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**PAST, PRESENT AND FUTURE:
THE NATIONAL AMBIENT AIR
QUALITY STANDARDS
FOR
OZONE AND PARTICULATE
MATTER**

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EXECUTIVE SUMMARY

Under the Clean Air Act (CAA) of 1970, the Environmental Protection Agency (EPA) is required to review the National Ambient Air Quality Standard (NAAQS) every five years and decide if there is a need to revise these health and welfare standards. As a result of an American Lung Association (ALA) lawsuit, which charged the EPA with not following these requirements, the EPA formally issued proposals on December 13, 1997 to tighten the existing standards for ozone and set a new standard regulating fine particulates. The agency has been under a court-ordered deadline to publish final decisions on whether to revise the standards by July 19th. These standards were the most stringent ever proposed and set off an economic and environmental debate amongst the Administration, industry groups, Congress, environmentalists and the EPA. Many specifically criticized the science used in setting the standard saying that it was both speculative and incomplete.

The proposed rule called for a tightening of the primary ozone standard from the current 0.12 parts per million one-hour standard to an allowable 0.08 parts per million (ppm) eight-hour standard. This standard was established to safeguard human health and prevent adverse health effects. Under this the proposed rule, counties would be allowed three exceedances before deemed out of compliance. The secondary standard, intended to control the effects that air pollution has on vegetation, was proposed in two forms. The first proposal was identical to the primary standard, and the alternative was a new seasonal accumulating -type standard.

For the first time the PM NAAQS standard will focus on fine particles 2.5 microns (μm) or smaller. These particles have been signaled out as those responsible for many adverse respiratory problems. The standard has been proposed at a 24-hour level of $50 \mu\text{g}/\text{m}^3$ with an annual standard of $15 \mu\text{g}/\text{m}^3$.

In the interim period between the official announcement of the proposal in December and the decision on the promulgation of the new standards in July, a period of public comment, Congressional hearings and mass media coverage transpired. Congressional committees, in hearings on both sides of the Capitol, have hammered away at the issue for months, allowing critics to question the scientific basis, potential costs and health benefits of the new regulations to reduce emissions of ozone and particulate matter.

The new rules have generated extensive opposition from major industries, including oil, utility and automobile companies, who have challenged the costs of the regulations as well as the EPA's scientific justification for them. But environmental groups like the Sierra Club and public health agencies which support the proposed rules claim the new rules will protect children's health and the environment.

In addition, the rules have divided Congress along regional and ideological lines. Democrats from Midwest and oil states have joined the mainly Republican opposition, because power plants, automobile users and refineries in their states could bear new costs under the rules. Many Republicans from states that are downwind from such facilities support the rules. In addition, hundreds of cities and counties could fine themselves in violation of the rules.

On June 25 after a grueling eight-month review period, President Clinton finally endorsed the highly controversial decision by the EPA to significantly tighten the standards. The president, however, ultimately agreed to finalize rules that are somewhat less stringent than EPA originally proposed.

The final rules, which EPA promulgated on July 18, will set a new eight-hour standard for ozone. In contrast to EPA's proposed rule, however, the final ozone rule will allow four exceedances of the standard before an area is deemed out to compliance. The original proposal would have allowed only three exceedances. The current rule allows only one exceedance of the standard per year. Likewise, the final rule for fine PM calls for a weaker daily standard than EPA originally proposed. EPA's proposal called for a 24-hour standard of $50 \mu\text{g}/\text{m}^3$, while the final rule will set a standard of $65 \mu\text{g}/\text{m}^3$. The annual standard of $15 \mu\text{g}/\text{m}^3$ proposed by the EPA will remain the same.

Both standards are expected to dramatically increase the number of counties in the nation considered in violation of national air quality standards. Based on 1993-1995 monitoring dates, EPA estimated that 335 counties would violate the new ozone rule, compared with 104 counties that do not meet the existing rule. In addition, the agency estimated that 167 counties would violate the new set of PM standards, compared with 41 counties that violate the existing PM₁₀ rule.

The final regulations also include an "implementation package" that will give states, localities and industries time to prepare to meet the new standards. According to the White House statement, "The vast majority of areas that do not currently meet the new ozone standard will be able to do so without any additional new local pollution controls or measures." These areas will not be designated as nonattainment areas but rather as transitional with a 2004 deadline for compliance.

Nonattainment designations for fine particulate matter, on the other hand, will not begin until a full scientific review is conducted of the pollutant's human health effects. The rule instead gives the EPA five years to build a nationwide network to monitor, gather, and analyze data on fine particulates. After that, the EPA will give areas that are not in compliance another three years to submit air quality plans for meeting the new standards, a year-and-a-half to review the plans and several additional years to comply with the new standards.

The President's decision to endorse the tighter air pollution requirements immediately generated opposition from certain member of Congress. Congress has the right to

reject any major Federal regulation under a law enacted in the 104th Congress known as the Small Business Regulatory Enforcement Fairness Act (SBREFA).

A bipartisan House-Senate group announced plans at a June 25th press briefing to pursue legislation following the July recess to override the proposed air quality standards.

In the House, Reps Ron Klink (D-PA) and Fred Upton (R-MI) introduced a bill (H.R. 1984) which directs EPA to hold off setting the proposal until the next five-year review cycle for pollutants as required by the CAA, allowing more time for scientific review and analysis to determine whether the changes would be needed. It would also provide \$75 million in funding for new research into fine particulate matter for each fiscal year for the next five years. Another bill introduced by Rep. Bob Ney (R-OH) calls on EPA to postpone a final rule until present national clean air standards for ozone and particulate matter are fully attained. To avoid having competing proposals, Rep. Ney has asked cosponsors of his bill to instead join the list of members signing on to H.R. 1984.

Meanwhile, the Senate bill (S. 1084) introduced by Senator James Inhofe (R-OK) is very similar to H.R. 1984, except for a broader research plan and an interagency study program designed to reassess the pollutants' effects on human health. Industry groups have also renewed pledges to sue the agency over regulations based on allegations that the agency violated certain laws governing the regulatory process.

Both bills, however, face uphill battles. There appears to be little doubt that President Clinton would veto a bill to defer new standards, for which implementing legislation is still to be written.

CONTENTS

Introduction	1
Background	1
The Clean Air Act	1
National Ambient Air Quality Standards	1
Establishment and Purpose of the Clean Air Scientific Advisory Committee ..	2
The Most Recent Review	2
Current and Proposed Standards	3
Ozone	3
Compliance	4
Particulate Matter	4
Compliance	6
Air Quality Trends	6
Scientific Uncertainty	7
The PM Debate	7
EPA Particulate and Ozone Report-House Committee on Science	9
The 1997 CITGO Particulate Matter Study	10
Questioning the Science Behind the Ozone Standard	11
Cost/Benefit Analysis	12
Key Stakeholders	13
Industry and Business	13
Opposition Grassroots Efforts	14
Environmental and Public Health Groups	14
The Other Side	14
Federal, State and Local Roles	15
State Officials	15
The Announcement and the Response	16
The New Rules	16
Ozone	17
PM	17
Monitoring Requirements for PM	17
Implementation	18
Implementing the Ozone Standard	18
Implementing the Standard for Particulate Matter	19
Economic and Social Impacts	20
Fatalities Induced by Economic Impacts	20
Job Loss	20
Control Measures and Available Technology	21

Congressional Policy Alternatives	22
H.R. 1984	22
S. 1084	23
H.R. 1863	23
Small Business Regulatory Enforcement Fairness Act	24
Reauthorization of the CAA	24
Court Challenges	24
 Recommendations	 24
 Acronyms	 25
 Acknowledgments	 25
 Appendices	

INTRODUCTION

Few Americans doubt the importance of the environment or that Americans should be protected from the health effects of various emissions. As will be discussed in this paper, many do question how to monetize life or the benefits of one less case of asthma or bronchitis. By looking at the history of the CAA, we can understand its purpose but still question whether this is the right time to alter the regulations it requires. This issue has moved beyond the arena of health care and industry costs; beyond the claims of uncertainties and has instead moved behind the closed doors of White House officials, scientists and politicians leaving many unanswered questions about one of the most debated issues of the year.

BACKGROUND

The Clean Air Act (CAA)

The CAA was first established in 1963 giving the Department of Health and Education and Welfare the responsibility for preparing summaries of the scientific knowledge on the polluting effect that were caused by many sources. The CAA of 1970 marked the beginning of a new era in which the Federal Government would set binding national standards rather than rely primarily on the states to protect environmental quality. Section 108 specifically gives the Administrator of the EPA the responsibility to identify "pollutants which may reasonably be anticipated to endanger public health and welfare" and to protect the public from adverse health effects.ⁱ Following, in Section 109, the Administrator is directed to establish primary and secondary NAAQS for each pollutant at a level to protect public health, with an "adequate margin of safety".ⁱⁱ

The margin of safety provision is added on the assumption that each pollutant can exist at a threshold level below which adverse health effects do not occur. The standard is therefore set, scientifically and objectively, in hopes of determining this threshold level. The last Criteria Document for both ozone and PM did not however, find a threshold level which made the EPA decision of standard levels a risk management decisionⁱⁱⁱ. The stipulation of "adequate margin of safety" is an additional

ⁱ¹Clean Air Act (1990 Amendments), 42 U.S.C. 7408 [CAA *108]

ⁱⁱ²Clean Air Act (1990 Amendments), 42 U.S.C. 7409 [CAA *109].

ⁱⁱⁱ³Wolff, George T. "Letter to Administrator Browner: Closure by the Clean Air Science Advisory Committee on the Staff Paper for Particulate Matter." 13 June 1996.

safety measure prescribed by the US Court of Appeals to deal with uncertainties of incomplete or indeterminate scientific and technical information. ^{iv}

National Ambient Air Quality Standards (NAAQS)

NAAQS were established to control ambient air quality concentrations of the six "criteria" pollutants which included photochemical oxidants and total suspended particles. These two standards were later set to specifically control the polluting nature of ozone and particulate matter 10 microns in diameter or less (PM₁₀).

Section 109 also gave the Administrator the authority to revise or set new NAAQS as was seen necessary, and in 1971, standards were established for all six criteria pollutants. In later years, the Congress saw a need to establish a definite mechanism by which there would be a guaranteed review of the NAAQS. As a result they included in the 1977 CAA a provision which required these standards to be reviewed, and revised if necessary, every five years.

The Act has also been interpreted to direct the Administrator to only consider the protection of public health in the decision to revise or set a NAAQS based on the best available science. As interpreted in Lead Industries Association v. EPA^v this forbid the consideration of cost/benefit economics as well as technical feasibility in complying with the standards. Costs, can however, play an integral role in deciding the most cost-effective implementation plans for the standards.

The initial step in a NAAQS review is the drafting of the Criteria Document by the EPA. The purpose of this document is to encapsulate all of the relevant science as far as its chemistry, effect and source derivation for a particular criteria pollutant. Building on the information contained in the Criteria Document, a Staff Paper is written which contains the recommended standard range and form along with their justification for them. These two documents are then sent to the CASAC for review. The review period in the past has lasted several years to reach closure on both documents.

Establishment and Purpose of the Clean Air Scientific Advisory Committee

^{iv}U.S. EPA. *Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, Staff Paper*. Office of Air Quality Planning and Standards. July 1996.

^vLead Industries Association v. EPA, 647 F 2d. 1130 (D.C. Cir 1980)

Additionally, the Clean Air Scientific Advisory Committee (CASAC) was established to "...complete a review of the criteria published under Section 108 of the CAA and the national primary and secondary ambient air quality standards ... and recommend to the Administrator any new NAAQS or revision of existing criteria and standards as may be appropriate".^{vi} They were also given the responsibility to inform the Administrator of any possible adverse public health, welfare and/or economic effects which could arise due to the implementation of these standards. For all NAAQS review, the CASAC is therefore required to do its own review and comment by way of a closure letter to the Administrator. It is then left in the hands of the Administrator to take all recommendations into consideration and decide whether a revision to the standards is necessary.

The Most Recent Review

Prior to the current CASAC review, the committee reached closure on the last Criteria Documents and Staff Paper in 1989. When they did not, however, publish proposed NAAQS nor promulgate final NAAQS in the Federal Register by October 1991, the American Lung Association as well as other plaintiffs filed suit against the EPA. The Agency was specifically sued for not subscribing to the five year review requirement as written in section 108 of the CAA. As a result, the U.S. District Court for the Eastern District of New York ordered the EPA to announce its proposal by August 1, 1992 and its final decision by March 1, 1993. The decision was to retain the-then-current standards for ozone of 0.12 ppm at a one -hour standard and PM₁₀ standard of 150 µg/m³. They did, however, emphasize that they would rapidly complete the next NAAQS review due to the numerous studies which had been completed since the 1986 Criteria Document.

As a result of a second suit filed by the ALA^{vii}, the EPA was instructed to follow a set time line for review and proposal of the PM standard by November 29, 1996. The next round of review began with the EPA's submission of the Staff Paper and the Criteria Document, for both ozone and PM, to the CASAC in February, 1995 and November, 1995 respectively. These papers detailed the most recent research and studies and highlighted the common precursors of the two pollutants. The studies showed adverse health effects, due to both ozone and PM, at levels below the current standards. Closure was reached by the committee on both papers by the end of November of 1996 and the formal proposal was published in the Federal Register on December 13, 1996. The promulgation of the final standards was scheduled for June 28, 1997, after a three month comment period, but the court allowed the EPA a 22-day extension which setting the promulgation date at July 19, 1997.

^{vi}Clean Air Act, 42 U.S.C. 7409 [CAA *109 (d)(2)]

^{vii}ALA v. Browner, 884 F. Supp. 345 (D. Ariz., 1994)

CURRENT AND PROPOSED STANDARDS

Ozone^{viii}

The proposed ozone standard, calls for a lowering of allowable concentration levels from the current 12 ppm one -hour standard with three exceedances per three consecutive years to a revised 0.08 ppm eight -hour standard where exceedances are based on average concentrations rather than individual peak concentrations. This level would be identical for both the primary and secondary standard. This is the first revision of the ozone standard since 1977 and was selected from the Staff paper recommendation of 0.07 -0.09 ppm. Studies review in the Criteria Document as well as CASAC recommendations all supported the transition to an 8 -hour NAAQS. This method of measurement will decrease the influence of meteorological conditions, such as peaks which cause areas to 'flip-flop' in and out of compliance, and better represent the risk of long-term exposure to humans.

Tropospheric ozone, commonly called smog, is a colorless, odorless gas which is not directly emitted from a stationary or mobile source, but formed in the atmosphere. Most commonly, ozone is formed from numerous chemical reactions involving sunlight, high levels of nitrous oxides (NO_x) and Volatile Organic Compounds (VOC) in the presence of sunlight. NO_x is an anthropogenic precursor emitted largely in the combustion process of electric power generating plants and highway vehicles. The largest sources of VOC are industrial sources such as chemical plants, refineries, factories, consumer and commercial products and motor vehicles. Motor vehicle emissions are, in fact, known to contribute one-third of all ozone or smog forming emissions.^{ix}

^{viii}For in-depth details of the proposed ozone standard see: U.S. EPA, *National Ambient Air Quality Standards for Ozone: Proposed Decision*, 61 Federal Register. 65716-65750. 13 December 1996.

^{ix}U.S. EPA, *Air Quality Criteria for Ozone and Related Photochemical Oxidants*.

The alarm over ozone levels stems from the range of adverse health effects that are associated with ground level ozone. These include a decrease in normal lung function, chest pains, shortness of breath, and higher susceptibility to respiratory infection. Other studies highlighted in the EPA's 1996 Ozone Criteria Document emphasize the correlation between long period of ozone exposure and the development of permanent damage in lung functions as well as the onset of many chronic respiratory illnesses. Additionally, some of document studies of hospital records also support this claim by showing a correlation of the highest ozone concentration and increasing amount of hospital admissions. Children and athletes who spend a lot of times outdoors, as well as the elderly, are known to be at the highest risk from ozone. ^x As proposed, the EPA claims that the revised ozone standards would provide the following increased protection beyond that provided by the current standard from the following effects:

- * 1.5 to over 2 million fewer incidences of decreased lung function each year,
- * Approximately 200,000 to 400,000 fewer incidences each year of symptoms such as aggravated coughing and difficult or painful breathing,
- * Approximately 1,600 fewer hospital admissions and 5,000 fewer hospital visits for individuals with asthma, and
- * Reduced risks of more frequent childhood illnesses. ^{xi}

Compliance

As of 1993, there were 925 air quality monitors to record ozone concentration. These monitors were mainly situated in urban and suburban areas with less attention paid to the rural areas. One of the key problems with ozone standards is its formation in the air which transport the pollutant from its originating site, largely in the Midwest industrial areas, to other regions such as the northeast. This has been the cause of much concern and regional debate. ^{xii}

Based on the 1993-1995 data, there were 50 counties out of attainment with the current standards at the time the proposal was announced. This is down from the 104 counties that were said to not comply during the period of 1991 -1993. According to the

^{x10}Ibid

^{xi11}U.S. EPA. *Health and environmental effects of ground-level Ozone*, Fact Sheet. Office of Air & Radiation: Office of Air Quality & Standards. 29 November 1996.
[ttnwww.rtpnc.epa.gov/naaqspro/o3hlth.htm](http://www.rtpnc.epa.gov/naaqspro/o3hlth.htm)

^{xii12}U.S. EPA. *Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information, Staff Paper*. Office of Air Quality Planning and Standards. July 1996.

EPA's estimates, the new standard of 0.08 ppm 8 -hour standard would put 335 counties into nonattainment with a population of 122 million people affected. ^{xiii}

Particulate Matter (PM) ^{xiv}

In addition to the EPA's proposal to reissue the PM₁₀ at a annual maximum concentration of 50 µg/m³ and an allowable 24 -hour concentration of 150 µg/m³, a new standard was proposed to limit the concentration of particles which are 2.5 µm (microns) in diameter or less. The proposed standard for PM_{2.5} was set at an annual concentration of 15 µg/m³ and 24-hour concentration of 50 µg/m³ based on a 3-year and spatial averaging system.

^{xiii}¹³EPA Ozone and PM Questions and Answers, 26; with full details listed at ttnwww.rtpnc.epa.gov/naaqspro/o3list.htm

^{xiv}¹⁴For in-depth details of the proposed PM standards see: EPA, *National Ambient Air Quality Standards for Particulate Matter: Proposed Decision*, 61 Federal Register. 65638-65713. 13 December 1996.

Environmental and health risks posed by particulate concentration are dependent on the individual diameter size. The size of the particle ultimately dictates its ability to penetrate lung tissue, become lodged within respiratory tissue and the body's capability in removing the harmful pollutants.^{xv} While individual particles are not visible, the culmination of fine particles in the air appears as what is commonly referred to as soot and impairs visibility. Due to their size, PM_{2.5} can remain suspended in the air and travel long distances often impairing visibility throughout a region. This additional standard will in effect shift the emphasis from the capturing of larger particles to pollutants such as NO_x and SO₂ which can be controlled through gaseous emissions.^{xvi}

PM varies greatly not only in size but in origination, chemical composition and associated biological health effects. PM₁₀, mainly coarse particles in the size range of 10-2.5 µm, is a byproduct of industrial crushing and demolition, vehicle travel on unpaved roads and windblown dust. These particles tend to be alkaline composed mainly of sulfates, nitrates, metal compounds and carbon-based compounds that settle out of the atmosphere in a relatively short amount of time.^{xvii}

PM_{2.5}, can be formed through primary or secondary reactions. Primary particles are those directly emitted into the atmosphere while secondary particles are those formed from precursor molecules (NO_x, SO₂ and VOC), which are released during fuel combustion and generated during atmospheric reactions. The main source of these precursors is fuel combustion (diesel engines and power plants), residential fireplaces, woodstoves and agricultural burning. The EPA has claimed that these fine particles pose the highest threat to human health. This is due to fact that they are able to easily become lodged in the deepest recesses of the lungs. Those at highest risk from exposure and inhalation of fine particles are the elderly, children, asthmatics and adults with preexisting heart or lung disease.^{xviii} Studies cited in the 1996 Criteria Document for PM specifically pointed to the correlation between fine particulate matter and the adverse health effects related to PM. These include premature death from lung disease and heart attacks, asthma attacks, chest pain, aggravated coughing and increased occurrence of chronic respiratory illness.

^{xv15}U.S. EPA. *Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, Staff Paper.* Office of Air Quality Planning and Standards. July 1996.

^{xvi16}Blodgett, John E., Larry B. Parker and James E. McCarthy. *Air Quality: EPA's Proposed New Ozone and Particulate Matter Standards.* Prepared by Congressional Research Service for Congress. 17 June 1997.

^{xvii17}U.S. EPA. *Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, Staff Paper.* Office of Air Quality Planning and Standards. July 1996.

^{xviii18}U.S. EPA Office of Air and Radiation. "Health and Environmental Effects of Particulate Matter, Fact Sheet." 3 April 1997. [ttnwww.rtpnc.epa.gov/naaqspro/pmhlth.htm](http://www.rtpnc.epa.gov/naaqspro/pmhlth.htm)

In promulgating these new standards, the increased health protection provided would include:

- * Prevention of 15,000 premature deaths,
- * Decreased hospital admissions and emergency room visits,
- * Reduced risk of chronic bronchitis and childhood respiratory symptom,
- * Lower incidence of aggravated asthma and childhood respiratory problems, and
- * Reduced risks of more frequent childhood respiratory illnesses. ^{xix}

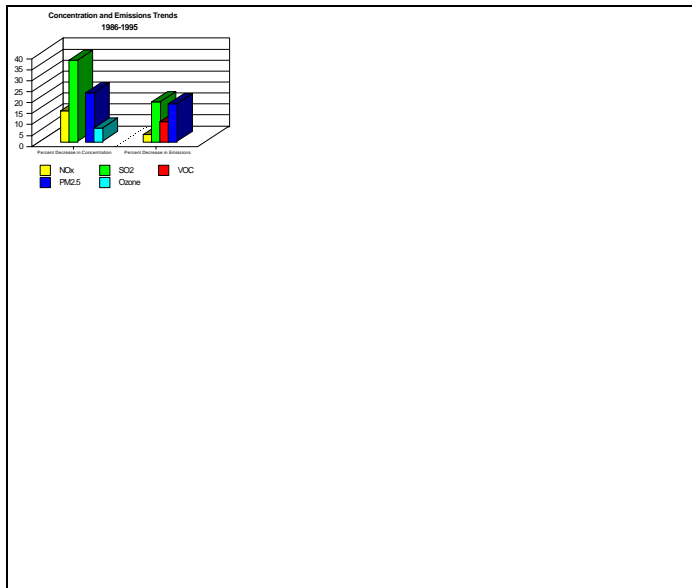
Compliance

The PM₁₀ level in the proposed standard will remain the same, however, the form of measuring compliance has been revised from 1 allowable exceedance to a 98th percentile form to be averaged over a 3 -year period. As with ozone, this change is expected to reduce the effect of meteorological conditions, (peaks in concentration caused by heat waves) on complying. At the present time there are 41 counties not in attainment, but under this revision it is expected that 75 percent of those counties would be able to meet the standard and only 11 would remain in non-compliance.

The prediction of counties in nonattainment for PM_{2.5} is much more crude due to the fact that there are only 50 established monitoring units measuring fine particulates. The EPA has made a rough estimation of 167 counties which will not be in compliance under new standards but will not be able to finalize that number until monitoring data is collected in the upcoming years.

In contrast, the American Petroleum Institute (API) has conducted their own studies

^{xix} ¹⁹ *Ibid.*



and concluded that the combination of these two standards could put as many as 637-749 counties into nonattainment (Appendix A). According to an API staff member, the discrepancy between these estimates and those made by the EPA are based on the categorizing system used by the agency.^{xx} The EPA often categorizes areas based on one of two systems -Consolidated Statistical Metropolitan Area or Standard Metropolitan Area. These areas are established by the Departments of Labor and

Commerce and often combine actual counties and metropolitan areas. In some cases, these areas even cross state boundaries (e.g. Kansas City, KS; Kansas City, MO; Trenton, NJ; Wilmington, DE; Philadelphia, PA).

Air Quality Trends

Every year the EPA gathers and analyses data from these numerous monitors around the country. These measurements include actual air concentrations of pollutants as well as emissions based on engineering estimation models. As seen in the chart below, trends of increasing air quality or decreased concentrations and emissions have emerged over the last 10 years. These improvements are largely due to the effective implementation of clean air regulations and industrial technology improvements. This occurred simultaneously with extensive economic and population growth, specifically a

^{xx20}Teresa Pugh, American Petroleum Institute. personal interview. 9 July 1997.

28 percent increase in population, a 116 percent in vehicle miles traveled and a 99 percent increase in domestic product.^{xxi}

SCIENTIFIC UNCERTAINTY

While the EPA feels that it has provided an adequate amount of scientific evidence to promulgate in both the ozone and PM Criteria Documents, many questions are still being asked about the conclusiveness of the studies. Although EPA maintains that the "best available science" was used, underlying debate has focused on the lack of agreement and support from the CASAC^{xxii} as was seen in their closure letters to the Administrator.

The PM Debate

While the EPA has stated that 15,000 premature deaths can be avoided by promulgating the new PM_{2.5} standards, the CASAC relayed their belief that their

^{xxi}21 U.S. EPA Office of Air and Radiation. "1995 National Air Quality: Status and Trends." www.epa.gov/oar/aqtrnd95/summary.html

^{xxii}22 The CASAC is a committee of medical, scientific and technical experts created in the CAA for the sole purpose of overseeing and reviewing the process of setting the NAAQS. The committee is comprised of 7 members all appointed by the EPA Administrator, as well as 14 consulting members. Specifically, the role of the CASAC is to review and revise both the Criteria Document and the Staff Paper which are prepared by the EPA and provide feedback to the administrator in the form of a closure letter.

"understanding of the health effects of PM is far from complete...the diversity of opinion also reflects the many unanswered questions and uncertainties associated with establishing causality of association between $PM_{10/2.5}$ and mortality... many unanswered questions and uncertainties regarding the issue of causality. The concerns include: exposure misclassification, measurement error, the influence of co-founders, the shape of the dose-response function, the use of a national $PM_{2.5}/PM_{10}$ ratio to estimate local $PM_{2.5}$ concentrations...the lack of an understanding of toxicological mechanisms, and the existence of possible alternative explanations."^{xxiii}

^{xxiii23}Wolff, George T. "Letter to Administrator Browner: Closure by the Clean Air Science Advisory Committee on the Staff Paper for Particulate Matter." 13 June 1996.

There was a consensus from 19 of the 21 committee members on a new PM_{2.5} standard, but only two felt that the standard should be set as stringent as it was proposed, and in general, there was "no consensus on the level, averaging time or form of PM_{2.5} NAAQS." ^{xxiv}

The closure letter for PM also criticized the short period of time for the completion of this NAAQS review as the previous review took eight years.

^{xxiv24} Ibid.

"While your staff is to be highly commended for producing such quality documents in such a short period of time, the deadlines did not allow adequate time to analyze , integrate, interpret, and debate the available data on this very complex issue. Nor does a court-ordered schedule recognize that achieving the goal of a scientifically defensible NAAQS for PM may require iterative steps to be taken in which new data are acquired to fill obvious and critical voids in our knowledge."^{xxv}

Kay Jones, formally of the Council on Environmental Quality, first discovered a key error in the American Cancer Society study of estimated premature deaths prevented by the new PM_{2.5} standard. This error in a study performed by C. Arden Pope for the American Cancer Society was due to misinterpretation of data comparing mortality rates and concentration levels in the use of a median instead of a mean in the selection of a 15 µg/m³ standard level. While it was not possible to directly convert from the median to the mean value due to unavailable data, Jones used data supplied from the EPA 2.5 database for 1987 -1995. By comparison, a 1.25 ratio was found between the median and the mean which would set the new standard level at 18.75 µg/m³.

With further critical examination of this health study, Jones, working for Citizens for a Sound Economy, calculated that the annual mortality rate fell from 15,000 to under 1,000. This number was determined when the standard was revised to 18.75 and the 1993-95 EPA database cities PM_{2.5} levels was used in replace of the 1979 -82 average levels used in the Pope study. This is demonstrated below in Figures 1a and 1b with the results showing that with the revised data, only 5 cities exceed the 18.75 µg/m³ standard.

Source: Kay Jones Ph.D. " Is the EPA Misleading the Public About the Health Risks From PM 2.5?"

^{xxv25} Ibid.

When the research was expanded to include all cities in the EPA database of city concentration levels as in Figure 1c, and not just those included in the original study, a total of ten cities were found to exceed the standard, and as seen in Table 1. The estimated annual mortality fell to 840 persons. Jones also criticized Pope's absence of discounting for factors such as smoking as the cause of premature death.^{xxvi}

Source: Kay Jones Ph.D. "Is the EPA Misleading the Public About the Health Risks From PM 2.5?"

It is still uncertain exactly how many epidemiological studies were done on PM_{2.5}. Carol Browner, Administrator of the EPA, stated in her testimony for the House Science Committee that the agency reviewed 86 studies on PM health-related studies but this has been disputed by Rosina Bierbaum, Assistant Director of the Environment at the White House Office of Science and Technology. In an interview for The Weekly Standard (July 7, 1997), Bierbaum claimed that she was only able to find 13 studies which specifically pertained to PM_{2.5}, only four of which looked for association with premature death, not causation. More exact, only two of these studies successfully showed an association between particle increase and premature death. Of the other 9 studies which looked at concentrations of fine particulates and non-fatal illness, only five showed significant association but the results were not conclusive.

EPA Particulate and Ozone Report-House Committee on Science

The House Science Energy and Environment Subcommittee submitted a report to Chairman Jim Sensenbrenner which reported the subcommittee's findings and recommendations on the proposed standards based on a series of testimonials. The report cites that there are "Gaps or incomplete research including a lack...monitoring data for PM_{2.5} [distinct from PM₁₀] and insufficient clinical and animal studies of exposures to PM_{2.5}". The fact that key studies (The Harvard Six City Study and The American Cancer Society/Pope) were never made available to independent scientific reviewers was also emphasized. They summarized that the standard set forth by the EPA could be seen as a "precautionary" measure due to many uncertainties, lack of data and inadequate monitoring systems.

^{xxvi26} Jones, Kay. *Is the EPA Misleading the Public About the Health Risks From PM_{2.5}?* Prepared for Citizens for a Sound Economy Foundation. Washington, D.C. 12 May 1997.

One study detailed in the committee report which was conducted by TRC Environmental Corporation for EPA Region II, suggested that the assumed ambient concentrations of fine particles are in reality much higher than estimated by the Agency. The supporting data was collected in the summer of 1996 in New York City and found that PM_{2.5} levels were found to be as high as 30 -45 µg/m³, two to three times the standard which has been established by the EPA. The significance of this error is that the Agency may have tremendously underestimated the number of counties which will fall into nonattainment during implementation and will make it even more difficult to ever meet the standards.

Additionally, a report conducted by the EPA in Phoenix, which examined PM concentrations and mortality rates, was unable to conclude that there was any direct relationship between fine particles concentrations and mortality. This is based on 18-months of data collection after which scientists were still unable to identify an association between daily mortality and fine -mass measure.

The 1997 CITGO Particulate Matter Study

CITGO Petroleum Corporation published a study after conducting a series of PM_{2.5} measurements at indoor and outdoor locations in Tulsa, Oklahoma, Corpus Christi, Texas and Lake Charles, Louisiana during a four-week period. The purpose of this study was to compare test site concentrations at CITGO facilities with the ambient air standards proposed by the EPA in November of 1996 which called for an allowable 24 hour average of 50 µg/m³ and an annual average of 15 µg/m³. Data were collected with the use of a PM₁₀ monitor with a 2.5 micron adapter on it, all of which was designed by the Research Triangle Institute in conjunction with the EPA. The equipment used is significant since this may be the monitor which will be adopted to deal with the current lack of monitors. This corporation felt that the importance of indoor air pollution be equally stressed since it has been estimated that people spend as much as 90 percent of their time indoors.

PM_{2.5} measurements were made indoors at business offices, schools, theaters and homes while outdoor measurements were made on the city streets, at the zoo, local fairs and other areas that tend to be highly populated. The concentration results were not corrected nor controlled for changing weather patterns or human activity around the monitor. Data was used directly from the monitors because it is believed that these occurrences only played a minor role in the monitored levels, and were not the cause of the intense range of readings which were found to be anywhere from negligible to 140 µg/m³. CITGO analyzed the data collected and took the average of the recorded concentrations as this is the most important and relevant information in a study of this nature. While individual reading did exceed the 24 hour standard of 50 µg/m³, none of the average concentrations for a given location exceeded the standard and one (the monkey cages at the zoo) equaled this value.

Composite averages were 24.1, 23.5, and 15.3 for Louisiana, Oklahoma and Texas respectively. They were used for comparison to the proposed 3-year annual average of 15 µg/m³. Although this is only a rough approximation of PM_{2.5} concentrations, 10 of the 13 outdoor samples which were done exceeded the standard and showed that

achieving this level as required by the EPA may be difficult for many cities. The average of the indoor samples taken in Tulsa was 18.6 µg/m³, finding that 4 out of 12 sites exceeded the allowed average although at this time the EPA does not have the power to regulate indoor pollution through current or proposed standards.

Questioning the Science Behind the Ozone Standard

While the CASAC reached an agreement on altering the ozone standard from a 1 -hour to an 8-hour measurement, they did not endorse any specific alternative and wrote "the Panel concluded that there is no 'bright line' which distinguishes any of the proposed standards (either the level or the number of allowable exceedances) as being more protective of public health." ^{xxvii} The letter continued to state that therefore the decision on the concentration level and allowed exceedances was seen as a policy judgement.

With regard to the Panel's comments, industry continues to claim that the studies used in the ozone review process were selectively chosen and were not sufficient to produce scientifically sound decisions. Analysts reviewing the studies cited by the EPA as showing correlation claim that while the standards will reduce asthma attacks and medical, they were unable to draw a clear linkage between low levels of ozone or PM and impaired lung function. ^{xxviii} Smith also points out in this report that many ozone studies are not specifically of ozone alone but include research on other emitted pollutants such as sulfur dioxide and carbon monoxide. There has also been much criticism of the language used by the EPA to describe the effects of ozone. Critics suggest that their use of terms such as "compromised lung function" and disfunction would more likely be characterized by the public as mild or short lived discomfort. ^{xxix}

An independent report produced by API also criticized the relevance of the EPA study results. The report claims that the responses (i.e., in chamber tests, camp studies, hospital admissions and risk assessments) which were deemed to support the setting of a more stringent standard were not similar among all test cases nor were the concentration test levels of ozone representative of urban area levels. Furthermore, API claims that the subjects used were not representative of the sensitive population identified by the EPA nor were the responses as adverse or long -term as suggested by the agency. ^{xxx}

^{xxvii27} U.S. EPA. *Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information, Staff Paper*. Office of Air Quality Planning and Standards. November 1995.

^{xxviii28} Smith, Anne. et al. *Costs, Economic Impacts, and Benefits of EPA's Ozone and Particulate Matter*. Reason Public Policy Institute. June 1997.

^{xxix29} Green, Kenneth. *Rethinking EPA's Proposed Standards for Ozone and Particulate Matter*. Reason Public Policy Institute. June 1997.

^{xxx30} American Petroleum Institute. EPA's Review of the NAAQS for Ozone.

Dr. Mortan Lippman, CASAC member, in his testimony before the House Science Committee emphasized that there is a "lack of a more definitive data based on the chronic effects of ambient O₃ exposures on humans is a serious failing that must be addressed with a long-term research program." Dr. Joe Mauderly, current chairman of CASAC, during his testimony also noted the fact that many areas are currently not meeting the ozone standard and may not for many years. While he did support the standard, he stressed the fact that "greater overall health benefits might be derived by first using the nation's resources to achieve compliance with the present standards...rather than a more restrictive standard."

COST/BENEFIT ANALYSIS

Another key issue in this debate has been the cost of compliance on industry and small businesses. As already mentioned, the CAA prohibits the consideration of economic cost and feasibility in the determination of NAAQS. However, in accordance with Executive Order 12866, as this has been concluded to be a "significant regulatory action", and therefore the EPA is required to review the impacts of its new regulation. Specifically this order requires the Agency to analyze and identify the costs and benefits of the new regulation, pivotal impacts on small businesses as well as state and local governments, and to examine environmental justice implications.^{xxxii} Along with the proposed and final rules, the EPA was therefore required to submit a Regulatory Impact Analysis (RIA) report to the Office of Management and Budget for review.

The chart below summarizes the predicted costs of compliance by both the Administration and private industry. These costs are associated mainly with the implementation process as well as the monitoring of the pollutants.

Ozone and PM_{2.5} Annual Cost/Benefit Estimates (in billions)				
	^{xxxii} EPA-RIA (in 1990 dollars)	Council of Economic Advisors	Reason Public Policy ^{xxxiii} Institute (in 1990 dollars)	API-Chicago ^{xxxiv} Study

^{xxxii31} Blodgett, John E., Larry B. Parker and James E. McCarthy. *Air Quality: EPA's Proposed New Ozone and Particulate Matter Standards*. Prepared by Congressional Research Service for Congress. 17 June 1997.

^{xxxii32} Innovative Strategies and Economic Group. *Regulatory Impact Analyses for the Particulate Matter and Ozone National Ambient Air Quality Standards and Proposed Regional Haze Rule*. Prepared for the U.S. EPA. 16 July 1997.

^{xxxiii33} Smith, Anne. et al. *Costs, Economic Impacts, and Benefits of EPA's Ozone and Particulate Matter*. Reason Public Policy Institute. June 1997.

Ozone				
Costs	\$1.1 (partial) \$9.6 (full)	\$60	\$20-\$60	\$4.1-\$8.8
Benefits	\$0.4-\$2.1 \$1.5-\$8.5	*	<\$0.5-\$2	\$1-\$4
PM2.5				
Costs	\$8.6 \$37	*	\$70-\$150	*
Benefits	\$19-\$104 \$20-\$110	*	\$2-\$40	*

* Information was not available for comparison

N.B. The EPA estimates are based on the new rules announced July 18, 1997 while the other reports focused on the proposed standards from December 13, 1996 which varied slightly in value for PM _{2.5}.

EPA estimates were taken from the final copy of the RIA released July 16, 1997 and refers to the final rules. As indicated under the ozone costs and similar throughout the EPA's estimates, the first number listed is an estimate of partial attainment costs/benefits while the latter figure refers to full attainment. The RIA uses analytical data for the year 2010 but does not attempt to imply that full attainment will be reached by that date. This study, as well as the other cited, all claim uncertainties in costs and benefits because of the length of time that will be required for full attainment, reservations about the cost of new abatement technology and lack of emissions data.

As the data shows, EPA's estimated costs of full attainment exceed the monetized benefits with the RIA stressing the many benefits (See Appendix B, Tables 1 and 2) that were not monetarily evaluated due to technical or conceptual environmental valuation. Stakeholders have used these figures to justify their opposition to the standards and many went further to prepare their own analyses. Costs vary tremendously which led industrial groups to further criticize what they have called the EPA's conservative figures. In the case of the API Study, costs for Chicago alone could be as high as \$8.8 billion per year. This study used a modeling technique for their analysis and concluded that background ozone levels in this area may make it impossible to meet the standards, even if all control measures are exhausted.

KEY STAKEHOLDERS

Since the beginning of the last review period there have been conflicting views about the need for NAAQS revisions. During the period in which comments were elicited, the EPA received over 57,000 letters, electronic messages and faxes. In an attempt to prevent the standards from being revised, industry, business, health and environmental groups pressured Congress and the Administration during this period. This resulted in numerous hearings where the testimonies of scientists, physicians and experts in the field of public health, science and epidemiology were heard.

^{xxxiv34} Sierra Research, Inc. *Socio-Economic Study of possible Eight-Hour Ozone Standards*. Prepared for API. 26 January 1996.

The EPA received criticism from both industry and environmental groups. The main industrial arguments centered around the question of sound science, cost/benefits, legality of the implementation plans and feasible technology. Concurrently, environmental and public health groups urged the EPA to lower the standards beyond the proposed level to further prevent adverse health effects.

Industry and Business

As significant stationary source emitters of SO₂ and NO_x, industry associations such as Edison Electric Institute (EEI) have supported keeping the current PM and ozone standards, but changing from the 1 -hour average to the 8 -hour average. Their main argument is lack of scientific evidence showing direct links between adverse health effect and the emitted pollutants. Their recommendation has been the establishment of further research in conjunction with PM_{2.5} monitoring equipment while maintaining the current standards until better evidence is available. Due to the fact that it will take approximately five years to collect the necessary research and data for implementation, another round of review will pass and it would be best to hold off on new standards until that time.^{xxxv}

Led by executives of the National Association of Manufacturing (NAM), the Air Quality Standards Coalition (AQSC) is a group of more than 500 industrial, trade and business groups who stand to bear the billion dollar costs necessary to comply with the new standards. At the forefront of this coalition, it is not surprising to find key legislative executives from utility, petroleum and automotive companies, since, as stated by the EPA, these areas will be the target of major emissions reductions. Formed several years ago to defeat the new standards, this coalition began an attack on the science used in setting the standards, stating that the excessive costs with only minimal health benefits are not justified by the incomplete science or inconclusive evidence.

Opposition Grassroots Efforts

The coalition, in conjunction with organizations such as Citizens For a Sound Economy (CSE) together have invested as much as \$30 million in political contributions, independent research studies and campaign strategies. Stated by some to be one of the most organized and expensive campaigns, its intent was to alert and educate the public of potential costs, allowing them to make a more informed decision. Determined to move the fight outside the beltway, member organization, such as NAM, used extensive grassroots efforts to activate national business executives, state and local officials including governors and mayors, as well as other community leaders across the country. The ongoing campaign has consisted of letters, phone calls, Congressional lobbying as well as numerous print ads (Appendix C) which appeared in newspapers throughout the nation.

CSE used slightly more direct tactics in their newspaper, television and radio ads (as seen in Appendix C) claiming that these standards will drastically reduce families'

^{xxxv35} Bob Beck, Edison Electric Institute. 1 July 1997. Group meeting.

disposable income and severely limit personal freedoms such as mowing one's lawn or having a barbeque in the backyard.

Environmental and Public Health Interest Groups

Environmental and public health groups such as the American Lung Association, the Sierra Club and the American Public Health Association could very well be called the initiators of this feud. While they continually promote the EPA's quest to protect health and welfare and encouraged the President to adopt the new air quality standards, organizations such as the ALA and the Natural Resource Defense Fund feared that greater risk exists than realized and stressed the need for even more stringent standards. In referencing their own studies, they supported the lower range of the EPA's proposal, 0.07 ppm, claiming this level would protect an additional 57 million people over the 0.08 standard.^{xxxvi} Many of these organizations feared that the EPA would soften the standards to appease business and industrial groups and continually cited study after study which supported their claims about the adverse health effects of PM and ozone.

The Other Side

While not as extensive as the campaign efforts of the AQSC, environmental and health organizations created their own campaign in response to the industries attempt to prevent the implementation of the new and more stringent standards. Through their web page, the ALA encouraged the public to write, call and/or email the EPA in what they claimed to be "the most important decision [the] EPA will make in the next year to protect public health."

Just one month before the expected publication of the new rules, the Sierra Club became active in the campaign as well. Again, trying to shift the point of interest away from industrial costs, the Sierra Club used radio, television and news releases to urge the White House to take action and stated that "any move to weaken the clean air protections...will be unacceptable." Television ads (Appendix C) were used to try to appeal to human emotion by depicting asthmatic children in combination with news releases urging the public to pledge support.

Federal, State and Local Roles

Throughout the review period both President Clinton and Vice President Gore attended various advisory meetings behind closed doors and remained extremely cautious about taking a stance. Congress was also very involved in the review and comment period as a result of the immense lobbying efforts of environmental, commerce and industrial groups. Both the House Commerce Committee and the Senate Environment and Public Works Committee held a series of hearings to review the scientific studies to question EPA officials and CASAC panel members and to consider the alternatives. When congressional staffers were questioned about predictions of future congressional

^{xxxvi36}American Lung Association. "Call the EPA." 1997.
www.lungusa.org/noframes/global/news/legislative/epacontact/html

actions, it was believed that a movement by the Republicans to override this rule would be minimal due to their poor track record with environmental issues in the 104th Congress. Other staffers and members of Congress also directly criticized the science stating that it was not adequate to support the standards and that at the root of the problem was the conflicting advocacy and regulatory roles, played by the EPA.

State Officials

At the same time, state governors and local mayors were also very vocal in their support or opposition to these standards. At a June, 1997 U.S. Conference of Mayors meeting in San Francisco, a vote was called in opposition to the new smog and soot limits. The meeting resulted in the approval of Resolution No. 32, introduced by Detroit Mayor Dennis Archer and Dearborn Mayor Michael Guido. This resolution, intended to pressure the EPA to retain the PM standards and alter the ozone standard only by changing to a eight-hour averaging system, again reiterated their concerns over economic growth, progress in job creation and technology. Mayors in opposition represent states that depended on the automotive, steel and fossil fuel industries. Those few who supported the standards, such as Mayor Rosemary Corbin of Richmond, California, back up their position stating that "...there are enough deaths from this level of particulate matter that the standard makes sense." ^{xxxvii}

The U.S. Governors also arrived at similar conclusions. Here, however, support for the standards was slightly prominent coming from N.J. Governor Christie Todd Whitman and N.Y. Governor George Pataki as well as the governors of Massachusetts, Colorado and New Hampshire. Not surprisingly, these are the states that have historically not been able to comply with the ozone and PM standards as a result of pollution from the upwind industrial states.

The Announcement and the Response

On June 25, 1997, after what had been called a deadlock, President Clinton pledged his support for the smog and soot standards with only a slight variation in the daily PM_{2.5} standard to provide "...more flexibility in implementation." Prior to this announcement, numerous letters had been signed by close to 90 House Democrats and sent to the President. These letters asked for a meeting to discuss the proposal and some even expressed the possibility of an attack if the proposal moved forward. These meetings were never granted and House Democrat Ron Klink (D-PA) told administration officials that he felt the letters were "totally ignored." Other ranking members, such as House Commerce Committee Chairman Tom Bliley (R-VA) reacted by saying, "Today's decision is a sharp rebuke to the thousands of Mayors, local and county officials, Governors and State legislators, ...for whom compliance with these new rules is impossible, as even the EPA admits." ^{xxxviii}

Additionally, other prominent members of Congress such as Sen. James Inhofe (R-OK), Rep. John Upton (R-Mich) and Rep. John Dingell (D-Mich) have continued to

^{xxxvii}37 "U.S. Mayors Oppose Clean Air Rules." June 1997. www.infoseek.com/Contents

^{xxxviii}38 Bliley, Tom. Committee on Commerce News Release. 25 June 1997.

oppose the standards and immediately began to work on gaining bipartisan support to overcome a presidential veto of newly introduced legislation to block the standards. The science issue has emerged as the force behind legislative efforts to overturn the standards. This legislation, which will be discussed in greater detail later in this paper, includes H.R. 1984 as well as S. 1084, was drafted in the hopes of having it pass before July 19.

Klink and Inhofe have realized the difficulties in gaining enough power to override a veto but have stated, "I feel very comfortable that we can come up with a veto-proof margin in the House," while still recognizing the additional work which must be done in gaining Senate support.^{xxxix} To date, only four Republican Senators are not with the opposition movement. Sens. Olympia Snowe (R) and Susan Collins (R) from Maine, and Sen. Alfonse D'Amato (R-NY) are backing the proposal claiming that as much as 60 percent of their pollution is from other states.^{xl}

THE NEW RULES

NAAQS Standards

After receiving the President's support, EPA Administrator Carol Browner signed the final air quality standards on July 16, 1997. These standards were then published on July 18 in the Federal Register. The President ultimately agreed to finalize rules that are somewhat less stringent than the EPA originally proposed. The new standards also included an implementation package to allow for the greatest flexibility and reasonable amounts of time to comply.

Ozone

The new ozone rule was updated from 0.12 ppm to 0.08 ppm measured over an 8-hour period. An area will comply with the standard when the 3-year average of the annual 4th-highest daily maximum 8-hour concentration is below 0.08 ppm. The EPA changed the form of the standard from three exceedances to four to provide greater stability to areas facing the risk of nonattainment by essentially allowing an additional "bad air" day.

It is believed that this level will adequately protect the public health and as well as protect vegetation. For these reasons, the secondary standard was set at an identical limit. These two standards will become effective 60 days after their publication date while in all practicality, the 1-hour standard will remain in effect until an area has met the 1-hour, 0.12 ppm for 3 consecutive years. This helps to assure that areas will not

^{xxxix39} Bureau of National Affairs. "Number of Counties Violating Air Rules Would Double Under Changes, EPA Says." Daily Report for Executives, No. 136. 16 July 1997.

^{xl40} Bureau of National Affairs. "Sierra Club Appeals to White House To Support Adoption of EPA Air Standards." Daily Report for Executives, No. 116. 16 June 1997.

“backslide” in efforts to achieve quality air while also assisting in a smooth and legal transition to the new standards.^{xli}

PM

The two new rules established for PM_{2.5} were set at a 24-hour average limit of 65 micrograms per cubic meter with an annual arithmetic mean of 15 micrograms per cubic meter. The EPA altered its original 24-hour standard proposal from 50 to 65 µg/m³ in order to “allow maximum flexibility” to community pollution sources where the annual standard is met but occasionally experience peaks in the daily soot levels.

Areas will comply with these new standards when the 3-year average of the annual arithmetic mean concentrations, from single or multiple monitors, is less or equal to 15 µg/m³. The 24-hour limit will provide additional health protection by focusing on peak concentrations and localized hot spots that arise due to seasonal conditions and reducing area exposure to fine particles. The daily standard is based on the 98th percentile concentrations in a year, averaged over three years.

In an effort to continue to protect against the effects of coarse fraction particles, the EPA has retained the annual PM₁₀ standard of 50 µg/m³ but revised the 24-hour standard of 150 µg/m³ to a 99th percentile form as opposed to the active 1-expected exceedance form.^{xlii}

Monitoring Requirements for PM

Along with the new standards, the EPA has issued the a final rule which will revise the current monitoring network for particulates. The monitoring used for PM₁₀ will be retained while the announcement has called for a change in sampling frequency and less data collection locations. As there is no existing network for fine particles, the EPA is looking for resource funds to cover the costs of the new monitors. Within the final rules are explicit explanations of the new federal reference method for measuring fine particles, new criteria for monitor placement, new schedules for data collection and new approaches for safeguarding the particulate data quality. The monitoring regulations will be in effect 60 days after the publication of the rules and the network of monitors will be phased in during a 3-4 year period beginning in 1997.

Core community-oriented monitors will be required by 1998 in all metropolitan areas that are heavily polluted and populated by at least 500,000 people in order to better understand the risks of fine particles. Additionally, each state will then be required to have two supplementary monitors placed in small cities or rural areas for the possible use of studying the long-range transport of PM_{2.5}. It is the hope of the EPA that this new monitoring network can be integrated with the existing visibility monitoring requirements to achieve the many goals of the air quality standards, including the proposed regional haze program which was announced with the final standards.^{xliii}

^{xli41} U.S. EPA. “EPA’s Revised Ozone Standard, Fact Sheet.” 17 July 1997.

^{xlii42} U.S. EPA. “EPA’s Revised Particulate Matter Standards, Fact Sheet.” 17 July 1997.

^{xliii43} U.S. EPA. “EPA’s Monitoring Requirements for Particulate Matter, Fact Sheet.” 17 July 1997.

Implementation

In a Nashville speech on June 25, 1997, President Clinton said in showing his support for the new standards, “Read the implementation schedule. Work with us. We will find a way to do this in a way that grows the American economy.” As outlined below, the implementation package was promised to allow for the use of common-sense measures to comply with the standards incorporating in the flexibility needed by business and government to protect health in a cost-effective way.^{xliv}

Implementing the Ozone Standard

The implementation of the new 8-hour ozone standard will focus on regional approaches and avoid the stigma of non-compliance. Following the recent promulgation, State governors will have up to three years to act in accordance with the CAA in designating areas which do not fill the requirements of the new rules. There will then be an additional three years to develop and submit State Implementation Plans (SIP) which describe plans to enable compliance. Under the CAA stipulations, areas will be given up to 10 years, with the possibility of two 1-year extensions to attain the standard, putting required compliance no earlier than 2007.^{xlv}

The regional approaches already mentioned focus on the work of 37 eastern States through the Ozone Transport Assessment Group (OTAG) and their belief that by reducing interstate pollution (long-distance transport of ozone), all areas will be facilitated in complying with the NAAQS. Efforts will therefore focus on reducing NO_x emissions (as the major component of ozone) from major power plants in upwind states as this has been found to be the most cost-effective abatement opportunity. The EPA believes that in following this plan, areas which are designated as non-attainment will be able to significantly achieve lower ozone levels and quickly attain the standards.

Within 90 days, the EPA will publish a listing of existing nonattainment areas and those which currently meet the 1-hour standard. In addition, the EPA has established a new category of classification entitled “transitional”. Depending on certain criteria, most areas involved in these regional measures will be able to adopt this classification and avoid the hindrance of local pollution planning and avoid economic restrictions.^{xlvi}

According to a utilities spokesman, electric utilities are only currently emitting 29 percent of the NO_x in the air and do not emit any VOC, the two main ingredients in

^{xliv44}White House. “Achieving Clean Air in Common Sense, Flexible and Affordable Ways, Fact Sheet.” 25 June 1997.

^{xlv45}Ibid.

^{xlvi46}Innovative Strategies and Economic Group. *Regulatory Impact Analyses for the Particulate Matter and Ozone National Ambient Air Quality Standards and Proposed Regional Haze Rule*. Prepared for the U.S. EPA. 16 July 1997.

ozone. It is therefore believed that by controlling or limiting these emissions, it will not substantially help to comply with the new standards and control mechanisms must be used elsewhere. The power plants will still be hurt the worst, especially in this time of electric utility deregulation. In order to be competitive, utilities are trying to lower their fees, but the cost of compliance with these new standards will be an added obstacle during this period.^{xlvii}

Implementing the Standard for Particulate Matter

As already discussed, due to uncertainty another scientific review period will pass before any areas are deemed as non-attainment areas or local controls are required. This will ensure that the best available science is used for the process of implementation by gathering information from a newly established monitoring network. During this period, further studies will research the effects of fine particles as well as the mechanisms which cause adverse health effects to determine by 2002 if the PM standards need to be revised.^{xlviii}

Affected stakeholders will be allowed input in establishing the nationwide network monitoring system over the next five years. The network will consist of approximately 1,500 monitors all capable of determining the chemical composition of the particulates measured. The EPA predicts that by 2001 three years of complete data will be available from the earliest monitors and 2004 for all monitors. Using this monitoring data, the earliest that states could be designated as not complying would be 2002. As required by the CAA, the EPA has 2-3 years to designate or classify areas. Since this will not be possible, starting in 1999, the EPA will issue "unclassifiable" classification for fine particulates. After the proper designation can occur in 2002, counties will be given 3 years to develop and submit SIPs and after a year and a half review process, an additional 10 years (with the possibility of two 1-year extensions) to attain the PM_{2.5} standards. In this time, business and industry will be encouraged to develop the most cost-effective technology to reduce particulate emissions.^{xlix}

Early data collection has shown that one-third of all areas that will not comply with this standard could be in attainment as a result of the emissions cap-and-trade program under the 1990 CAA acid rain program. This program, which will be fully implemented between 2000-2010, aims to reduce regional SO₂ emissions, a common precursor to both fine particles and acid rain. By giving credits under this program, areas may be able to attain the new standards without any additional local measures.^l

In order to assure that progress is not lost under the coarse particle standard during this transition, the EPA will propose rulemaking in the Fall of 1997. For areas that do

^{xlvii}47 Bob Beck, Edison Electric Institute. 1 July 1997. Group meeting.

^{xlviii}48 Innovative Strategies and Economic Group. *Regulatory Impact Analyses for the Particulate Matter and Ozone National Ambient Air Quality Standards and Proposed Regional Haze Rule*. Prepared for the U.S. EPA. 16 July 1997.

^{xlix}49 Ibid.

^l50 Ibid.

not meet the PM₁₀ standards when the standards go into effect, those standards will remain active until the time when the proposed rules are published. For those which do attain the standard, the standard will remain in place over the next three years during the process of developing implementation plans. ^{li}

Economic and Social Impacts

Fatalities Induced By Economic Impacts

While the CAA specifically forbids the consideration of cost in the setting of new standards, there have been studies showing that these new regulations will cause more harm than good in the form of "...economically transmitted impacts of a proposed risk-reduction rule." ^{lii} In a policy study conducted by Ralph Keeney and Kenneth Green of the Reason Public Policy Institute, the effect of regulatory cost is explored. According to the study, regulatory costs will be "transmitted through the economy, are ultimately paid by individuals, leaving them with less disposable income." There have been numerous estimates about what the actual costs of the new standards will be, but even at the low end value of \$10 billion 1990 dollars, it has been estimated that assuming equal costs among households (model A), 2,201 annual fatalities will occur. Under the assumption that costs will be incurred proportionally according to income (model B), an estimation of 901 deaths has been made. This is due to the general presumption that decreasing income means less money spent per family on health and safety, leading to higher risks of fatalities.

The almost perfect linear relationship between regulatory costs and induced fatalities is based on the quantifying model concept of "richer is safer" originated by Aaron Wildavsky (as explained in Keeney "Estimating Fatalities Induced by the Economic Costs of Regulation"). By using this model ^{liii}, fatality estimations for the compliance costs ranging from \$7.5 billion (EPA) to \$120 billion ^{liv} were calculated as 1,651 and 27,000 respectively under assumption A and 676 and 11,000 respectively assuming model B.

Tables 1 and 2 in the Appendix D show the result of further analysis by gender, economic status, and race for both models A and B. In analysis of this study, it was seen that induced fatalities and premature deaths are predicted to prevail mostly among people earning less than \$35,000 per year and in the black community. It is also assumed that those states which will have the most difficulty complying with the standards and are expected to face the highest costs will show a notable fatalities. ^{lv}

^{li51} Ibid.

^{lii52} Keeney, Ralph and Kenneth Green. *Estimating Fatalities Induced By Economic Impacts of EPA's Proposed Ozone and Particulate Standards*. Reason Public Policy Institute. June 1997.

^{liii53} Ibid.

^{liv54} Smith, Anne. et al. *Costs, Economic Impacts, and Benefits of EPA's Ozone and Particulate Matter*. Reason Public Policy Institute. June 1997.

^{lv55} Ibid.

Job Loss

It has been predicted that the effect of the new standards due to compliance will be seen regionally with states such as California and Texas being hit the hardest. While these states protest over the extreme difficulty they face in meeting the required levels, other states will feel the effects through job loss and increased prices for goods and services. Table 3 and Figure 1 in Appendix D show an estimated breakdown of job loss by state and Table 4 further shows a breakdown by job sector, all of which will result from industries complying with the high cost of the standards. As can be seen, the impact will be largely felt in sectors of low income, blue collar jobs and small businesses with unemployment levels as high as 50,000 to 100,000 each year by 2010. In analysis of this information, it is only natural to question the repercussion, such as lack of regional competitiveness, which may be the result of this non-uniform economic impact.^{lvi}

One sector to be most impacted by the final rules is the highway construction industry. This includes related areas of construction equipment manufacturing, asphalt pavement manufacturing and construction equipment leasing companies with possible spill over into fields such as civil engineering. Under the CAA, states that contain areas of non-compliance stand the chance of losing some or all of their federal highway funds. This could not only risk the health and safety of people traveling on these highways but also many future projects and indirectly the livelihood of workers in related fields. In using the Census Bureau's annual survey of County Business Patterns for 1994, the American Road and Transportation Builders Association determined that 62.2 percent or 160,000 highway workers could become unemployed. Additionally, almost 45 percent of the highway construction firms are small firms (with less than 5 employees) which could be permanently put out of business as a result of the loss of funds.

Table 5 in Appendix D shows a state-by-state listing of the risk highway construction workers may face in either losing their job or their income. Unfortunately, as many as six states are at a 100 percent risk of losing all highway workers and funds due to the fact that counties within these states have been identified as possible nonattainment areas. Also, nearly two-thirds of the countries' construction jobs are housed in these high risk states which could leave an exceedingly high number of people without jobs.^{lvii}

Of course, this is a biased view and has been refuted by the EPA and Department of Transportation officials. Richard Wilson, of the EPA Office of Air and Radiation, said that sanctions will not be used until at least 2005-2010, stressing the need for areas to maintain funds in order to maintain the current standards and prevent "backsliding".

^{lvi}56 Green, Kenneth. *Rethinking EPA's Proposed Standards for Ozone and Particulate Matter*. Reason Public Policy Institute. June 1997.

^{lvii}57 American Road and Transportation builders Association. *Economic Impact of Proposed U.S. EPA Ozone and PM Standards on the U.S. Highway Construction Industry*. 1997.

Mortimer Downey, Deputy Secretary of Transportation, also pointed to the flexibility of the implementation, specifically the cost-effective methods which will be employed. ^{lviii}

Control Measures and Available Technology

One of the key reasons for questionable costs is the uncertainty of available and feasible technology needed for attainment. Almost all industrial manufacturing and processing facilities, many of which are small businesses, would be impacted by the new regulations. It will, however, ultimately be left to the states, in cooperation with industry, to come up with methods to satisfactory abate controls.

Appendix E contains a list of control options for NO_x, SO₂ and VOC emissions, all precursors of either smog and/or soot that can be used in areas that be will be categorized as nonattainment. Due to the commonality of precursors, one control measure will, in many circumstance, reduce the concentration of both PM_{2.5} and ozone. The list includes many diverse control techniques for mobile, stationary and area sources as well as suggestive roles for state and local government officials to which would facilitate the attainment of the PM_{2.5} standard. Due to the common precursor molecules of both ozone and PM, many of the control measures would help industry to meet both standards.

Additionally, large impacts in emissions reductions could be achieved through state required Vehicle Miles Traveled Programs. These programs entail businesses and manufacturers who employ more than 100 people to reduce the use of the highways by establishing altering work shifts and encouraging workers to commute together the use mass transit. ^{lix}

Aside from direct control measures, the alternative of market-based strategies or economic incentive programs exist. These programs are a direct result of government regulations but allow industry and business to factor the environment into their decisions by assigning a cost to pollution and revenue to pollution abatement. A market response strategy, such as an emissions fee, provides incentives to reduce emissions without setting specific control requirements. A marketable permit program, such as the emissions trading program which currently exists to deal with acid rain, sets a direct limit on total mass emissions. By creating a system of credits and/or allowances, industry is given the freedom to reduce the required pollutants from areas where they can be achieved most cost-effectively while still meeting the required reductions. These examples, plus the other available strategies, have the inherent incentive of encouraging investment in cleaner, more cost-effective technology. ^{lx}

CONGRESSIONAL POLICY ALTERNATIVES

^{lviii}⁵⁸ Briefing on EPA's New Quality Standards and the Reauthorization of ISTEA. 21 July 1997.

^{lix}⁵⁹ State and Territorial Air Pollution Program Administrators/Association Of Local Air Pollution Control Officials. *Controlling Particulate Matter Under the Clean Air Act: A Menu of Options*. July 1996.

^{lx}⁶⁰ *Ibid*.

Now that the EPA has announced its final ruling for ozone and particulate matters NAAQS, Congress will have the opportunity to review the standards and consider alternatives. At the present moment, there are two standing bills (H.R. 1984 & S. 1084) in Congress and many law suits threatened.

H.R. 1984

On June 19, 1997 H.R. 1984 was introduced on the floor of the House of Representatives. This bill, which was originally named the Klink -Boucher-Upton Clean Air Standards Bill, was sponsored by 27 Congressmen and questioned the need for new standards. The bill provides a four-year "moratorium" of the rule and authorizes an additional \$75 million for each fiscal year for the next five years for PM research. In this four year period, the EPA shall not declare any new or revised standards. In following the Clean Air Act, another full review for ozone and fine particles will be performed in this period and it would then be decided what standards should be followed.

In addition, H.R. 1984 will require the EPA to use these funds to further investigate, research and disseminate information which would facilitate our understanding of the health effects of fine particles. The legislation calls for the monitoring of fine particles to begin immediately so that information, such as biological mechanisms which produce adverse health effects, dose response levels and particle size and amount being retained in the lung, is available when the time for fine particle standard implementation arises. Implementation would remain on schedule following the stipulation that implementation cannot begin until the monitoring period is completed. Additionally, this bill declares that it is not intended to amend the standard setting procedures as they are written under the CAA but instead is itself a free standing amendment which will only affect the current EPA proposal.

This compromising bill would therefore provide additional time to resolve any legislative disputes which relate to the proposal while continuing the progressive efforts to protect against ozone and PM. While delaying these implementations, the CAA Amendments of 1990 will continue to be implemented and reduce the precursors of ozone and PM. In this way, there is no risk of nullifying the provisions under the CAA Amendments of 1990 and there would not be an extensive delay in achieving high quality air.

H.R. has at least 112 co-sponsors and is backed by a broad bipartisan House coalition. Among its supporters are Commerce Committee ranking Democrat John D. Dingell of Michigan, moderate Republican Fred Upton of Michigan and GOP conservative David McIntosh of Indiana.

S. 1084

This legislation was introduced by Sens. James Inhofe (R-OK) and John Breaux (D-LA). It is the Senate companion bill to H.R. 1984 with the only differences being that this bill calls for a broader interagency research program.

H.R. 1863

This bill sponsored by Rep. Bob Ney (D-OH) and introduced on June 11, 1996, explicitly prohibits the EPA from establishing new or revised ozone and particulate matter standards before the current standards have been attained. This means that the current standards under the existing CAA Amendments would remain active until the date at which attainment is required in areas of highest concentration. These dates are December 31, 2001 and November 15, 2010 for particulate matter and ozone respectively. At the present time, this bill, which has been titled The Job Protection Act of 1997, has been referred to the House Commerce Committee where it was then referred to the Subcommittee on Health and Environment. To avoid having competing proposals, Rep. Ney has asked cosponsors of his bill to instead join the list of members signing on to H.R. 1984.

Small Business Regulatory Enforcement Fairness Act (SBREFA)

Under SBREFA, Congress has a 60 day review period during which they can pass a “joint resolution of disapproval” in regard to the new standards, one of the benefits of using the oversight angle. This would be introduced in the form of a bill which would nullify the standards issued and would not allow the agency to reissue them in any form resembling that of the original. If it is decided that this is the favorable course of action, the bill would have to pass in House of Representatives and the Senate. After this time, new legislation could be introduced which would offer further alternative standards or lay out additional guidelines for further amendments to the CAA.

A total of 67 votes in the Senate would be needed to override an expected Clinton veto. In the House, opponents of the rule would need a two-thirds majority. Many environmental groups and members of Congress-mainly Democrats-are doubtful that opponents will be able to mount enough support for a needed two-thirds majority.

Reauthorization of the CAA

Both the Senate Environment and Public Works and the House Commerce Committees are authorizing committees which entitle them to enact amendments which could directly address specific areas of the Act with the aim of weakening or postponing the implementation of the ozone and PM NAAQS. This could occur, for example, if the language specified for monitoring and further research before the implementation process can occur.

Court Challenges

Few expect these standards to be adapted and implemented without a laborious judicial review process. Litigation will be directed at hindering the implementation process. Challenges are expected to question the stringency of one or both of the

standards, the legality of the new regulations as they may clash with statutory requirements and charges that the EPA has not complied with other regulatory mandates. It has even been suggested that environmental and public health interest groups may complain that the standards are too lenient to protect the public health. ^{lxi}

RECOMMENDATIONS

It is obvious that there is a need for greater cooperation between the EPA and industry. In the upcoming years there will be a growing need for advanced pollution abatement equipment that will be cost-effective and feasible in attaining the standards. Industries are encouraged to play a more active role in the development of this technology, not only to lower their costs, but to protect their overall interests.

Additionally, industry can avoid situations which occurred in the previous few months by playing a more active role in the next review process. This could include the careful review of all monitoring data as it is gathered conducting, further industrial-based studies and requested review of studies used by the EPA. Since the fine particle standard will not be implemented until after this review, there exists the possibility of altering the standard before action is required. Specifically, it is important for industry officials to impact EPA decisions before the a proposal is required. This can be achieved through increased inquiry and comment as well.

Lastly, it is recommended that Congress revisit the cost issue under the CAA. As cost/benefit analysis is required in the form of an RIA, this information is readily available for review. By amending the Act to include the consideration of costs only after the examination of health risks, there would be less apprehension and opposition from both industry and small business. This would also enable the EPA to truly examine the harmful impacts of a regulation, such as job loss and decreases in personal disposable income, before setting a standard. In this way, adverse health effects would be minimized without any indirectly harmful social impacts.

ACRONYMS

CAA -----Clean Air Act
EPA-----Environmental Protection Agency
NAAQS----National Ambient Air Quality Standard
ALA-----American Lung Association
PM-----Particulate matter
ppm-----Parts per million
µm-----Microns
SBREFA--Small Business Regulatory Enforcement Fairness Act
CASAC----Clean Air Scientific Advisory Committee
NO_x-----Nitrous oxides

^{lxi61} Blodgett, John E., Larry B. Parker and James E. McCarthy. *Air Quality: EPA's Proposed New Ozone and Particulate Matter Standards*. Prepared by Congressional Research Service for Congress. 17 June 1997.

VOC-----Volatile Organic Compounds
API-----American Petroleum Institute
RIA-----Regulatory Impact Analysis
EEI-----Edison Electric Institute
NAM-----National Association of Manufacturing
AQSC-----Air Quality Standards Coalition
CSE-----Citizens For a Sound Economy
SIP-----State Implementation Plans
OTAG-----Ozone Transport Assessment Group

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