2.0 STATEMENT OF NEED FOR THE PROPOSED REGULATIONS

2.1 INTRODUCTION

Congress passed the Clean Air Act (CAA) to protect public health and the environment from the adverse effects of air pollution. This section summarizes the statutory requirements affecting the development and revision of the National Ambient Air Quality Standard (NAAQS) and briefly describes the health and welfare effects of particulate matter (PM), ozone, and regional haze (RH) and the need for regulatory action at this time.

2.2 STATUTORY AUTHORITY AND LEGISLATIVE REQUIREMENTS FOR PM AND OZONE NAAQS, AND RH RULE

2.2.1 PM and Ozone

Two sections of the CAA govern the establishment and revision of NAAQS. Section 108 (42 U.S.C. 7408) directs the Administrator to identify pollutants which "may reasonably be anticipated to endanger public health or welfare" and to issue air quality criteria for them. These air quality criteria are intended to "accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of [a] pollutant in the ambient air . . . ."

Section 109 (42 U.S.C. 7409) directs the Administrator to propose and promulgate "primary" and "secondary" NAAQS for pollutants identified under section 108. Section 109(b)(1) defines a primary standard as one "the attainment and maintenance of which in the judgment of the Administrator, based on [the] criteria and allowing an adequate margin of safety, [are] requisite to protect the public health."[1] A secondary standard, as defined in section

1 The legislative history of section 109 indicates that a primary standard is to be set at "the maximum permissible ambient air level . . . which will protect the health of any [sensitive] group of the population," and that for this purpose "reference should be made to a representative sample of persons comprising the group rather than to a single person in such a group." (S. Rep. No. 91-1196, 91st Cong., 2d Sess. 10 (1970)).

109(b)(2), must "specify a level of air quality the attainment and maintenance of which in the judgment of the Administrator, based on [the] criteria, [are] requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of [the] pollutant in the ambient air." Welfare effects as defined in section 302(h) [42 U.S.C. 7602(h)] include, but are not limited to, "effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being."

Section 109(d) of the Act directs the Administrator to review existing criteria and standards at 5-year intervals. When warranted by such review, the Administrator is to revise NAAQS. After promulgation or revision of the NAAQS, the standards are implemented by the States.

As discussed in the preambles to the PM and ozone rules (U.S. EPA, 1997 b and c), the costs and technological feasibility of attainment are not to be considered in setting NAAQS. These factors, however, can be considered in the development of State plans to implement such standards. Under section 110 of the Act, the States are to submit to EPA for approval State Implementation Plans (SIP) that provide for the attainment and maintenance of NAAQS by certain deadlines.

The current reviews of the NAAQS for PM and ozone have two separate and distinct components: the development of any new or revised standards which are codified in 40 CFR Part 50; and the development of cost-effective implementation strategies to achieve such standards, codified in 40 CFR Part 51.

2.2.2 RH

In addition to the NAAQS for PM and ozone, EPA is proposing a RH rulemaking to achieve reasonable progress towards the national visibility protection goal. The EPA recognized that visibility impairment is an important effect of PM on public welfare and concluded that the most appropriate approach for addressing it is to establish secondary standards for PM identical to the suite of primary standards, along with a revised visibility protection program to address RH in Class I Federal areas. The sources, precursor pollutants, and geographical areas of concern that ozone, PM and RH have in common provide the opportunity to minimize the regulatory burden on sources that would otherwise be required to comply with separate controls for each of these pollutants. These pollutants will most likely be considered jointly by the various authorities responsible for the implementation of the new standards.

In 1970, section 169A of the CAA set forth a national visibility goal that calls for "the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution."

The EPA's 1980 visibility regulations address visibility impairment that is "reasonably attributable" to a single source or small group of sources. These rules were designed to be the first phase in EPA's overall program to protect visibility. The EPA explicitly deferred action addressing RH impairment until some future date "when improvement in monitoring techniques provides more data on source-specific levels of visibility impairment, regional scale models become refined, and our scientific knowledge about the relationships between emitted air pollutants and visibility impairment improves." (U.S. EPA, 1997a).

Congress added section 169B as part of the 1990 Amendments to focus attention on RH issues. Section 169B(f) called for EPA to establish the Grand Canyon Visibility Transport Commission (GCVTC) to assess scientific and technical information pertaining to RH in the Grand Canyon National Park. The final report from the Commission, "Recommendations for Improving Western Vistas," was completed in June 1996. Section 169B(e) calls for the

Administrator, within 18 months of receipt of the Commission's report, to carry out her "regulatory responsibilities under section [169A], including criteria for measuring 'reasonable progress' toward the national goal." (U.S. EPA, 1997a)

2.3 AUTHORITY FOR THIS RIA

Pursuant to Executive Order (E.O.) 12866, this Regulatory Impact Analysis (RIA) assesses the costs, economic impacts, and benefits associated with the implementation of these and alternative NAAQS for PM and ozone, as well as for the proposed RH rule. E.O. 12866 states that "Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary or compelling by public need . . . . In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures . . . and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits . . ., unless a statute requires another regulatory approach." Since the CAA precludes consideration of costs or technological feasibility in determining the ambient standards, the results of this RIA were not taken into account by the Administrator in her decision on whether to change the current NAAQS. Further discussion of other alternatives pursuant to E.O. 12866 is contained in Chapter 3 of this document.

The Unfunded Mandates Reform Act of 1995 (UMRA), in title II, section 201, directs agencies "unless otherwise prohibited by law [to] assess the effects of Federal regulatory actions on State, local, and tribal governments, and the private sector . . . ." Section 202 of title II directs agencies to provide a qualitative and quantitative assessment of the anticipated costs and benefits of a Federal mandate resulting in annual expenditures of $100 million or more, including the costs and benefits to State, local, and tribal governments, or the private sector. This section does not apply to the NAAQS because EPA cannot consider economic or technological feasibility in setting the PM and ozone NAAQS, and the NAAQS will not in themselves establish any new

regulatory requirements. Section 205 requires that the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule be selected or an explanation of why such alternative was not selected. This section applies only when a written statement is required under section 202. Section 204 requires each Agency to develop a process to permit State, local and tribal officials to provide meaningful and timely input in the development of regulatory proposals containing significant Federal intergovernmental mandates. The EPA had a series of preproposal outreach meetings that solicited input on issues related to the NAAQS (U.S. EPA, 1997 b and c)

The proposed RH rule establishes presumptive targets for visibility improvements in mandatory Class I Federal areas, but also provides discretion to the States to establish alternative targets where warranted. This RIA fulfills the UMRA section 202 requirement to analyze the costs and benefits of implementing a RH program. In view of the discretion the proposed rule would provide the States, the RIA analyzes two different presumptive targets for visibility improvement; one target equal to a rate over 10 years, the other over 15 years. The RIA analysis estimates that the RH rule would likely result in the expenditure by State, local, and tribal governments in the aggregate, or by the private sector of over $100 million per year for either presumptive option.

The UMRA section 204 consultation requirement was met by providing numerous opportunities for State, local and tribal governments to provide input during development of the proposed RH rule as described in the preamble to the final rule.

The Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) provides that, whenever an agency is required to publish a general notice of rulemaking for a proposed rule, the Agency must prepare regulatory flexibility analyses for the proposed and final rule unless the head of the Agency certifies that it will not have a significant economic impact on a substantial number of small entities. Since the NAAQS themselves do not establish any requirements applicable to small entities, the Agency may certify that the rules will not have a significant economic impact on a substantial number of

small entities. The EPA has explained in some detail in the preambles to the NAAQS rules and the proposed RH rules why these rules do not have a significant adverse impact on a substantial number of small entities. While speculative, the Agency has conducted general analyses of the potential cost impacts on small entities of control measures the States might adopt to attain the proposed NAAQS and proposed RH rule, and has included these analyses in this RIA.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that each Federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minorities and low-income populations. The implementation plans determining which control measures will be used to attain the PM and ozone NAAQS and RH rule are developed by the States, therefore it is not possible to rigorously assess environmental justice concerns in this analysis.

Detailed discussions of the applicability of the above mentioned Executive Order and Acts to the PM and ozone NAAQS and the RH rule can be found in the preambles to these rules.

2.4 KEY HEALTH AND WELFARE EFFECTS

2.4.1 PM

As identified and discussed in the PM Criteria Document (CD) and PM Staff Paper (SP) (U.S. EPA, 1996c and d), key health effects categories associated with PM include: 1) premature mortality; 2) aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions and emergency room visits, school absences, work loss days, and restricted activity days); 3) changes in lung function and increased respiratory symptoms; 4) changes to lung tissues and structure; and 5) altered respiratory defense mechanisms.

Based on a qualitative assessment of the epidemiological evidence of effects associated

with PM, the populations that appear to be at greatest risk from exposure to PM are: 1) individuals with respiratory disease and cardiovascular disease; 2) individuals with infectious respiratory disease; 3) elderly individuals; 4) asthmatic individuals; and 5) children.

In formulating alternative approaches to establishing adequately protective, effective, and efficient PM standards, it is necessary to specify the fraction of particles found in the ambient air that should be used as the indicator(s) for the standards. The scientific evidence indicates that continued use of PM_{10} as the *sole* indicator for the PM standards would not provide the most effective and efficient protection from the health effects of PM. The recent health effects evidence and the fundamental physical and chemical differences between fine and coarse fraction particles have prompted consideration of separate standards for the fine and coarse fractions of PM_{10}. In this regard, the CD (U.S. EPA, 1996d) concludes that fine and coarse fractions of PM_{10} should be considered separately. Taking into account such information, the Clean Air Scientific Advisory Committee (CASAC) found sufficient scientific and technical bases to support establishment of separate standards relating to these two fractions of PM_{10}. Specifically, CASAC advised the Administrator that "there is a consensus that retaining an annual PM_{10} NAAQS . . . is reasonable at this time" and that there is "also a consensus that a new $PM_{2.5}$ NAAQS be established."

There are significant physical and chemical differences between the two subclasses of PM_{10} and it is reasonable to expect that differences may exist between fine and coarse fraction particles in both the nature of potential effects and the relative concentrations required to produce such effects. The specific components of PM that could be of concern to health include components typically within the fine fraction (e.g., acid aerosols, sulfates, nitrates, transition metals, diesel particles, and ultra fine particles), and other components typically within the coarse fraction (e.g., silica and resuspended dust). While components of both fractions can produce health effects, in general, the fine fraction appears to contain more of the reactive substances potentially linked to the kinds of effects observed in the epidemiological studies. The fine fraction also contains the largest number of particles and a much larger aggregate surface area than the coarse fraction which enables the fine fraction to have a substantially greater

potential for absorption and deposition in the thoracic region, as well as for dissolution or absorption of pollutant gases.

With respect to welfare or secondary effects, fine particles have been clearly associated with the impairment of visibility over urban areas and large multi-state regions. Fine particles and their major constituents are also implicated in materials damage, soiling, and acid deposition. Coarse fraction particles also contribute to soiling and materials damage.

Particulate pollution is a problem affecting localities, both urban and non-urban, in all regions of the United States. Manmade emissions that contribute to airborne PM result principally from stationary point sources (fuel combustion and industrial processes), industrial process fugitive particulate emission sources, non-industrial fugitive sources (roadway dust from paved and unpaved roads, wind erosion from cropland, etc.) and transportation sources. In addition to manmade emissions, consideration must also be given to natural emissions including dust, sea spray, volcanic emissions, biogenic emissions (e.g., from plants and animals), and emissions from wild fires when assessing particulate pollution and devising control strategies (U.S. EPA, 1996c and d).

2.4.2 Ozone

As identified and discussed in the ozone CD and SP (U.S. EPA, 1996a and b), key health effects categories associated with ozone exposure include: 1) change in pulmonary function responses; 2) increased respiratory symptoms and effects on exercise performance; 3) increased airway responsiveness; 4) acute inflammation and respiratory cell damage; and based on animal studies 5) chronic respiratory damage.

In addition to the various health effects associated with exposure to ozone identified in the ozone CD and Staff Paper (U.S. EPA, 1996 a and b), recent peer reviewed scientific publications indicate that exposure to ambient ozone increases the risk of mortality. While this evidence was not used in the NAAQS standard setting process, this new evidence suggests that substantial

additional health benefits associated with reducing ozone concentrations may exist.

The populations identified as having demonstrated particular susceptibility to ozone include "exercising" or active healthy and asthmatic individuals, including children, adolescents, and adults working outdoors. There are limited data on the ozone susceptibility of individuals with preexisting respiratory disease or other limitations on their pulmonary function and exercise capacity (e.g., those with chronic obstructive pulmonary disease, ischemic heart disease). However, these individuals may be of concern based on the likelihood that decrements in lung function or exercise capacity due to ozone exposure may have greater clinical importance to them than similar changes in healthy persons.

Welfare effects of ozone include, but are not limited to, effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility and climate, damage to and deterioration of property, and hazards to transportation. Of these welfare effect categories, the effects of ozone on crops, vegetation, and ecosystems are of significant concern at concentrations typically occurring in the U.S. As stated in a previous ozone CD and SP (U.S. EPA, 1989), "of the phytotoxic compounds commonly found in the ambient air, ozone is the most prevalent, impairing crop production and injuring native vegetation and ecosystems more than any other air pollutant." By affecting crops and native vegetation, ozone also directly affects natural ecosystem components such as soils, water, animals, and wildlife, and ultimately the ecosystem itself. Some of these impacts have direct, quantifiable economic value, while others are currently not quantifiable.

Finally, additional health and welfare effects and benefits accrue directly from control of ozone precursors (NOx and VOC). For example, reduced NOx results in substantial benefits from reduced nitrogen deposition into water bodies such as the Chesapeake Bay and from reduced PM. Reduced VOC results in air toxics reductions and reduced cancer risk.

2.4.3 RH

Regional haze is produced from a multitude of sources and impairs visibility in every direction over a large area, possibly over several states. Regional haze masks objects on the horizon and reduces the contrast of nearby objects. The formation, extent, and intensity of RH is a function of meteorological and chemical processes, which sometimes cause fine particle loadings to remain suspended in the atmosphere for several days and to be transported hundreds of kilometers from their sources. It is this type of visibility degradation that is principally responsible for impairment in national parks and wilderness areas across the country. Visibility in urban areas may be dominated by local sources, but may be significantly affected by long-range transport of haze as well. Fine particles transported from urban areas in turn may be significant contributors to regional-scale visibility impairment.

Visibility has direct significance to people's enjoyment of daily activities in all parts of the country. Individuals value good visibility for the well-being it provides them directly, both in the places where they live and work, and in the places where they enjoy recreational opportunities. Visibility is also highly valued because of the importance people place on protecting nationally-significant natural areas.

2.5 NEED FOR REGULATORY ACTION

2.5.1 Market Failure (Externality)

In the absence of government regulation, market systems have failed to deal effectively with air pollution because air sheds have been treated as public goods and because most air polluters do not internalize the full damage caused by their emissions. For an individual firm, pollution is usually an unusable by-product which can be disposed of at no cost by venting it to the atmosphere. However, in the atmosphere, pollution causes real costs to be incurred by others. This is generally referred to in economic theory as a negative externality.

The fact that the producer, or consumer, whose activity results in air pollution, does not bear the full costs of his/her action leads to a divergence between private costs and social costs.

This negative externality causes a "market failure" because it causes a misallocation of society's resources, with more resources being devoted to the polluting activity than would be if the polluter had to bear the full social cost of his/her actions..

There are a variety of market and nonmarket mechanisms available to correct this situation. Examples of market mechanisms include emission fees and trading systems. Other than regulation, nonmarket approaches would include negotiations or litigation under tort law and general common law. In theory, these latter approaches might result in payments to individuals to compensate them for the damages they incur.

Such resolutions may not occur, however, in the absence of government intervention. Two major impediments often block the correction of pollution inefficiencies and inequities by the private market. The first is high transaction costs when millions of individuals are affected by thousands of polluters, such as is the case with PM, ozone, and RH pollution problems. The transaction costs of compensating individuals adversely impacted by air pollution include contacting the individuals affected, apportioning injury to each from each pollution source, and executing the appropriate damage suits or negotiations. If left to the private market, each polluter and each affected individual must litigate or negotiate on their own or organize into groups for these purposes. The transaction costs involved could be so high as to exceed the benefits of the pollution reduction.

The second factor discouraging private sector resolution of the PM, ozone, and RH pollution problem is that pollution abatement tends to be a public good. That is, after pollution has been abated, benefits of the abatement can be enjoyed by additional people at no additional cost. This constitutes the classic "free rider" problem. Any particular individual is reluctant to contribute time or money to reduce PM, ozone, and RH expecting that they may be able to "free ride" on others' efforts to mitigate the problem.

In view of the clear legal requirements placed on the EPA by the CAA, the Agency is proposing to revise the NAAQS for PM and ozone and propose a RH rule to provide adequate

protection of public health and welfare. As this RIA shows, there are resource costs associated with the implementation of these standards by the States. However, governmental action is required by the CAA. Moreover, these standards, when implemented by the States, will mitigate the negative externalities which would otherwise occur due to the failure of the marketplace.

2.6 REFERENCES

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