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Particulate Matter ($PM_{2.5}$): National Ambient Air Quality Standards (NAAQS) Implementation

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Summary

By December 31, 2004, the U.S. Environmental Protection Agency (EPA) intends to finalize the designations of geographical areas for the national ambient (outdoor) air standards for fine particulate matter or "$PM_{2.5}$" (particles less than 2.5 micrometers in diameter). Particulate matter, including $PM_{2.5}$, is one of the six principal pollutants classified as criteria pollutants for which the agency has set National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA). NAAQS are designed primarily to protect human health by providing an adequate margin of safety. After several years of litigation and other delays, EPA is moving to implement the NAAQS for $PM_{2.5}$ promulgated in 1997.

National $PM_{2.5}$ air quality data have been collected for three years or more. The next step in the process is the designation of geographical areas for attainment or nonattainment. Areas with air quality levels exceeding the annual and 24-hour $PM_{2.5}$ standards, which limit the concentration of fine particle levels in the ambient air, will be designated "nonattainment areas." Many areas that have not been designated as nonattainment under implementation of other NAAQS are expected to be designated nonattainment for the first time with the implementation of the $PM_{2.5}$ NAAQS.

The designation process is a cooperative federal-state/tribe process in which states/tribes provide initial designation recommendations to EPA for consideration. EPA ultimately makes the decision on the final designations. $PM_{2.5}$ nonattainment areas will require the development of comprehensive implementation plans to meet the $PM_{2.5}$ standards.

EPA is currently reviewing the state/tribe attainment designation recommendations, and plans to notify the states/tribes of any modifications by June-July 2004. A preliminary review of the submissions indicates that 18 states and the District of Columbia have recommended 145 counties as potential nonattainment areas. The agency is expected to use its discretion to expand the size and number of nonattainment areas, including designation of additional counties because of their contribution to nonattainment in a defined metropolitan statistical area.

A number of issues will continue to be the topic of debate as the implementation of the $PM_{2.5}$ NAAQS progresses. Among the questions and concerns are when and why the standards were established; what criteria are used to determine nonattainment; how boundaries of the nonattainment area are established; whether special provisions can be made for areas affected by pollution from upwind; what the deadline will be for reaching attainment; what grants or other funding might be available to assist areas in reaching attainment; and how nonattainment designation might affect economic development and transportation investments in an area.

Actions following the recent release of the 8-hour ozone designations will likely affect certain decisions and the schedule regarding $PM_{2.5}$ NAAQS implementation. Legislation currently being considered could also potentially alter the implementation process. This report will be updated as developments warrant.

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Background

By December 31, 2004, the U.S. Environmental Protection Agency (EPA) intends to finalize the designations of geographical areas for attainment or nonattainment[1] of the national ambient (outdoor) air standards for fine particulate matter or "$PM_{2.5}$" (particles less than 2.5 micrometers (µm) in diameter). This action continues EPA's implementation of new National Ambient Air Quality Standards (NAAQS) for particulate matter promulgated in 1997 under authority of the Clean Air Act (CAA),[2] delayed until recently because of court challenges and other factors.

What Is $PM_{2.5}$?
$PM_{2.5}$ can be naturally occurring or manmade in the form of solid particles in soot, smoke, dust, and in some instances is in the form of liquid particles. $PM_{2.5}$ can come from various residential and industrial combustion activities, or they may result from the reaction of certain gas emissions with the atmosphere. Sources of $PM_{2.5}$ include vehicle and equipment exhaust, utility and other industrial plant emissions, burning wood, and fugitive dust emissions from roads or generated by various activities such as construction and agricultural operations. $PM_{2.5}$ has been linked to cardiovascular and respiratory health problems, and contributes to visibility "haze" and acidic deposition.

NAAQS are a core component of the CAA,[3] and the statute requires that EPA set primary standards at a level,"requisite to protect the public health" with an "adequate margin of safety" (42 U.S.C. 7409(b)(1)), based on a review of the scientific literature. The CAA also requires setting secondary standards at a level "requisite to protect the public welfare" as defined by the act (42 U.S.C. 7409(b)(2) and 7602(h)). EPA has promulgated NAAQS for six principal pollutants classified by the agency as "criteria pollutants": sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone, and lead. Every five years, according to the statute (but less frequently in practice), EPA is required

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[1]Areas will be identified as "nonattainment" when they violate or contribute to the violation of National Ambient Air Quality Standards (NAAQS), or "attainment/unclassified" when they meet the standard or the data are insufficient for making a determination of compliance with the NAAQS.

[2]62 *Federal Register* 38652-38896, July 18, 1997.

[3]Sections 108 and 109 of the Clean Air Act (CAA) govern the establishment, review, and revisions of NAAQS (42 U.S.C. 7408 and 7409). For an overview of NAAQS, see CRS Report RL30853: *Clean Air Act: A Summary of the Act and Its Major Requirements*.

to review the latest scientific studies and either reaffirm or modify the NAAQS. The most recent changes, a strengthening of the PM standards and ozone, were promulgated in 1997.

A critical step in NAAQS implementation is the designation of geographical areas failing to comply with the NAAQS following extensive monitoring and analysis of relevant air quality data. Earlier this year, on April 15, 2004, EPA designated areas in 32 states and the District of Columbia as "nonattainment areas" (474 counties) for a new ozone air quality standard.[4] Nonattainment designation begins a process in which states (and tribes) must develop and adopt emission control programs sufficient to bring air quality into compliance by an EPA defined deadline.

It is expected that some of the areas being considered under implementation of the $PM_{2.5}$ standards have not previously been designated nonattainment for any other NAAQS. This has raised questions and concerns about the process in these areas, including when and why the standards were established; what criteria are used to determine nonattainment; how boundaries of the nonattainment area are established; whether special provisions can be made for areas affected by pollution from upwind; what the deadline will be for reaching attainment; what grants or other funding might be available to assist areas in reaching attainment; and how designation might affect economic development and transportation investments in an area.

This report provides a brief overview of the NAAQS implementation process, including links to sources of additional information. The report also discusses issues and legislation that could potentially alter the implementation process.

The $PM_{2.5}$ Standards

Earlier regulation and monitoring of particulate matter under the CAA, beginning in 1971, focused primarily on total suspended particles (TSP) and later on, coarse particles equal to or less than 10 micrometers in diameter (PM_{10}). After extensive analysis and review, EPA revised the PM standards to provide separate requirements for fine particulate matter ($PM_{2.5}$) based on their link to several types of cardiovascular and respiratory health problems, including aggravated asthma and bronchitis, and links to premature death.[5]

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[4]See CRS Report RL32345, *Implementation of EPA's 8-Hour Ozone Standard*.

[5] There is extensive and growing literature on the health effects of $PM_{2.5}$. For relevant EPA criteria and technical documents in support of the 1997 promulgation, as well as more recent analyses, see [http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html]. For a brief summary indicating some dimensions of the estimated premature mortality, see Statement of Jonathan Levy, Harvard School of Public Health, at "Health Effects of $PM_{2.5}$ Emissions," Hearing, Senate Environment and Public Works Committee, October 2, 2002. More recent research indicates a correlation between particulate concentrations and infant mortality (*The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession*, Kenneth Y. Chay and Michael Greenstone, *Quarterly Journal of Economics*, Volume 118, Issue 3, August 2003).

The NAAQS for $PM_{2.5}$ became effective September 16, 1997.[6] The primary and the secondary $PM_{2.5}$ NAAQS requirements are the same. As part of the promulgation of the $PM_{2.5}$ NAAQS, EPA revised the coarse particles designation (PM_{10}) to particles larger than 2.5 but smaller than 10 micrometers ($PM_{10-2.5}$), so as to explicitly exclude fine particles, and also promulgated the 8-hour ozone NAAQS. The $PM_{2.5}$ standards are set at:

1. an annual maximum concentration of 15 micrograms per cubic meter ($\mu g/m^3$) based on the three-year average of arithmetic $PM_{2.5}$ concentrations for one or more community-oriented monitors;[7] and

2. a 24-hour concentration of 65 $\mu g/m^3$, based on the three-year average of the 98th percentile of 24-hour $PM_{2.5}$ concentrations at each population-oriented monitor[8] within the area.

In requiring both $PM_{2.5}$ standards (24-hour and annual), EPA reportedly considered the "combined effect of the standards rather than an approach that weighed short- and long-term exposure evidence, analyses, and standards independently."[9] EPA considers the annual standard the primary requirement for reducing total $PM_{2.5}$ risk. The 24-hour standard is intended to provide supplemental protection for days with peak $PM_{2.5}$ concentrations, localized "hot spots," and $PM_{2.5}$ risks arising from seasonal emissions.

Geographical Area Designation Process

The CAA establishes a process for designating nonattainment areas[10] and setting their boundaries, but it allows the EPA Administrator some discretion in determining what the final boundaries of the areas will be. According to EPA's 2003 *Trends Report*, there were 124 areas designated as nonattainment for at least one of the six criteria pollutants (including particulate matter) and approximately 126 million people living in these areas, as of September 2002.[11] The number of nonattainment

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[6]62 *Federal Register* 38652-38896, July 18, 1997.

[7]Community oriented monitoring zones are defined as ".an optional averaging area with well established boundaries such as county or census block" (40 *Code of Federal Regulations* Part 58 Subpart A).

[8]Population-oriented monitoring (or sites) applies to "residential areas, commercial areas, recreational areas, industrial areas, and other areas where a substantial number of people may spend a significant fraction of their day" (40 *Code of Federal Regulations* Part 58 Subpart A).

[9]U.S. EPA Fact Sheet: *EPA's Revised Particulate Matter Standards*, July 17, 1997.

[10]The EPA "Greenbook" lists areas of the country where air pollution levels persistently exceed the national ambient air quality standards and may be designated as nonattainment. For current information on the location of NAAQS nonattainment areas, visit EPA's website [http://www.epa.gov/oar/oaqps/greenbk.html].

[11]U.S. EPA, *National Air Quality Trends Report: 2003 Special Studies*, chapter 4, pp. 59-61, September 2003, at [http://www.epa.gov/airtrends/pm.html].

areas and associated population have increased since this report; the April 15, 2004, 8-hour designated nonattainment areas alone include 159 million people.

The designation process is a cooperative federal-state/tribe process in which states/tribes provide initial designation recommendations to EPA for consideration. Tribes are not required, but were encouraged, to submit recommendations.[12] In Section 107(d)(1)(A) (42 U.S.C. 7407), the statute states that governors shall submit a list to EPA of all areas in the state, "designating as ... nonattainment, any area that does not meet (*or that contributes to ambient air quality in a nearby area that does not meet*)" an air quality standard (emphasis added).

$PM_{2.5}$ attainment or nonattainment designations are to be made primarily on the basis of three-year federally referenced $PM_{2.5}$ monitoring data.[13] At the time the new NAAQS were being finalized, EPA also developed methods for monitoring fine particles. Using funding specifically authorized for this purpose in EPA appropriations FY1998-FY2000,[14] the agency worked closely with states and tribes to initiate the deployment of a portion of the network of 1,200 monitors in January of 1999. The majority of the monitors were not in place until January of 2000. States/tribes were expected to rely on data collected during 2000-2002 for their recommendations. EPA plans to consider the 2001-2003 data to make the final designations. The agency has specified data and conditions that will not be acceptable, but there are several other factors that states/tribes and the agency will consider as described in EPA's guidance.[15] The agency's nonbinding guidance recommends that states/tribes consider using the same boundaries for nonattainment for both the $PM_{2.5}$ and 8-hour ozone standards, to facilitate consistency in future implementation plans.

$PM_{2.5}$ designations will not include nonattainment classifications based on severity as is the case with PM_{10} and ozone, which has seven classifications. The 1990 CAA Amendments include classifications of nonattainment based on the extent to which the NAAQS is exceeded, and establish specific pollution controls and attainment dates for each classification.[16] EPA interprets that those classification

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[12]The area designation requirements under the CAA (section 107) are specific with respect to states, but not tribes. EPA plans to follow the same designation process for tribes per sections 110(o) and 301(d) of the CAA and pursuant to the 1988 Tribal Authority Rule, which specifies that tribes shall be treated as states in selected cases (40 *Code of Federal Regulations* Part 49). Currently, six tribes have participated in the $PM_{2.5}$ designation recommendation process, recommending designations of attainment/unclassified (see [http://www.epa.gov/pmdesignations]).

[13]A federally referenced monitor is one that has been accepted for use by EPA for comparison of the NAAQS by meeting the design specifications, and certain precision and bias (performance) specifications (40 *Code of Federal Regulations* Part 58).

[14]Appropriations for monitoring averaged roughly $50 million per year, P.L. 105-65, P.L. 105-226, P.L. 106-74.

[15]See EPA's NAAQS website at [http://www.epa.gov/ttn/naaqs/pm/pm25_guide.html].

[16]These requirements can be found in Title I Part D Sections 171-193 of the act..

provisions in the act regarding particulate matter [17] explicitly apply to PM_{10}, but not $PM_{2.5}$ NAAQS implementation. $PM_{2.5}$ implementation is governed by the general and nonattainment planning requirements of Title I of the act.[18]

EPA recognized that determining the geographic extent of nearby source areas that contribute to nonattainment would be complicated. The CAA is not specific regarding requirements to combine neighboring counties within the same nonattainment area, but it does require the use of metropolitan statistical area boundaries in the more severely polluted areas (Section 107(d)(4)(A)(iv)). Echoing this requirement, and similar to the 8-hour ozone approach, EPA recommended that Metropolitan Statistical Areas or Consolidated Metropolitan Statistical Areas[19] serve as the "presumptive boundary" for nonattainment areas under the $PM_{2.5}$ standards.

Metropolitan areas are generally treated as units, even where part of the area lies in a separate state or where part of the area does not have readings exceeding the standards. In the latter case, even though a specific county may not exceed the standards, the pollution generated there is likely to influence $PM_{2.5}$ levels elsewhere in the metropolitan area. In addition, including the entire metropolitan area avoids the creation of additional incentives for sprawl development on the fringes of urban areas. For rural areas in violation of the $PM_{2.5}$ standards, EPA's guidance presumes that the full county would be designated a nonattainment area.

Following state/tribe designation submissions, the EPA Administrator has discretion to make modifications, including to the area boundaries. As required by statute,[20] the agency will notify the states/tribes regarding any modifications allowing sufficient opportunity to demonstrate why a proposed modification is inappropriate, but the final determination rests with EPA.

Detailed information regarding EPA's guidance for $PM_{2.5}$ designation can be obtained from EPA's $PM_{2.5}$ Implementation website at [http://www.epa.gov/ttn/naaqs/pm/pm25_index.html] and its Policy and Guidance website at [http://www.epa.gov/ttn/oarpg].

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[17]Under subpart 4 of the CAA, PM_{10} nonattainment designations are either "moderate" or "serious," and each of these categories is subject to specified control requirements. Moderate areas require permits for new and modified major stationary sources of PM_{10} and must impose reasonably available control measures (RACM). Serious areas must impose best available control measures (BACM) and reduce definition of a major source of PM_{10} from 100 tons per year to 70 tons per year. For areas designated moderate, the deadline for attainment is six years after designation; for serious areas, the deadline is ten years after designation (Section 188 of Part D subpart 4 of Title I in the CAA; 42 U.S.C. Sec. 7513).

[18]CAA Title I Part A, and Part D subpart 1.

[19]As defined by the Office of Management Budget. For more information on the definitions of metropolitan areas, see [http://www.census.gov/population/www/estimates/metroarea.html].

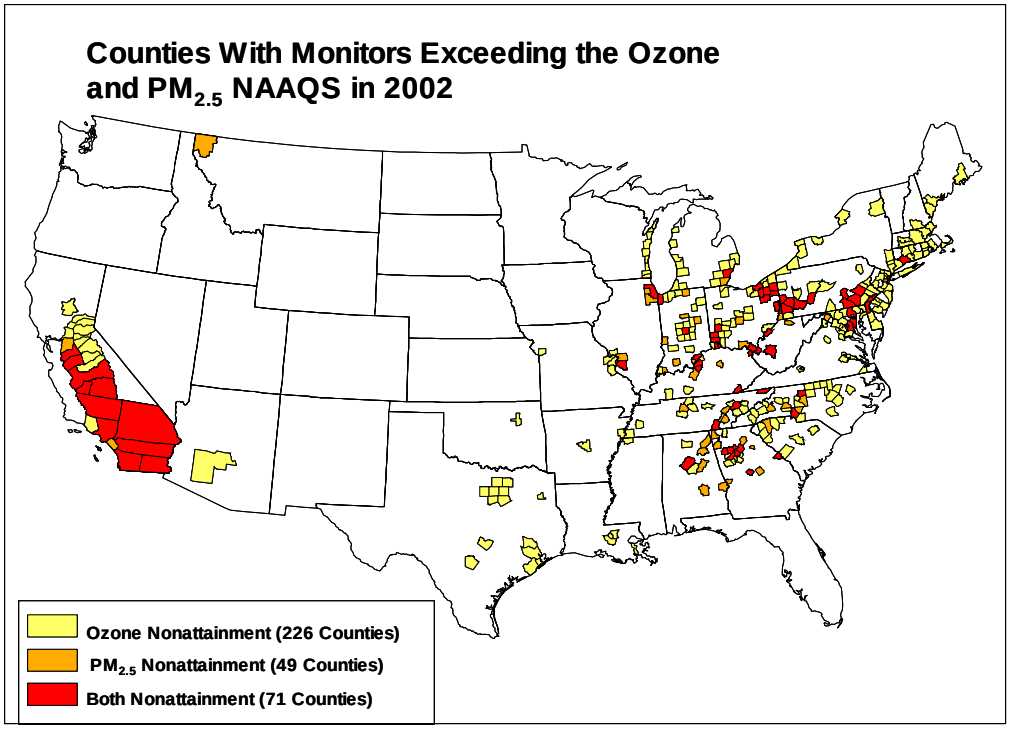
[20]CAA section 107(d)1(B)(ii).

$PM_{2.5}$ Implementation Status

EPA is currently reviewing the state/tribe attainment designation recommendations, and plans to notify the states/tribes of any modifications by June-July 2004, followed by the final $PM_{2.5}$ implementation rule in late 2004 or early 2005, and final designations by the December 31, 2004 date. A preliminary review of the submissions indicates that 18 states and the District of Columbia have recommended 145 counties as potential nonattainment areas.[21]

Many of these $PM_{2.5}$ areas are expected to overlap with the 8-hour ozone designations. As an indication of the potential overlap of the two new NAAQS, **Figure 1** shows EPA's estimates for violations of $PM_{2.5}$ and 8-hour ozone based on 2000-2002 monitoring data. The data show at least one monitor measuring concentrations exceeding the $PM_{2.5}$ NAAQS in 120 counties. Final $PM_{2.5}$ designation areas will be determined based on 2001-2003 monitoring data. Also, the map in Figure 1 only shows those counties with monitoring results above the standards, however, final nonattainment designation areas will include other counties within a defined metropolitan statistical area.

Figure 1. EPA Estimates of Counties in Nonattainment of $PM_{2.5}$ and 8-Hour Ozone NAAQS
(based on 2000-2002 data)



Source: U.S. Environmental Protection Agency

[21]For $PM_{2.5}$ geographical designation recommendations from individual states and tribes, see EPA's "$PM_{2.5}$ Designations" website at [http://www.epa.gov/pmdesignations].

Demonstrating Attainment: The State Implementation Plan

Following designation of an area as nonattainment, the state where the area is located must develop a State Implementation Plan (SIP) that demonstrates how attainment with the $PM_{2.5}$ standards will be achieved. Under Section 110 of the CAA, the states must submit their SIPs to EPA within three years of designation. To be approved, a SIP must demonstrate that the area will reach attainment of the standards by a specified deadline. SIPs include pollution control measures that will be implemented by federal, state, and local governments, and rely on models of the impact on air quality of projected emission reductions to demonstrate attainment.

EPA expects most $PM_{2.5}$ SIPs will focus primarily on local control measures to reduce emissions. The most common local measures affect motor vehicles, fuels, and stationary sources of pollution. In addition, because of the significant contribution of $PM_{2.5}$ to visibility impairment ("haze"), and the frequent tendency of $PM_{2.5}$ emissions to be transported across geographic boundaries, regional planning to address sources inside and outside nonattainment areas is also expected to be a critical component of $PM_{2.5}$ SIPs.

If new, or revised, SIPs for $PM_{2.5}$ attainment establish or revise a transportation-related emissions allowance ("budget"), or add or delete transportation control measures (TCMs), they may trigger "conformity" determinations. Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a SIP, and will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards.[22] The initial conformity rule was promulgated by EPA November 24, 1993 (58 *Federal Register* 62188), and has subsequently been amended several times. The most comprehensive amendments, clarifying and streamlining the 1993 rule, were published August 15, 1997 (62 *Federal Register* 43780).

Transportation conformity, under EPA's current rules, applies to ozone, PM_{10}, CO, and NOx, but does not include $PM_{2.5}$. On November 5, 2003, EPA published a proposed rule (68 *Federal Register* 62690) that would make transportation conformity regulations explicitly applicable to $PM_{2.5}$ nonattainment areas, and includes criteria and procedures for the new $PM_{2.5}$ and 8-hour ozone NAAQS. Conformity determinations must be submitted to EPA within one year of the effective date designating an area as nonattainment. Recognizing that the transportation conformity requirements could apply in $PM_{2.5}$ nonattainment areas prior to the availability of SIP budgets, EPA included options in the proposed rule regarding interim emissions tests for conformity determinations.[23] EPA anticipates promulgating a final rule in late June-July 2004.

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[22]For additional information on conformity, see CRS Report RL32106, *Transportation Conformity Under the Clean Air Act: In Need of Reform?*

[23]See 68 *Federal Register* 62697-62699.

EPA has concluded that in many cases, $PM_{2.5}$ attainment will be reached as the result of implementing strategies developed under the 1999 visibility protection regulations ("Regional Haze Rule"[24]); voluntary diesel engine retrofit programs; new federal standards on cars, light trucks, and heavy duty diesel engines that are scheduled to be implemented between 2004 and 2010; and the 1998 regional strategy to reduce nitrogen oxides from eastern states referred to as the "NOx SIP Call."[25] Although primarily designed to meet the ozone NAAQS, EPA predicts the NOx SIP call will also provide some benefits in terms of reduced levels of nitrate fine particles.

Other, proposed, legislation and EPA regulations for controlling coal-fired electric power plants' emissions, such as, "Clear Skies"/multi-pollutant legislation and the proposed "Interstate Air Quality Rule"(IAQ) to be implemented between 2004 and 2015,[26] are also expected to contribute national and regional measures for attaining $PM_{2.5}$ standards. The EPA predicts that, of an estimated 120 eastern counties out of compliance with $PM_{2.5}$ NAAQS in 2002, the Interstate Quality Rule will bring 28 more counties into compliance in addition to the 58 counties predicted to come into compliance under existing programs.[27]

$PM_{2.5}$ NAAQS Implementation Timeline and Delays

Due to legal challenges, lack of a national monitoring network, and other factors, implementation of the new standards has been delayed since they were promulgated. The current implementation schedule is based primarily on statutory requirements. An initial milestone schedule was outlined in an April 21, 2003, memorandum to EPA Regional Administrators, which also provides the non-binding guidance for implementation of the $PM_{2.5}$ designations.[28] Recognizing there may be potential efficiencies associated with states and tribes being able to harmonize future control strategies, the initial $PM_{2.5}$ schedule was intended to be similar to the 8-hour ozone program. The timeline presented in **Table 1** reflects the most recent key milestone dates for $PM_{2.5}$ implementation.

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[24]64 *Federal Register* 35714, July 1, 1999. EPA recently published a proposal revising the regional haze rule, intended to provide guidelines for state and tribal air quality agencies to use in determining how to set air pollution limits (69 *Federal Register* 25184, May 5, 2004).

[25]64 *Federal Register* 35714, October 27, 1998.

[26]For a further discussion, see CRS Report RL31779, *Air Quality: Multi-Pollutant Legislation in the 108th Congress*, and CRS Report RL32273, *Air Quality: EPA's Proposed Interstate Air Quality Rule.*

[27]CRS Report RL32273, *Air Quality: EPA's Proposed Interstate Air Quality Rule.*

[28]EPA memorandum, April 21, 2003, from EPA's Office of Air and Radiation Assistant Administrator Jeffrey R. Holmstead to EPA Regional Administrators, available on EPA's NAAQS website at [http://www.epa.gov/ttn/naaqs/pm/pm25_guide.html].

Table 1. Estimated Schedule for $PM_{2.5}$ NAAQS Implementation

Date	$PM_{2.5}$ NAAQS Milestones
February 2004 (completed)	State/tribal area designation recommendations (can be based on 2000-2002 monitoring data)
June-July 2004	EPA notifies states/tribes regarding modifications to states/tribes' recommendations
August-September 2004	EPA proposes $PM_{2.5}$ implementation rule
Late 2004- Early 2005	EPA promulgates final $PM_{2.5}$ implementation rule
December 31, 2004 (required one year after states/tribes' recommendations)	EPA promulgates final area designations
December 31, 2005, or one year after the final designation effective date	States must submit transportation conformity determination within one year of the effective date of nonattainment designation of an area, assuming EPA's proposed "conformity rule" is promulgated
December 2007-January 2008 (three years after final area designations)	States/tribes submit revised implementation plans (SIPS) to achieve $PM_{2.5}$ compliance in nonattainment areas
2010-2015 (5-10 years after final area designations)	NAAQS statutory compliance deadline for attainment

Source: Prepared by Congressional Research Service based on U.S. Environmental Protection Agency fact sheets and guidance documents, and relevant *Federal Register* Notices.

The $PM_{2.5}$ requirement of three years of monitoring data to determine whether or not areas are meeting the established limits is one factor responsible for delaying implementation. Comprehensive monitoring data sufficient to make this determination and the attainment designations were not available in 1997. Recognizing this dilemma, in the 1998 Transportation Equity Act for the 21st Century (TEA-21),[29] Congress revised the statutory deadline requirements for the new NAAQS, predicated on a previously released EPA Interim Implementation Policy. TEA-21 required states to submit designation recommendations within one year after receipt of three years of data meeting defined federal protocols, and EPA to promulgate designations within one year after state recommendations are due but not later than December 31, 2005.

As discussed earlier, operation of the network of monitors was phased in from 1999 through 2000, making three-year monitoring data available at different points depending on area location. Rather than a staggered designation schedule which would likely result in hampering cross-coordination of implementation plans, the EPA proposed a single date for state/tribal recommendations and final EPA designations.

[29]P.L. 105-178, Title VI.

In addition to the delay in establishing a monitoring network, the NAAQS standards were challenged in District Court by the American Trucking Associations, the U.S. Chamber of Commerce, and several other state and business groups. An initial May 1999 opinion by the District Court partially in favor of the plaintiffs, was reversed by the Supreme Court in February 2001.[30]

Whether the agency has exceeded its authority by extending deadlines for existing nonattainment areas, and whether the statutory requirements should be made more flexible has been an issue of recent debate.[31] In its "Clear Skies" bill (H.R. 999/ S. 485) and in its regulatory guidance, the Administration proposed additional flexibility for nonattainment beyond what exists currently in the CAA. Congress amended the CAA in the FY2004 omnibus appropriations (P.L.108-199) mandating the current $PM_{2.5}$ deadlines of February 15, 2004, for Governors to submit their $PM_{2.5}$ designation recommendations, and December 31, 2004, for EPA to promulgate designations for each state.

Issues

Although the two are parallel, $PM_{2.5}$ implementation is not expected to generate the level of controversy associated with the recent 8-hour ozone action. A number of general issues, such as cost and interpretation of boundaries, are expected to be similar, but the CAA requirements regarding $PM_{2.5}$ are deemed by the agency to be less complicated, relative to ozone requirements, and the $PM_{2.5}$ will be a new implementation rule rather than a transformation of an existing one, as in the case of 8-hour ozone. In addition, fewer areas are expected to be designated $PM_{2.5}$ nonattainment areas than were designated under the 8-hour ozone NAAQS.

Boundaries. Some states/tribes may disagree with EPA's final designations. The agency has generally used its discretion to expand the size of nonattainment areas, or to combine areas that a state listed as separate areas into a single larger unit. In implementing other NAAQS, for example, EPA has combined nonattainment counties across state lines into the same nonattainment area, if the counties are part of the same metropolitan area. Pursuant to the statutory requirements for working with states, EPA staff in the regions and the agency's Office of Air Quality Planning and Standards have been made available for assistance and consultation throughout the designation process according to the agency.

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[30]United States Court of Appeals for the District of Columbia Circuit, argued December 17, 1998; decided May 14, 1999 (No. 97-1440). *American Trucking Associations, Inc., et al., Petitioners v. United States Environmental Protection Agency*; *Whitman v. American Trucking Associations*, U.S. Supreme Court, No. 99-1257 and No. 99-1426, February 27, 2001 (121 S. Ct. 903). See CRS Report RS20860, *The Supreme Court Upholds EPA Standard Setting Under the Clean Air Act: Whitman v. American Trucking Ass'ns*.

[31]See CRS Report RS21611, *Ozone and Particulate Air Quality: Should the Deadline for Attainment Be Extended?* for detailed discussion of scheduling issues regarding NAAQS for $PM_{2.5}$ and 8-hour ozone.

Spatial Averaging. Some concern has been raised regarding the option available to states to use spatial averaging of monitoring data to determine attainment for the annual standard.[32] Spatial averaging allows calculation of the average arithmetic mean over three years using data from multiple monitoring sites within a monitoring planning area, versus data from a single monitor. There is concern that by allowing averaging of locations well below the $PM_{2.5}$ annual standard with locations substantially above, spatial averaging could potentially lead to a designation of attainment in the defined area while failing to provide adequate health protection. On the other hand, it has been suggested that spatial averaging is consistent with epidemiological studies used in the determination of the $PM_{2.5}$ standards and could reflect a better characterization of area-wide exposure in some circumstances. In addition, states have stressed the need for flexibility given the variability in the nature and sources of $PM_{2.5}$.

As a means of protecting against inappropriate use of spatial averaging, certain criteria must be met and conditions demonstrated.[33] Monitors must be specifically designated in monitoring plans prior to data collection and analysis, and sufficient opportunity for public comment must be provided in advance of final approval.[34]

Upwind Pollutant Contributions. One of the more frequently raised issues in nonattainment areas is whether any special consideration can be given to areas whose air quality is adversely affected by pollution from upwind areas. Unlike the larger coarse particles which generally settle more rapidly and fall near their source of emission, the smaller $PM_{2.5}$ particles frequently remain in the atmosphere longer and can travel significant distances from their original source. The transport of $PM_{2.5}$ can contribute to, and in some cases be the primary cause of nonattainment, in areas downwind of the emission source.

Recent EPA attempts to extend the deadlines for ozone attainment in an effort to provide additional time for areas affected by upwind pollution (seven areas regulated for ozone under Subpart 2), have been overturned by court decisions in three separate circuits.[35] Subpart 1 of the CAA which allows EPA to "classify the area for the purpose of applying an attainment date" and consider such factors as "the availability and feasibility of pollution control measures," may provide more flexibility. In another recent effort by the EPA, the proposed Interstate Air Quality (IAQ) rule[36] is intended to address interstate transport of pollutants that are hindering attainment of $PM_{2.5}$ and 8-hour ozone NAAQS in downwind states.

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[32]Spatial averaging applies only to the annual standard, and does not apply the 24-hour standard intended to protect against peak or seasonal levels. See Appendix N of 40 Code of Federal Regulations Part 50. Also, see discussion of spatial averaging in the final rule for particulate matter NAAQS 62 *Federal Register* 38671-38674.

[33]40 *Code of Federal Regulations* Part 58.

[34]See 40 *Code of Federal Regulations* Part 58.20(f) and 58.26(e) regarding public notification and public comment associated with spatial averaging.

[35]The cases involved St. Louis, Washington, D.C., and Beaumont-Port Arthur, Texas.

[36]69 *Federal Register* 4572.

Identifying Sources and Control Measures. Determining sources contributing to emission of fine particles in order to identify the appropriate actions for compliance with the $PM_{2.5}$ standards, as required for future designated geographic nonattainment areas including surrounding areas, is expected to be complicated. EPA has been conducting several technical studies in an effort to develop extensive guidance to assist states identify appropriate control measures in their SIPs for specific parameters and conditions.

Economic Impacts. Another concern of areas facing nonattainment designation, particularly of local businesses and governments, is that it will have potential negative impacts on an area's economic development. Nonattainment designation does require new major sources of pollution to offset their pollution by equivalent or greater emission reductions from existing sources, and requires highway and transit planners to demonstrate that new projects "conform" to the area's SIP.[37] Although EPA has not analyzed the potential economic impact of designating areas as nonattainment for particulate matter, a recent EPA analysis[38] found that ozone nonattainment designations had no net negative impact on those areas. Specifically, 6.5 million jobs were created in ozone nonattainment areas from 1990 to 1998, and "over 55 percent of ozone nonattainment areas had average annual employment growth rates greater than that of their region of the country." Personal income growth in these nonattainment areas essentially matched the national average between 1990 and 1998, according to the agency (38.5% vs. 38.9%).

Grant Programs. Although EPA does not have a grant program designed to assist nonattainment areas, the agency does provide grants to state air pollution agencies in support of their programs. Many nonattainment areas have benefitted in the past from a program administered by the Department of Transportation: the Congestion Mitigation and Air Quality Improvement program (CMAQ).[39] Although CMAQ's purpose is to reduce emissions from highway travel as a means of assisting states in complying with the NAAQS, providing grants for $PM_{2.5}$ attainment activities would require amending the program.

CMAQ funds are distributed based on a formula that takes into account population and severity of pollution. The structure of the current formula does not include any funding factors for $PM_{2.5}$ (or $PM_{10-2.5}$). States with new nonattainment areas designated under the $PM_{2.5}$ NAAQS would not receive CMAQ funds without revisions to the statutory formula.

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[37]For additional information on conformity, see CRS Report RL32106, *Transportation Conformity Under the Clean Air Act: In Need of Reform?*

[38] U.S. EPA, *Office of Air and Radiation, "The Historical Record: Nonattainment Status and Economic Growth*," February 26, 2002.

[39]The CMAQ program, funded by the Highway Trust Fund, was established by Congress under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA, P.L. 102-240). In enacting the Transportation Equity Act for the 21st Century (TEA-21, P.L. 105-178) Congress authorized another $8.1 billion for continuing it from FY1998 through FY2003.

Reauthorization legislation has been introduced in the House and Senate. The Administration's proposal, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA) was introduced by request as H.R. 2088 and S. 1072, and a third bill, the Transportation Equity Act: A Legacy for Users (TEA-LU) was introduced as H.R. 3550. Section 1611 of the bill passed by the Senate, S. 1072, would amend the statutory funding formula for determining how CMAQ funds are distributed among the states to include factors for new nonattainment areas that do not meet the NAAQS for $PM_{2.5}$.[40] H.R. 3550, passed by the House, would not do so. The Senate bill would also provide a substantial increase in CMAQ funding, to $13.4 billion over the six years FY2004-FY2009, a $5.3 billion (65%) increase above the previous authorization. The House bill would provide a smaller increase, to $9.4 billion (16%). Both bills would also expand the types of projects eligible for assistance, although in different ways. (For a more detailed discussion of CMAQ and relevant pending legislation see CRS Report RL32057, *Highway and Transit Program Reauthorization: Environmental Protection Issues and Legislation*).

Proposed Legislation and Regulations

Concerns regarding the potential impacts of the new ozone and particulate standards have led to several attempts to modify the implementation requirements.[41] Legislative attempts have generally been attached to larger pieces of legislation, and (with the exception of amendments clarifying the schedule for implementation) have not been enacted.

The Administration has proposed an additional modification of the requirements for areas not meeting the new ozone and fine particle standards in its Clear Skies bill (H.R. 999/S. 485). In Section 3, Clear Skies would allow EPA to avoid designating 8-hour ozone and $PM_{2.5}$ areas as nonattainment until 2016, provided that the area demonstrates that it will attain the standards by December 31, 2015. Areas fitting into this new "transitional" category could avoid additional regulatory controls, including the requirement to demonstrate conformity, if they could demonstrate that attainment would be achieved through the imposition of federal controls on utilities, diesel engines, automobiles, and other sources. The Senate Environment and Public Works Committee, Subcommittee on Clean Air, Climate Change and Nuclear Safety, held a series of hearings regarding S. 485 during the first session of the 108th Congress.

EPA proposed the Interstate Air Quality (IAQ) rule in December 2003 primarily to address the interstate transport of pollutants (SO_2 and NOx) that are hindering downwind states from attaining the 8-hour ozone and $PM_{2.5}$ NAAQS.[42] The proposed rule, covering 29 states in the eastern United States and the District of Columbia,

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[40]The structure of the current formula is based on classifications of nonattainment under the previous 1-hour ozone standard, and S. 1072 would amend the formula to include comparable classification for the designation of new 8-hour ozone nonattainment areas.

[41]See CRS Issue Brief IB10107, *Clean Air Act Issues in the 108th Congress*.

[42]Proposed Interstate Air Quality (IAQ) Rule, 69 *Federal Register* 4572.

uses a cap and trade approach to reduce the target pollutants by up to 70%. As discussed earlier, the proposal is predicted to have a greater impact on $PM_{2.5}$ attainment than on 8-hour ozone attainment.[43]

Conclusion

$PM_{2.5}$ standards are expected to affect numerous areas that have not previously been designated nonattainment for a NAAQS. This has raised concern in these areas regarding the potential impacts, and triggered numerous questions regarding the specifics of the implementation process.

EPA projects that federal measures, such as recent auto and truck emission standards and controls on power plants, will be sufficient to demonstrate attainment in a large portion of monitored nonattainment counties by 2015, prior to the development and implementation of local measures. At a recent Congressional hearing,[44] EPA Administrator Leavitt stated that "EPA projects that adopted and proposed regulatory measures, combined with existing federal and state programs, will bring well over half of the areas of the country into attainment with fine particles and ozone standards between now and 2015." Some members of Congress, and others, have questioned the agency's predictions regarding the relative magnitude of the emission reductions associated with existing and proposed air quality controls.

Actions following the release of the 8-hour ozone designations will likely affect certain decisions and the schedule regarding $PM_{2.5}$. EPA's $PM_{2.5}$ implementation plan (like many EPA rules) may be challenged in the courts. As discussed earlier, the agency's first attempt at an implementation plan was among the issues remanded by the Supreme Court in a 2001 decision that addressed a number of issues related to the setting of the $PM_{2.5}$ and the 8-hour ozone standard. It would not be surprising if interested parties returned to the courts in the months ahead as the agency attempts to implement new versions of its implementation plans. Thus, the final form of $PM_{2.5}$ implementation or its effects may not be known for some time.

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[43]See CRS Report RL32273 *Air Quality: EPA's Proposed Interstate Air Quality Rule*.

[44]U.S. Senate Committee on Environment and Public Works hearing on: *The Environmental Protection Agency FY2005 Budget*, March 10, 2004 (transcript to be published).