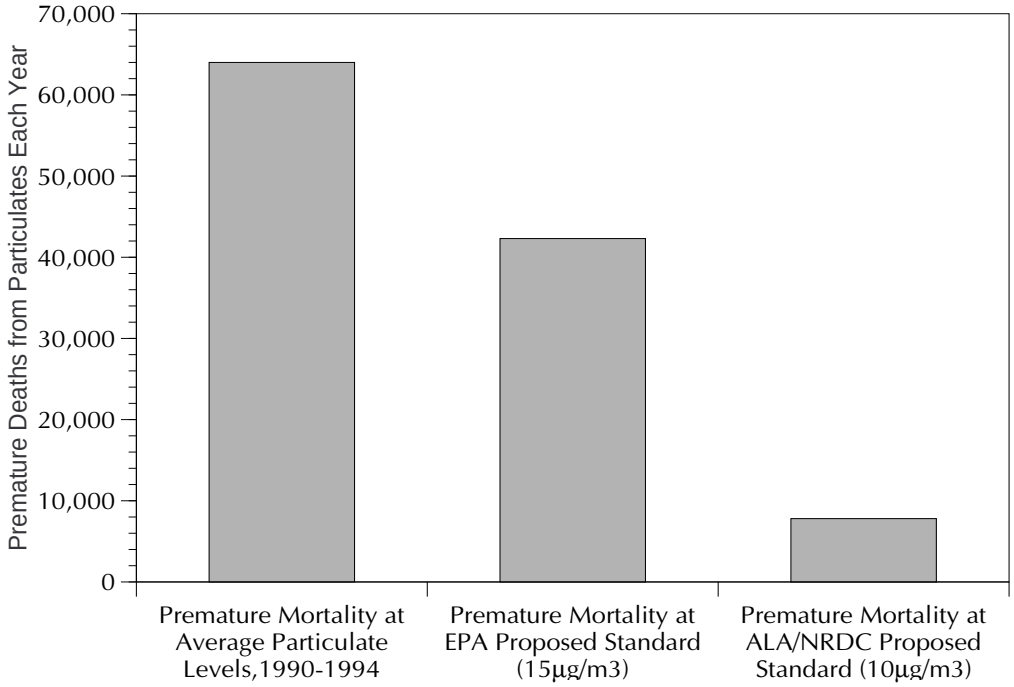
The Clinton Administration's proposed rule, released on November 27, 1996 establishes new, tougher health standards for $PM_{2.5}$. These standards represent a significant improvement over the current public health goals. The draft rules recommend a three-year average $PM_{2.5}$ limit of 15 μg/m$^3$, and propose retaining the annual $PM_{10}$ standard of 50 μg/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 $PM_{2.5}$ limit of 50 μg/m$^3$ (not counting the top 2 percent of concentrations).

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).

**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.*

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.

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 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.

**Table 2. 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.*

## 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 $PM_{10}$ 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 $\mu g/m^3$. In EPA's example (Table 2), the three year mean (or average) over the four sites is 14.52 $\mu g/m^3$. Within 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

**Table 3. 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.*

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 $\mu g/m^3$, 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 PM2.5 standard of 50$\mu g/m^3$. 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 50$\mu g/m^3$, 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 2.5$\mu g/m^3$ (Table 3). 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) (Skrzycki 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.

Chapter Three

# Particulate Pollution in Utah

## Top Particulate Polluters in Utah

To quantify and analyze particulate pollution by facility for Utah and the nation, the Environmental Working Group obtained facility emissions data for particulate matter from the Environmental Protection Agency. The most recent data available were from the state's Air Quality Emissions Inventory database for 1995. Although other pollutants serve as precursors (i.e. $NO_x$ and $SO_x$) this analysis focuses on direct emissions of particulate matter.

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 $\mu g/m^3$, *not* because no effects have been demonstrated below 9 $\mu g/m^3$, but because the cleanest city in the study had a $PM_{2.5}$ level of 9 $\mu g/m^3$. In fact, no threshold has been determined below which mortality rates are unaffected by $PM_{2.5}$.

Based on the most recent AIRS data on $PM_{10}$, 9 $\mu g/m^3$ $PM_{2.5}$ 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 $\mu g/m^3$ $PM_{2.5}$. Given the demonstrated mortality effects at low levels of $PM_{2.5}$, our recommended annual $PM_{2.5}$ standard of 10 $\mu g/m^3$ 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 $PM_{2.5}$ levels in representative regions of the country. This study should not delay implementation of the health standards recommended in this report.

All data in this section of the report are presented as total direct particulate 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.

Nationwide, about 3.5 *billion* pounds of $PM_{10}$ are spewed into the air each year by stationary pollution sources. Cars and trucks, which emit about 25 percent of $PM_{10}$ 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.

## Table 4. NEEDS A UTAH TITLE

| Plant Name | City | Annual PM10 Emissions (Tons/Year) | Industry Type |
|---|---|---|---|
| CNG Producing Company | Near Roosevelt | 3,987 | Oil And Gas Exploration Services |
| Kennecott - Copperton Concentrator And | Bingham Canyon | 2,096 | Primary Copper |
| Pacificorp Hunter | Castledale | 1,704 | Electric Services |
| Magcorp | Rowley Junction | 1,369 | Primary Nonferrous Metals |
| Geneva Steel | Orem | 1,043 | Blast Furnaces And Steel |
| Kennecott Main Stack, Smelter And | Bingham Canyon | 896 | Primary Copper |
| Pacificorp Huntington | Huntington | 611 | Electric Services |
| Dugway Proving Grounds | Dugway | 382 | National Security |
| Continental Lime | Delta | 330 | Crushed And Broken Limestone |
| Holnam Inc. | Morgan | 316 | Cement, Hydraulic |
| Thiokol Corporations Strategic Op. | Promontory | 287 | Guided Missiles And Space Vehicles |
| Sigurd Plant | Sigurd | 229 | Gypsum Products |
| Kennecott - Utah Power Plant And | Magna/Bingham Canyon | 217 | Primary Copper |
| Deseret - Bonanza | Bonanza | 187 | Electric Services |
| Great Salt Lake Mineral | Little Mountain | 186 | Rock Salt |
| Salt & Potash Production Facility | Moab | 169 | Alkalies And Chlorine |
| Barney's Canyon Mine | Bingham Canyon | 138 | Gold Ores |
| Barrick Minerals | Mercur | 137 | Gold Ores |
| Sunnyside Cogeneration Associates | East Carbon City | 137 | Electric Services |
| S.F. Phosphates | Vernal | 129 | Phosphate Rock |
| Ashgrove Cement | Leamington | 124 | Cement, Hydraulic |
| Pineview Field | Coalville | 114 | Petroleum Refining |
| Westroc - Concrete Batch Plants | Springville | 101 | Construction Machinery |

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

In Utah, the CNG Producing Company, was the top particulate polluter, emitting 3,987 tons of $PM_{10}$ particulates in 1995 (Table 4). They were followed by Kennecott-Copperton Concentrator (2,096), Pacificorp-Hunter in Castledale(1,704), Magcorp (1,369), and Geneva Steel (1,043).

In Utah there were a total of 5 facilities emitting more than 1,000 tons of total particulates, and 18 facilities emitting more than 100 tons — EPA's definition of a "major" source. In Utah, the five largest particulate polluters are responsible for 69% of the more than 17,082 tons of particulate emissions in the state. The largest emitter was a members of the Oil and Gas Exploration Industry. As an industry, they were responsible for 3,987 tons of particulate emissions in the state. They were followed by the Primary Copper Industry (3,209), Electric Services (2,811 tons), primary nonferrous metals (1,369 tons), and the Steel Industry (1,111 tons) (Table 5).

## Top Emitters of Particulate Precursors - $SO_x$ and $NO_x$.

In addition to directly emitting small particles, many industrial facilities in Utah pollute the air with sulfur and nitrogen compounds. These compounds — known as particulate precursors — are converted to $PM_{2.5}$ after emission, and contribute to a large part of the particulate problem nationwide. Twenty-two facilities in Utah emitted more than 100 tons of $SO_2$ in 1995. The Kennecott Smelter, was the top $SO_2$ polluter, emitting 14,284 tons in 1995 (Table 6). They were followed by Pacificorp - Huntington (12,186 tons), Pacificorp-Hunter (6,840), Pacificorp - Castlegate (3,827), and the Intermountain Power Service Corporation in Lyndahl (2,599). According to EPA's AIRS database, there was only one major facility in Utah emitting $NO_2$ — the Geneva Steel plant, which emitted 5,067 tons in 1995.

**Table 8. The Oil and Gas industry is responsible for the most $PM_{10}$ particulate pollution in Utah.**

| Industry | Number of Sources >25 Tons/year | Total PM10 Emissions (Tons/year) |
|---|---|---|
| Oil And Gas Exploration Services | 1 | 3,987 |
| Primary Copper | 3 | 3,209 |
| Electric Services | 7 | 2,811 |
| Primary Nonferrous Metals | 1 | 1,369 |
| Blast Furnaces And Steel | 2 | 1,111 |

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

## Hot Spots and Sacrifice Zones

As drafted, EPA's proposal needs significant strengthening to prevent the premature death of many Utah residents 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.

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.

**Table 6. The Kennecott Smelter was the largest emitter of SO2 in Utah in 1995.**

| Plant Name | City | Annual SO2 Emissions (Tons/Year) |
|---|---|---|
| Kennecott Main Stack, Smelter | Bingham Canyon | 14,825 |
| Pacificorp Huntington | Huntington | 12,187 |
| Pacificorp Hunter | Castledale | 6,840 |
| Pacificorp Castle Gate | Helper | 3,827 |
| Intermountain Power Service Corporation | Lyndahl | 2,669 |
| Kennecott - Utah Power Plant And | Magna/Bingham Canyon | 2,599 |
| Ashgrove Cement | Leamington | 1,328 |
| Amoco | Salt Lake City | 1,270 |
| Geneva Steel | Orem | 972 |
| Chevron USA | North Salt Lake | 899 |
| Sunnyside Cogeneration Associates | East Carbon City | 860 |
| Unocal Pipeline Co. | Lisbon Valley | 789 |
| Deseret - Bonanza | Bonanza | 682 |
| Phillips Petroleum | Woods Cross | 586 |
| Holnam Inc. | Morgan | 524 |
| Flying J | North Salt Lake | 413 |
| Continental Lime | Delta | 326 |
| Brick Manufacturing Plant | West Jordan | 232 |
| Utelite Corp. | Rockport | 185 |
| Brush-Wellman | Delta | 151 |
| Brigham Young University | Provo | 151 |
| Davis County Energy Recovery Facility | Layton | 115 |

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

## Chapter Five

# 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 $10\mu g/m^3$ 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 $20\mu g/m^3$.

### 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.

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