Order Code RL32431

CRS Report for Congress

Particulate Matter ($PM_{2.5}$): Implementation of the 1997 National Ambient Air Quality Standards (NAAQS)

Updated January 3, 2007

Robert Esworthy
Specialist in Environmental Policy
Resources, Science, and Industry Division

Congressional Research Service

Prepared for Members and Committees of Congress

Particulate Matter ($PM_{2.5}$): Implementation of the 1997 National Ambient Air Quality Standards (NAAQS)

Summary

Particulate matter (PM), including fine particulate matter ($PM_{2.5}$), is one of the six principal pollutants for which the U.S. Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA). NAAQS are designed to protect human health, with an adequate margin of safety. After years of litigation and other delays, the EPA is moving to implement the NAAQS for $PM_{2.5}$ promulgated in 1997. Several key implementation milestones are scheduled to be completed in 2007. This report provides information on the designation process for $PM_{2.5}$ "attainment" and "nonattainment" areas and describes the issues that have been raised as the EPA and states develop implementation strategies.

The EPA's final designation of 39 areas, consisting of 208 counties in 20 states and the District of Columbia, as nonattainment areas for the 1997 $PM_{2.5}$ NAAQS became effective April 2005. States with $PM_{2.5}$ nonattainment areas are required to develop comprehensive implementation plans, referred to as State Implementation Plans (SIPs), demonstrating how attainment will be reached by a designated deadline. SIPs include pollution control measures that rely on models of the impact on air quality of projected emission reductions to demonstrate attainment. States are required to submit SIPs for how they will meet the 1997 $PM_{2.5}$ NAAQS by April 2008 (three years after the effective date for the final geographic designations), and states must be in compliance by 2010, unless they are granted a five-year extension. The EPA published a proposed "$PM_{2.5}$ implementation" rule on November 1, 2005, but has yet to publish the final rule that would provide guidance and procedures for establishing controls to achieve and maintain attainment.

A number of issues will continue to be debated as the implementation of the 1997 $PM_{2.5}$ NAAQS progresses. Questions and concerns include the following: what criteria were used to determine nonattainment; whether special provisions can be made for meeting attainment deadlines, particularly for areas affected by upwind pollution; what grants or other funding might be available to help areas reach attainment; and how nonattainment designation might affect economic development and transportation planning in an area.

The EPA rulemakings promulgated and proposed during FY2006 that affect various aspects of regulating air quality could influence the $PM_{2.5}$ NAAQS implementation process. The EPA's completion of its periodic review of the particulates NAAQS, as required under the CAA, could also affect implementation of the 1997 $PM_{2.5}$ NAAQS. As part of this CAA review process, on October 17, 2006, the EPA promulgated the final revisions to NAAQS for particulates, both $PM_{2.5}$ and PM_{10}, that included a strengthening of the 1997 $PM_{2.5}$ standard. In late December 2006, several states and industry, agriculture, business, and public advocacy groups petitioned the court to review the new 2006 particulates NAAQS.

Contents

List of Figures

List of Tables

Particulate Matter ($PM_{2.5}$): Implementation of the1997 National Ambient Air Quality Standards (NAAQS)

Introduction

National Ambient Air Quality Standards (NAAQS) are a core component of the Clean Air Act (CAA).[1] NAAQS do not regulate emission sources of pollutants directly; rather, they define the level of pollution in ambient (outdoor) air above which health effects occur. The statute requires that, based on a review of the scientific literature, the Environmental Protection Agency (EPA) set (1) "primary" standards at a level "requisite to protect the public health" with an "adequate margin of safety" and (2) "secondary" standards at a level "requisite to protect the public welfare."[2] NAAQS have been promulgated for six principal pollutants classified by the EPA as "criteria pollutants": sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone, lead, and particulate matter.

This report provides an overview of the NAAQS implementation process in the context of the 1997 standards for fine particulate matter ($PM_{2.5}$), which consists of particles less than 2.5 micrometers in diameter. It also discusses issues and concerns of stakeholders that could potentially alter the $PM_{2.5}$ implementation process. The EPA is in the process of implementing the NAAQS for particulates promulgated in 1997,[3] delayed because of court challenges and other factors. The EPA's 1997 revisions to the particulate matter standards (also referred to as the particulates NAAQS) included separate requirements for $PM_{2.5}$ for the first time. Since they were modified, the particulates NAAQS have been the source of significant concern and national debate, which have delayed their implementation. Congress has been particularly interested in the EPA's promulgation and implementation of the CAA standards and has held numerous hearings on particulate matter (and the ozone NAAQS established in 1997).

A key component of implementing the 1997 $PM_{2.5}$ NAAQS is the EPA's designations of geographical areas for "attainment" or "nonattainment" of the air quality standards for $PM_{2.5}$. The EPA's final designation of all or part of 208

---

[1] 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). See CRS Report 97-722, *Air Quality Standards: The Decisionmaking Process*, by John E. Blodgett and Larry B. Parker.

[2] 42 U.S.C. 7409(b)(1) for "primary"; 42 U.S.C. 7409(b)(2) and 7602(h) for "secondary."

[3] 62 *Federal Register* 38652, July 18, 1997.

counties[4] in 20 states and the District of Columbia for nonattainment of the 1997 $PM_{2.5}$ NAAQS became effective on April 5, 2005.[5] The final designations were based, in part, on the EPA's consideration of recommendations previously provided by states and tribes, and supplemental 2004 air monitoring data submitted by some states. 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 a statutorily defined deadline. States are required to submit their "implementation" plans (referred to as SIPs) for how they will meet the 1997 $PM_{2.5}$ NAAQS by April 2008, and they must be in compliance by 2010, unless they are granted a five-year extension.[6]

The designation of "nonattainment" areas raised questions and concerns, particularly for those areas designated as such for the first time. These questions and concerns include when and why the standards were established, what criteria were used to determine nonattainment, what measures will be necessary to achieve or maintain attainment by the scheduled deadlines, whether special provisions can be made for areas affected by upwind pollution, what flexibility is available for extending the deadline for reaching attainment, whether grants or other funding are available to help areas reach attainment, and how designation might affect economic development and transportation investments in an area.[7] Concerns also have been raised regarding compliance deadlines with respect to the EPA's timely provision of implementation procedures and guidance for achieving and maintaining compliance with the 1997 $PM_{2.5}$ NAAQS. The EPA published a proposed "$PM_{2.5}$ implementation" rule on November 1, 2005,[8] but a final rule has not yet been published.

---

[4] All designated counties and partial counties, including Indian Country geographically located within such areas, except as otherwise indicated by the EPA. See EPA's $PM_{2.5}$ Designations website at [http://www.epa.gov/pmdesignations].

[5] 70 *Federal Register* 944-1019, Jan. 5, 2005. The EPA published a final supplemental rule on Apr. 14, 2005 (70 *Federal Register* 19844), amending the agency's initial final designations published in January, re-designating as attainment/unclassifiable 17 counties previously designated nonattainment. The earlier rule included a provision for the EPA to withdraw a nonattainment designation prior to the Apr. 5, 2005, effective date if a state provided 2004 air monitoring data by Feb. 22, 2005, suggesting that a change in designation would be appropriate. Monitoring data for 2004 was not available in time for the EPA to meet its statutory deadline for completing its designations.

[6] Under section 172(a)(2)(A) of the CAA, the EPA may grant an area an extension of the initial attainment date for 1 to 5 years (in no case later than 10 years after the designation date for the area). A state requesting an extension must submit an implementation plan (SIP) by the required deadline that includes, among other things, sufficient information demonstrating that attainment by the initial attainment date is "impracticable."

[7] The EPA's Apr. 15, 2004, designations for the new ozone air quality standard (promulgated the same time as the $PM_{2.5}$ NAAQS in 1997) raised similar concerns. See CRS Report RL32345, *Implementation of EPA's 8-Hour Ozone Standard*, by James E. McCarthy.

[8] 70 *Federal Register* 65984, Nov. 1, 2005.

The CAA provisions require the EPA to consider revisions to NAAQS on a prescribed schedule.[9] Based on its finding that a review of the scientific evidence continued to support associations between exposure to particulates in ambient air and numerous significant health problems, the EPA promulgated revisions to the NAAQS for particulate matter on October 17, 2006.[10] The new particulates NAAQS tighten the 1997 standard for $PM_{2.5}$ but do not include several proposed changes to modify the standards for inhalable coarse particles smaller than 10 microns but larger than 2.5 microns (PM_{10}). The tightening of the $PM_{2.5}$ standards is expected to increase the number of areas (typically defined by counties or portions of counties) in nonattainment. According to the EPA, states will not be required to meet the new 2006 $PM_{2.5}$ standard until April 2015 (April 2020, if qualified for an extension[11]). The EPA estimates that the effective date for the final designations will not be before April 2010 for the 2006 $PM_{2.5}$ NAAQS.[12]

It is unclear how the EPA's new 2006 particulates NAAQS will affect the ongoing implementation process for the 1997 $PM_{2.5}$ NAAQS. However, the EPA has urged states to consider control strategies that may be useful in attaining the new 2006 $PM_{2.5}$ NAAQS when developing control strategies for the 1997 $PM_{2.5}$ standards.[13] Several elements of the new 2006 particulates NAAQS have been controversial, including the decision not to exclude rural sources from the coarse particle standard that EPA had initially proposed, and the divergence from recommendations made by the EPA's independent Clean Air Scientific Advisory Committee (CASAC),[14] in particular, with regard the stringency of the $PM_{2.5}$ standard. In late December 2006, 13 states and the District of Columbia petitioned the court to review the new 2006 particulates NAAQS. In addition, several groups representing various industry and agriculture interests (including coal, iron, steel, and

---

[9] Section 109(d)(1)) of the CAA. According to the statute, the EPA is required to review the latest scientific studies and either reaffirm or modify the NAAQS every five years, but reviews have occurred less frequently in practice.

[10] 71 *Federal Register* 61143-61233, Oct. 17, 2006, available at [http://epa.gov/pm/actions.html]. The schedule for completion of the agency's review of the particulates NAAQS is governed by a consent decree resolving a lawsuit filed in March 2003. The EPA was required to finalize its decision regarding the particulates NAAQS by Sept. 27, 2006 (*American Lung Assn. v. Whitman* [No. 1:03CV00778, D.D.C. 2003], as modified by the court).

[11] Under section 172(a)(2)(A) of the CAA, the EPA may grant an area an extension of the initial attainment date for 1 to 5 years (in no case later than 10 years after the designation date for the area). A state requesting an extension must submit an implementation plan (SIP) by the required deadline that includes, among other things, sufficient information demonstrating that attainment by the initial attainment date is "impracticable."

[12] See CRS Report RL33254, *Air Quality: EPA's 2006 Changes to the Particulate Matter (PM) Standard*, by Robert Esworthy and James E. McCarthy.

[13] The EPA's Advanced Notice of Proposed Rulemaking outlining an implementation plan for the transition to the Jan. 17, 2006, proposed particulates NAAQS (71 *Federal Register* 6722, Feb. 9, 2006).

[14] See the Clean Air Scientific Advisory Committee (CASAC) Particulate Matter Review Panel website at [http://www.epa.gov/sab/panels/casacpmpanel.html].

corn refiners; oilseed processors; farmers; and cattle and pork producers, as well as a number of public advocacy groups) also filed petitions to the court challenging the new 2006 NAAQS.

These and other issues and potentially affecting the implementation of the 1997 $PM_{2.5}$ NAAQS are presented in the following sections of this report, beginning with an overview of the particulates air quality standards and the geographical designation process.

The 1997 $PM_{2.5}$ Standards

Beginning in 1971, regulation and monitoring of particulate matter under the CAA focused primarily on total suspended particles (TSP) and, eventually, on coarse particles equal to or less than 10 micrometers in diameter (PM_{10}).[15] After extensive analysis and review, the EPA revised the particulates standards in 1997 to provide separate requirements for fine particulate matter ($PM_{2.5}$) based on their links to several types of cardiovascular and respiratory health problems, including aggravated asthma and bronchitis, and to premature death.[16] In the 1997 promulgation, the EPA also revised the coarse particles designation (PM_{10}) to include particles larger than 2.5 but smaller than 10 micrometers ($PM_{10-2.5}$), so as to explicitly exclude fine particles. As part of the 1997 rule, the EPA also promulgated the eight-hour ozone standard. The EPA's standard for PM_{10}, as modified by the 1997 changes, was challenged shortly after promulgation. Concluding that PM_{10} was a "poorly matched indicator" for thoracic coarse particles because it included the smaller $PM_{2.5}$ category as well as the larger particles, the U.S. Court of Appeals for the D.C. Circuit vacated the 1997 PM_{10} standards and remanded them to EPA. The 1999 U.S. Court of Appeals for the D.C. Circuit decision[17] directed the EPA to ensure that the standard did not duplicate the regulation of fine particles. The pre-existing 1987 PM_{10} standards remained in place.[18]

The primary (health) $PM_{2.5}$ NAAQS requirements, which became effective on September 16, 1997,[19] are the same and as the secondary (welfare) requirements. The 1997 $PM_{2.5}$ standards are set at

- an annual maximum concentration of 15 micrograms per cubic meter ($\mu g/m^3$), based on the three-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from one or more community-oriented monitors,[20] and

---

[15] 52 *Federal Register* 24640, July 1, 1987.

[16] For an update of EPA's health effects and other particulates-related research activities, see [http://www.epa.gov/pmresearch/].

[17] *American Trucking Assns. v. EPA*, 175 F.3d 1027, 1054-55 (D.C. Cir. 1999).

[18] 65 *Federal Register* 80776, Dec. 22, 2000.

[19] 62 *Federal Register* 38652-38896, July 18, 1997.

[20] Community-oriented monitoring zones are defined as "an optional averaging area with (continued...)

- 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[21] within the area.

In requiring both the annual and the 24-hour $PM_{2.5}$ standards in 1997, the 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."[22] The 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.

In 1997, the EPA changed the "form" of the 24-hour standards to a concentration-based percentile form, indicating the percentage of the time that a monitoring station can exceed the standard. For example, a 98th percentile 24-hour standard indicates that a monitoring station can exceed the standard 2% of the time during the year. The previous form was known as the "one-expected-exceedance" form; monitoring stations could exceed the 24-hour particulates NAAQS only once per year (averaged over three years). Although the limits of PM_{10} remained the same, the form of the PM_{10} 24-hour standard was changed to be based on a three-year average of the 99th percentile of 24-hour PM_{10} concentrations.

Geographical Area Designation Process

The designation of geographical areas failing to comply with the NAAQS, based on monitoring and analysis of relevant air quality data, is a critical step in NAAQS implementation. The CAA establishes a process for designating nonattainment areas and setting their boundaries, but it allows the EPA Administrator some discretion in determining what the final boundaries of the areas will be. Areas are identified as "nonattainment" when they violate or contribute to the violation of NAAQS. Areas are identified as "attainment/unclassified"[23] when they meet the standard or when the data are insufficient for determining compliance with the NAAQS.

According to the EPA's 2003 *Trends Report*, 124 areas were designated as nonattainment for at least one of the six criteria pollutants (including particulate matter) and approximately 126 million people lived in these areas as of September

---

[20] (...continued)
well established boundaries such as county or census block" (40 *CFR* Part 58 Subpart A).

[21] 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 *CFR* Part 58 Subpart A).

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

[23] Section 107(d)(1)(A)(iii) of the CAA provides that any area that the EPA cannot designate on the basis of available information as meeting or not meeting the standards should be designated unclassifiable.

2002.[24] The number of nonattainment areas and the associated population have increased since the 2003 *Trends Report*; the April 15, 2004, eight-hour ozone designated nonattainment areas alone include 159 million people.[25]

The designation process is intended as a cooperative federal-state-tribal process in which states and tribes provide initial designation recommendations to the EPA for consideration. Though not required to do so, tribes have been encouraged to submit recommendations. The area designation requirements under the CAA (Section 107) are specific with respect to states, but not to tribes. The EPA follows 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 CFR Part 49).[26] In Section 107(d)(1)(A) (42 U.S.C. 7407), the statute states that the governor of each state shall submit a list to the 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 were made primarily on the basis of three-year federally referenced $PM_{2.5}$ monitoring data.[27] At the time the $PM_{2.5}$ NAAQS were being finalized in 1997, the EPA began developing methods for monitoring fine particles. Using funding specifically authorized for this purpose in FY1998-FY2000 EPA appropriations,[28] the agency worked closely with states and tribes to initiate the deployment of a portion of the network of 1,200 monitors in January 1999. The majority of the monitors were not in place until January 2000. States and tribes were expected to rely on data collected during 2000-2002 for their recommendations. The EPA considered the 2001-2003 data to make the final $PM_{2.5}$ designations published in January 2005.

In its guidance document,[29] the EPA identified several factors that would be considered in determining attainment with the 1997 $PM_{2.5}$ NAAQS and specified data and conditions that would not be acceptable. The EPA's nonbinding guidance also

---

[24] 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].

[25] 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. Current information on the location of NAAQS nonattainment areas is available on EPA's website at [http://www.epa.gov/oar/oaqps/greenbk/].

[26] For information regarding tribes that have participated in the $PM_{2.5}$ designation recommendation process, see [http://www.epa.gov/pmdesignations].

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

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

[29] Information regarding EPA's guidance for $PM_{2.5}$ designation is available on EPA's $PM_{2.5}$ 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].

included a recommendation that states and tribes consider using the same boundaries for nonattainment for both the $PM_{2.5}$ and eight-hour ozone standards, to facilitate consistency in future implementation plans. The EPA expected that many of the $PM_{2.5}$ nonattainment areas would overlap with the eight-hour ozone designations.[30]

$PM_{2.5}$ designations do not include nonattainment classifications based on severity, as is the case with PM_{10} and ozone, which have two and seven classifications, respectively. The 1990 CAA Amendments include classifications of nonattainment, based on the extent to which the NAAQS are exceeded, and establish specific pollution controls and attainment dates for each classification (Title I Part D Sections 171-193). 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.[31] The EPA interpreted those classification provisions in the act for particulate matter to apply explicitly to PM_{10}, but not $PM_{2.5}$, NAAQS. Based on this interpretation, $PM_{2.5}$ implementation is governed by the general nonattainment planning requirements of Title I (Part A and Part D, subpart 1) of the act.

The EPA recognized that determining the geographic extent of nearby source areas that contribute to nonattainment would be complicated. The CAA does not specifically require combining 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 eight-hour ozone approach, the EPA recommended that Metropolitan Statistical Areas or Consolidated Metropolitan Statistical Areas[32] serve as the "presumptive boundary" for nonattainment areas under the 1997 $PM_{2.5}$ standards.

Metropolitan areas are generally treated as units, even when part of the area lies in a separate state or 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 1997 $PM_{2.5}$ standards, the EPA's guidance presumed that the full county would be designated a nonattainment area.

Following state and tribal designation submissions, the EPA Administrator has discretion to make modifications, including to the area boundaries. As required by statute (Section 107[d]1[B][ii]), the agency must notify the states and tribes regarding

---

[30] A map showing the final designation areas for $PM_{2.5}$ and for the eight-hour ozone NAAQS is available on EPA's website at [http://www.epa.gov/oar/oaqps/greenbk/mappm25o3.html].

[31] 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 the defined major source of PM_{10} from 100 tons per year to 70 tons per year. The deadline for attainment for moderate areas is six years after designation; for serious areas, the deadline is 10 years after designation. (Section 188 of Part D subpart 4 of Title I in the CAA; 42 U.S.C. Sec. 7513.)

[32] Defined by the Office of Management Budget. For more information on metropolitan areas, see [http://www.census.gov/population/www/estimates/aboutmetro.html].

any modifications, allowing them sufficient opportunity to demonstrate why a proposed modification is inappropriate, but the final determination rests with EPA.

1997 $PM_{2.5}$ NAAQS Geographical Area Designations: A Chronology

By the end of February 2004, 18 states and the District of Columbia had recommended 142 counties as potential nonattainment areas for the 1997 $PM_{2.5}$ NAAQS.[33] After reviewing the recommendations, the EPA recommended modifications resulting in nonattainment designations for 244 counties[34] in 21 states and the District of Columbia at the end of June 2004. As required by statute, the EPA notified each of the affected states regarding their specific modifications, providing them with the opportunity to submit new information and demonstrate why a proposed modification was inappropriate. Some states responding to the EPA's proposal continued to support their original recommendations.

The EPA's final $PM_{2.5}$ designation rule, published on January 5, 2005 (70 *Federal Register* 944-1019), established the boundaries for areas designated as "nonattainment," "unclassifiable" (data not sufficient to make a determination regarding compliance), or "attainment/unclassifiable."[35] The EPA designated 47 areas, composed of 225 counties in 20 states and the District of Columbia, as nonattainment; 5 areas consisting of 7 counties as unclassifiable;[36] and the remaining counties in the United States as attainment/unclassifiable.

The EPA's designations reflected minor modifications to its June 2004 proposal. Primarily, 19 counties were removed from the list of nonattainment areas, and other counties were redefined by designating only specified locations ("partial") within the county as nonattainment. In some cases, when considering factors defined in its guidance in conjunction with the additional information provided by the states and tribes, the EPA determined that only those portions of a county that contained the significant sources of emissions should be considered as contributing to the violations. In other cases, the agency determined that if emissions from a large identifiable source in a county contribute to the violations in a nearby area, the

---

[33] For the EPA's final and proposed $PM_{2.5}$ geographical designation recommendations and those from individual states and tribes, see [http://www.epa.gov/pmdesignations].

[34] Included seven cities: Baltimore, MD; St. Louis, MO; Alexandria, VA; Fairfax, VA; Falls Church, VA; Manassas, VA; and Manassas Park, VA.

[35] The EPA designates an area as attainment/unclassifiable if (1) monitored air quality data show that the area has not violated the standard during a three-year period or(2) there is not enough information to determine the air quality in the area. Despite the CAA, Section 107(d)(1)(A) definitions for "nonattainment," "attainment," and "unclassifiable," the EPA does not apply the "attainment" nomenclature. It is generally the case that the agency has sufficient data to determine that an area is *not* in nonattainment, but the data are insufficient or incomplete to fully determine attainment.

[36] The EPA concluded that there was insufficient information to designate these areas as either nonattainment or attainment/unclassifiable. According to the January 2005 Federal Register Notice (70 *Federal Registe*r 65984), these areas had violating monitors for years 2000-2002 but incomplete data or other data issues for years 2001-2003.

portion of the county where the source is located would be designated nonattainment, even if it is not contiguous with the remainder of the designated area. The boundaries for these "noncontiguous" portions are based on legally recognized government boundaries, such as townships, tax districts, and census blocks.

Some states and stakeholders continued to contend that several counties should not be designated nonattainment, particularly when taking into account 2004 $PM_{2.5}$ monitoring data. The EPA's final designations were based on monitoring data for the three-year period from 2001-2003. Monitoring data for 2004 were not available in time for the EPA to meet its statutory deadline for $PM_{2.5}$ geographical area designations (see timeline and discussion later in this report). The final $PM_{2.5}$ designation rule, published on January 5, 2005, included provisions allowing states to submit no later than February 22, 2005, certified, quality-assured 2004 monitoring data that suggest a change in designation is appropriate for consideration (70 *Federal Register* 948). A nonattainment designation could be withdrawn if the EPA agreed that the additional data warranted such a change.

On April 14, 2005, the EPA published a final supplemental rule amending the agency's initial final designations published in January 2005 (70 *Federal Register* 19844). After reviewing 2002-2004 air quality monitoring data provided by several states, the EPA determined that 8 areas comprising 17 counties previously identified as not meeting the 1997 $PM_{2.5}$ NAAQS should be designated as "in attainment" (see **Table 1** below). The EPA also changed four of the five areas designated as "unclassifiable" to "attainment," based on 2002-2004 data. The EPA did not consider the modifications for these areas "re-designations" because the changes were made prior to the April 5, 2005, effective date of the initial designations.

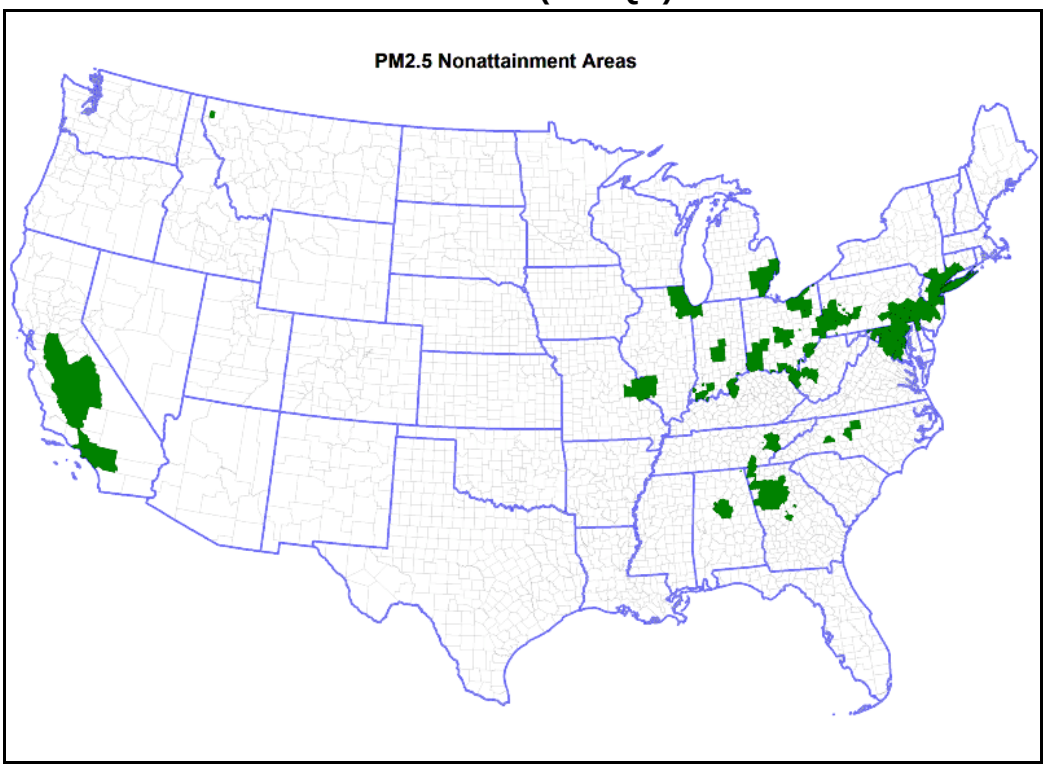
Table 1. Areas Previously Identified as Nonattainment for 1997 $PM_{2.5}$ NAAQS Designated as Attaining the Standards

State	Area Name	County
Alabama	Columbus, GA-AL	Russell
California	San Diego, CA	San Diego
Georgia	Athens, GA Columbus, GA-AL	Clarke Muscogee
Indiana	Elkhart, IN	Elkhart St. Joseph
Kentucky	Lexington, KY	Fayette Mercer (partial)
Ohio	Toledo, OH Youngstown-Warren, OH-PA	Lucas Wood Columbiana Mahoning Trumbull
Pennsylvania	Youngstown-Warren, OH-PA	Mercer
West Virginia	Marion, WV	Marion Monongalia (partial) Harrison (partial)

Source: U.S. Environmental Protection Agency, April 5, 2005, at [http://www.epa.gov/pmdesignations/documents/Apr05/changes.htm].

As a result of the changes, nonattainment designations are in effect for the remaining 39 areas, comprising 208 counties within 20 states (and the District of Columbia) nationwide, with a combined population of roughly 90 million. The designated nonattainment areas are primarily concentrated in the central, mid-Atlantic, and southeastern states east of the Mississippi River, as well as in California.[37] The EPA map in **Figure 1** highlights the $PM_{2.5}$ nonattainment designation areas. More than 2,900 counties in 30 states have been designated attainment/unclassifiable for the 1997 $PM_{2.5}$ NAAQS. Some public interest groups maintain that at least 150 additional counties warranted nonattainment designations on the basis of emission sources in those areas.[38] Any area initially designated attainment/unclassifiable may be subsequently re-designated to nonattainment if ambient air quality data in future years indicate that such a re-designation is appropriate.

Figure 1. U.S. Environmental Protection Agency Designations of Nonattainment Areas for the 1997 $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS)



Source: U.S. Environmental Protection Agency, April 5, 2005, at [http://www.epa.gov/pmdesignations/nonattaingreen.htm]. Based primarily on 2001-2003 monitoring data and 2002-2004 data for a subset of states.

---

[37] California has established its own $PM_{2.5}$ standards; for more information, see CRS Report RL31531, *Particulate Matter Air Quality Standards: Background and Current Developments*, by Robert Esworthy, or access the California Air Resources Board website at [http://www.arb.ca.gov/pm/pmmeasures/pmmeasures.htm].

[38] *American Lung Association*, Dec. 17, 2004, press release, "No One Should Have to Breathe Unsafe Air," available at [http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=34841].

In letters dated January 20, 2006, the EPA denied six petitions submitted to the agency requesting reconsideration of the previous designations of one or more full or partial counties as nonattainment for the 1997 $PM_{2.5}$ NAAQS. The petitions were for counties in Georgia, Illinois, Michigan, Missouri, Ohio, and West Virginia.[39]

Demonstrating Attainment with the 1997 $PM_{2.5}$ NAAQS

The State Implementation Plan. Following the 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, states must submit their SIPs to the EPA within three years of designation; $PM_{2.5}$ SIPs are due April 5, 2008. To be approved, a SIP must demonstrate that the area will reach attainment of the standards by a specified deadline — 2010 for $PM_{2.5}$ unless a five-year extension allowed under the CAA is granted. 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's $PM_{2.5}$ Implementation Rule. On November 1, 2005, the EPA published a proposed rule (70 *Federal Register* 65984) that described the requirements that states and tribes must meet in their implementation plans to achieve and maintain attainment of the 1997 $PM_{2.5}$ NAAQS.[40] The proposal included guidance for submitting a SIP demonstrating that reaching attainment within the five-year requirement is impractical. The rulemaking proposed allowing eastern states that fulfill their emission reductions under the CAIR federal cap-and-trade program entirely by reducing emissions from electrical generating units to satisfy SO_2 and NOx reasonably available control technology or RACT requirements under NAAQS for those sources in the states' $PM_{2.5}$ nonattainment areas. This proposal has raised concerns among some environmental and public interest groups, as well as the national associations of air pollution control agencies — the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO).[41] As of the writing of this report, the EPA has yet to finalize this implementation rule.

Transportation Conformity. 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 will trigger "conformity" determinations. Transportation conformity is required by the CAA, Section 176(c) (42 U.S.C. 7506(c)), to prohibit federal funding and approval for highway and transit

---

[39] See [http://www.epa.gov/pmdesignations/regs.htm#7] for additional information.

[40] The rule addresses attainment demonstration and modeling; local emission reduction measures, including reasonably available control technology (RACT), reasonably available control measures (RACM), and reasonable further progress (RFP); regional emission reduction strategies; innovative program guidance; emission inventory requirements; transportation conformity; and stationary source test methods.

[41] Testimony of John Paul on behalf of the STAPPA/ALAPCO on the EPA's Proposed Rule to Implement the Fine Particle National Ambient Air Quality Standard, Nov. 30, 2005, at [http://www.4cleanair.org/FinaltestimonyimplementationruleNSR11302005.pdf].

projects unless they 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. The initial conformity rule was promulgated by the EPA on November 24, 1993,[42] and has subsequently been amended several times. The most comprehensive amendments, clarifying and streamlining the 1993 rule, were published on August 15, 1997.[43]

Transportation conformity, under the EPA's previous rules, applied to ozone, PM_{10}, CO, and NOx but did not include $PM_{2.5}$. On July 1, 2004, the EPA published a final rule[44] making transportation conformity regulations applicable explicitly to $PM_{2.5}$ nonattainment areas and including criteria and procedures for the new $PM_{2.5}$ and eight-hour ozone NAAQS. Conformity determinations must be submitted to the EPA within one year of the effective date of designating an area as nonattainment. Since the conformity requirements could apply in $PM_{2.5}$ nonattainment areas prior to the availability of SIP emission budgets, the EPA included provisions in the final rule for interim emissions tests for conformity determinations. However, the final rule was challenged by several petitioners, and on October 20, 2006, the interim test provisions were overturned by the U.S. Court of Appeals for the District of Columbia Circuit.[45] The Court found that "... petitioners correctly argue, the challenged interim rule, which purports to create a new standard to which transportation plans must conform, violates the Act's requirement that transportation plans conform to an approved SIP, 42 U.S.C. § 7506(c)."[46] The court determined that there was no allowance under the Clean Air Act for interim tests and, as previously determined by the Court, that an EPA regulation may not allow a conformity provision to supersede an approved SIP.

Given the complexities associated with the final conformity rule, the EPA provided guidance to accompany the rule. The guidance, entitled *Companion Guidance for the July 1, 2004, Final Transportation Conformity Rule: Conformity Implementation in Multi-Jurisdictional Nonattainment and Maintenance Areas for Existing and New Air Quality Standards*,[47] expanded on the final conformity rule by including additional detailed examples and interpretations for generic scenarios that are present in the field and are expected to occur under the 1997 standards. The EPA

---

[42] 58 *Federal Register* 62188.

[43] 62 *Federal Register* 43780.

[44] 69 *Federal Register* 40004.

[45] *Environmental Defense v. EPA*, No. 04-1291 (D.C. Cir. Oct. 20, 2006), at [http://pacer.cadc.uscourts.gov/docs/common/opinions/200610/04-1291a.pdf].

[46] Ibid.

[47] EPA, July 2004, EPA420-B-04-012, Transportation and Regional Programs Division, Office of Transportation and Air Quality, available at [http://www.epa.gov/otaq/stateresources/transconf/policy.htm].

has provided other fact sheets and summary tables, and has conducted training sessions for implementers to further assist understanding of the rule.[48]

On May 6, 2005, EPA published a final rule[49] further amending the transportation conformity regulations by adding transportation-related $PM_{2.5}$ "precursors" and specifying when these precursors must be considered in conformity determinations before and after $PM_{2.5}$ SIPs are submitted.[50] Precursors are pollutants that react chemically in the atmosphere to form other pollutants. The transportation-related $PM_{2.5}$ precursors identified in the May 2005 rule are nitrogen oxides (NOx), volatile organic compounds (VOCs), sulfur oxides (SO_2), and ammonia (NH_3).

The EPA established the criteria for determining which transportation projects must be analyzed for local particle emissions (referred to as "hot spots") in $PM_{2.5}$ nonattainment and maintenance areas, and revised existing requirements for projects in PM_{10} areas, in a final rule published on March 10, 2006.[51] The CAA defines "hot-spot analysis" as an estimation of likely future localized pollutant concentrations resulting from a new transportation project and a comparison of those concentrations to the relevant air quality standard.[52] The March 2006 final rule requires quantitative $PM_{2.5}$ hot-spot analyses only for projects of air quality concern. These projects are further defined in the final rule as highway and transit projects that involve significant levels of diesel vehicle traffic, or any other project that is identified in the $PM_{2.5}$ SIP as a localized concern.

Other National Air Quality Improvement Programs and Strategies. According to a December 2004 EPA report entitled *The Particle Pollution Report: Current Understanding of Air Quality and Emissions through 2003*, monitored concentrations of $PM_{2.5}$ have decreased 10% and PM_{10} concentrations have decreased 7% since 1999, primarily in areas with the highest concentrations.[53] The EPA attributes a large portion of these decreases to the Acid Rain Program.

The EPA has concluded that in many cases, $PM_{2.5}$ attainment will be reached by implementing national strategies developed under the 1999 visibility protection regulations (Regional Haze Rule);[54] voluntary diesel engine retrofit programs; new federal standards, scheduled to be implemented between 2004 and 2010, on cars, light trucks, and heavy-duty diesel engines; and the 1998 regional strategy to reduce

---

[48] For EPA fact sheets, Q&As, and training material regarding conformity, see [http://www.epa.gov/otaq/stateresources/transconf/index.htm].

[49] 70 *Federal Register* 24280.

[50] See EPA's website at [http://www.epa.gov/otaq/stateresources/index.htm].

[51] 71 *Federal Register* 12468, Mar. 10, 2006.

[52] 40 CFR 93.101.

[53] U.S. Environmental Protection Agency, EPA 454-R-04-002, December 2004. Revised report posted on EPA's website at [http://www.epa.gov/airtrends/pm.html].

[54] 64 *Federal Register* 35714-35774, July 1, 1999. See CRS Report RL32483 *Visibility, Regional Haze, and the Clean Air Act: Status of Implementation*, by Larry Parker.

nitrogen oxides from eastern states, referred to as the "NOx SIP Call."[55] The EPA predicts that the NOx SIP Call, primarily designed to meet the ozone NAAQS, will also provide benefits in terms of reduced levels of nitrate fine particles.[56]

In May 2005, the EPA published a final rule, the Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone, or Clean Air Interstate Rule (CAIR), to address the interstate transport of pollutants (SO_2 and NOx) that are hindering downwind states from attaining the eight-hour ozone and 1997 $PM_{2.5}$ NAAQS.[57] The final rule covers 28 states in the eastern United States and the District of Columbia; it uses a cap-and-trade approach to reduce target pollutants by up to 70%.

Based on air quality analyses in support of the CAIR, the EPA predicted that 17 of 36 areas in the eastern United States designated as nonattainment (out of compliance) with the 1997 $PM_{2.5}$ NAAQS would reach attainment (come into compliance) by 2010 as a result of implementing CAIR in conjunction with other existing national programs.[58] On the other hand, the EPA analyses recognized that as many as 19 of the areas would remain in nonattainment, highlighting the importance of local and state emission reduction efforts. The extent of pollution reduction projected as a result of this rule has been the subject of considerable debate among stakeholders and some Members of Congress.[59]

Continuing Issues

Defining Nonattainment Boundaries. The EPA 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. As it did in implementing other NAAQS, the EPA also has combined nonattainment counties across state lines into the same nonattainment area, if the counties are part of the same metropolitan area. Although, according to EPA, staff in the regions and the agency's Office of Air Quality Planning and Standards were available for assistance and consultation throughout the designation process pursuant to the statutory requirements for working with states, some states continue to disagree with the EPA's final designations relative to the states' own recommendations.

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

---

[55] 63 *Federal Register* 57356, Oct. 27, 1998, and 69 *Federal Register* 21604, Apr. 21, 2004.

[56] For background on the NOx SIP Call, see CRS Report 98-236, A*ir Quality: EPA's Ozone Transport Rule, OTAG, and Section 126 Petitions — A Hazy Situation?* by Larry Parker and John Blodgett (available from the authors).

[57] 70 *Federal Register* 25162, May 12, 2005.

[58] See page 66006 of 70 *Federal Register* 65984, Nov. 1, 2005, *Proposed Rule To Implement the Fine Particle National Ambient Air Quality Standards*.

[59] For more information on the CAIR, see CRS Report RL32927, *Clean Air Interstate Rule: Review and Analysis*, by Larry B. Parker, and CRS Report RL32273, *Air Quality: EPA's Proposed Interstate Air Quality Rule*, by Larry B. Parker and John E. Blodgett.

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.

Subpart 1 of the CAA allows the EPA to "classify the area for the purpose of applying an attainment date" and to consider such factors as "the availability and feasibility of pollution control measures," and may provide the agency flexibility. As referenced in the proposed $PM_{2.5}$ implementation rule, areas also may petition the agency under Section 126 of the CAA to impose controls on upwind sources that significantly contribute to their nonattainment of the standard.[60] The agency has imposed additional controls on sources of nitrogen oxides (which contribute to particulate and ozone formation downwind) through its "NOx SIP Call" and the "Regional Haze Rule."[61] In addition, the CAIR, promulgated in May 2005, is intended to address interstate transport of pollutants that hinder attainment of $PM_{2.5}$ and eight-hour ozone NAAQS in downwind states.

Economic Impacts. Another concern, particularly of local businesses and governments in areas with nonattainment designations, is the potential negative impacts on an area's economic development. Nonattainment designation does require new major sources of pollution to offset 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. Although the EPA has not analyzed the potential economic impact of designating areas as nonattainment for particulate matter, a 2002 EPA analysis[62] 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 (38.5% versus 38.9%), according to the EPA.

In contrast to the EPA findings, a study conducted by NERA Economic Consulting for the American Petroleum Institute (API), found that meeting the 2010 ozone attainment deadline will lead to a $3 billion reduction in economic output in

---

[60] A number of such petitions regarding NAAQS other than $PM_{2.5}$ have been filed with the agency. The most well-known are those that were filed in August 1997 by eight northeastern states, four of which were granted by the agency in January 2000. See CRS Report 98-236, *Air Quality: EPA's Ozone Transport Rule, OTAG, and Section 126 Petitions — A Hazy Situation?* by Larry Parker and John Blodgett (available from the authors).

[61] The Regional Haze Rule establishes Best Available Retrofit Technology (BART) at stationary sources in 26 industrial categories; available at [http://www.epa.gov/visibility/actions.html].

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

the Philadelphia region in 2011.[63] According to the summary of the report, "[t]he economic impacts would include the cost of local controls of $3.9 billion per year, the loss of thousands of regional jobs, a reduction of billions of dollars in gross regional product, and a significant loss of disposable personal income in the area." The summary indicates that delaying the eight-hour ozone NAAQS attainment deadline to 2015 would lower the cost to the local economy to $100 million per year and lead to 1,000 fewer jobs. The extent to which the analysis supporting these findings has been subjected to the rigorous peer review process typical for publication in a scientific journal has been a concern to some.[64]

Grant Programs. Although the EPA does not have a grant program specifically designed to assist nonattainment areas, the agency generally provides several grants to state air pollution agencies in support of their programs. Other sources of funding are also available. For example, states may obtain funding for projects intended to contribute to attainment or maintenance of NAAQS under the Department of Transportation's (DOT's) Congestion Mitigation and Air Quality Improvement program (CMAQ). Congress authorized $8.6 billion for the program for FY2005-FY2009 under the Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, P.L. 109-59), signed into law on August 10, 2005.

Authorized initially by Congress under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA, P.L. 102-240) and funded by the Highway Trust Fund, CMAQ provides funding for surface transportation and other related projects that contribute to air quality improvements and congestion mitigation. In particular, the program is authorized to fund projects that contribute to the reduction of carbon monoxide (CO) and ozone concentrations. CMAQ funds are apportioned to a state based on its population and pollution reduction needs. The population of each nonattainment or maintenance area for ozone and/or CO in a state is multiplied by a weighting factor based on the level of nonattainment (e.g., moderate, serious, severe). States with no maintenance or nonattainment areas for ozone or CO are guaranteed a minimum of 0.5% of each fiscal year's authorized CMAQ funds.

CMAQ was expanded to allow the use of funds for projects intended to reduce particulates concentrations under the Transportation Equity Act for the 21st Century (TEA-21, P.L. 105-178). TEA-21 did not, however, change the apportionment formula that is based on CO and ozone. States with maintenance or nonattainment areas for *only* particulates receive the guaranteed minimum.[65]

---

[63] *Economic Impact of 8-Hour Ozone Attainment Deadlines on Philadelphia Region*, September 2005 (released November 7, 2005); conducted by NERA Economic Consulting for the American Petroleum Institute.

[64] Testimony of James Werner, Director, Division of Air and Waste Management, Delaware Department of Natural Resources and Environmental Control, before the U.S. Senate Committee on Environment and Public Works, Subcommittee on Clean Air, Climate Change, and Nuclear Safety, *Implementation of the Existing Particulate Matter and Ozone Air Quality Standards*, Nov. 10, 2005.

[65] For a more detailed discussion of CMAQ and relevant legislation, see CRS Report
(continued...)

Identifying Sources and Control Measures. Determining sources contributing to emission of fine particles to identify the appropriate actions for compliance with the $PM_{2.5}$ standards is expected to be complicated. The EPA has been conducting several technical studies in an effort to develop extensive guidance to help states identify appropriate control measures in their SIPs for specific parameters and conditions. The proposed $PM_{2.5}$ implementation rule provides information related to this concern as well.

Timely Completion of a $PM_{2.5}$ Implementation Rule. Many stakeholders and some Members of Congress have been concerned with the timing of the EPA's completion of the implementation requirements and associated guidance for achieving and maintaining compliance with the 1997 $PM_{2.5}$ NAAQS. The EPA's proposed "$PM_{2.5}$ Implementation Rule" was published on November 1, 2005,[66] and the agency has yet to release a final rule. States are required to submit their SIPs by April 2008. The EPA contends that many states generally have a sense of what needs to be done based on the proposal, information in the final transportation $PM_{2.5}$ conformity rule published in December 2004, and past experience with the development of SIPs for other NAAQS. Although recognizing there are certain nuances associated with the $PM_{2.5}$ NAAQS and that some areas that are in nonattainment of a NAAQS for the first time may require additional assistance, the EPA believes the targeted promulgation date should allow sufficient time for states to complete their SIPs. Some states and stakeholders have been less optimistic.

Completion of the EPA's Most Recent Review of the Particulates NAAQS and the September 2006 Changes.[67] At the end of 2005, the EPA completed its statutorily required[68] review and assessment of relevant scientific studies to either reaffirm or modify the particulates NAAQS. Based on the review, on October 17, 2006, the EPA promulgated revisions to the particulates NAAQS.[69] Given the simultaneity of these new 2006 particulates NAAQS and the ongoing implementation of the 1997 $PM_{2.5}$ standards, outcomes and challenges associated with the review and the EPA's changes to the existing (1987 and 1997) NAAQS for PM_{10} and $PM_{2.5}$ could affect the current implementation schedule.

---

[65] (...continued)
RL33057, *Surface Transportation Reauthorization: Environmental Issues and Legislative Provisions in SAFETEA-LU (H.R. 3)*, by Linda Luther.

[66] 70 *Federal Register* 65984, Nov. 1, 2005.

[67] For more information regarding of EPA's changes to the particulates NAAQS, see CRS Report RL33254, *Air Quality: EPA's 2006 Changes to the Particulate Matter (PM) Standard*, by Robert Esworthy and James E. McCarthy. Information can also be accessed on EPA's website at [http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html].

[68] Section 109(d)(1)) of the CAA.

[69] 71 *Federal Register* 61143-61233, Oct. 17, 2006.

Based on its review and analysis of scientific studies available between 1997 and 2002,[70] and on determinations made by the Administrator, the EPA's modifications to the particulates NAAQS tighten the current NAAQS primarily by lowering the daily (24-hour) standard for $PM_{2.5}$. The new 2006 particulates NAAQS lower the daily $PM_{2.5}$ standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retain the annual standard at 15 $\mu g/m^3$. The EPA left the existing (1987) daily standard for coarse particles (PM_{10}) in place at 150 $\mu g/m^3$ and relaxed the standard somewhat by revoking the existing annual maximum concentration standard of 50 $\mu g/m^3$.

Critics continue to argue that data do not support the stricter $PM_{2.5}$ standards or, in some cases, even the 1997 standards. On the other hand, several public interest groups and scientists, including the EPA independent Clean Air Scientific Advisory Committee (CASAC),[71] have advocated tightening the standards further than proposed. The Administrator's decisions regarding the particulates NAAQS represent the first time in CASAC's nearly 30-year history that the promulgated standards fall outside of the range of the scientific panel's recommendations. In a letter dated September 29, 2006, the seven members of CASAC objected to the Administrator's actions, both as regards PM_{10} and $PM_{2.5}$: "*It is the CASAC's consensus scientific opinion that the decision to retain without change the annual $PM_{2.5}$ standard does not provide an 'adequate margin of safety ... requisite to protect the public health' (as required by the Clean Air Act)....*"[72]

Tightening the $PM_{2.5}$ NAAQS is expected to result in more areas classified as "nonattainment" and needing to implement new controls on particulate matter. States and local governments would be required to develop and implement new plans for addressing emissions in those areas that do not meet any new standards. In a February 2006 advanced notice of proposed rulemaking (ANPR)[73] outlining an implementation plan for the transition to the January 17, 2006, proposed particulates standards, the EPA indicated that it would be beneficial for states to consider control strategies that may be useful in attaining the new 2006 $PM_{2.5}$ NAAQS when developing their strategies for the 1997 $PM_{2.5}$ standards.

A stricter standard may mean more costs for the transportation and industrial sectors, including utilities, refineries, and the trucking industry, affected by particulate matter controls. In terms of public health, a stricter standard may mean

---

[70] EPA, *Air Quality Criteria for Particulate Matter,* Oct. 29, 2004. EPA, *Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper,* Office of Air Quality Planning and Standards, EPA-452/R-05-005, July 2005. The EPA criteria document and staff paper can are available at [http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_cr_sp.html].

[71] The CASAC, mandated under Section 109(d)(2) of the CAA, reviews EPA's NAAQS criteria documents and staff papers as they are prepared, recommends improvements, and, after further meetings and reviews, signs off only when it is convinced that each accurately reflects the status of the science ([http://www.epa.gov/sab/panels/casacpmpanel.html]).

[72] Ibid. Italics in original.

[73] 71 *Federal Register* 6718, Feb. 9, 2006.

fewer health effects for the general population and particularly sensitive populations, such as children, asthmatics, and the elderly.

The EPA released a regulatory impact analysis (RIA) on October 6, 2006,[74] to meet its obligations under Executive Order 12866 [75] and in compliance with guidance from the White House Office of Management and Budget. The RIA analyzed only the benefits and costs of implementing the new $PM_{2.5}$ NAAQS. Based on several analytical approaches, the EPA estimated that compliance with the new NAAQS could prevent 1,200 to 13,000 premature deaths annually, as well as substantial numbers of hospital admissions and missed work or school days due to illness. According to the October 6, 2006, RIA, the estimated total annual health and welfare net benefits (subtracting social costs from the monetized benefits) in 2020 of attaining the new $PM_{2.5}$ NAAQS range from $9 billion to $12 billion, based on modeling of morbidity and mortality using published epidemiology studies, and from $2.4 billion to $70 billion, based on derivation from expert elicitation.

Designation of geographical areas and the associated impacts on specific areas would be speculative at best, because implementation of the new 2006 particulates NAAQS is several years off. States will not be required to submit SIPs until 2013 and would not have to meet the new $PM_{2.5}$ standard until April 2015 (April 2020, if qualified for an extension[76]). For the 1997 $PM_{2.5}$ NAAQS, states are required to submit implementation plans for how they will meet the standard by April 2008 and must be in compliance by 2010, unless they are granted a five-year extension.[77]

In late December 2006, 13 states, as well as several industry, agriculture, business, and public advocacy groups, separately petitioned the court to review new 2006 particulates NAAQS. These challenges could affect the current implementation schedule for the 1997 $PM_{2.5}$ NAAQS. The EPA's previous review and 1997 establishment of particulates (and ozone) standards was the subject of litigation and challenges, including a Supreme Court decision in 2001.[78] (See discussion below in

---

[74] EPA's Regulatory Impact Analysis (RIA) of the 2006 National Ambient Air Quality Standards for Fine Particle Pollution ($PM_{2.5}$), available on EPA's website at [http://www.epa.gov/ttn/ecas/ria.html].

[75] 58 *Federal Register* 51735, Oct. 4, 1993. See the White House OMB website, *Regulatory Matters*, at [http://www.whitehouse.gov/omb/inforeg/regpol.html#rr].

[76] Under section 172(a)(2)(A) of the CAA, the EPA may grant an area an extension of the initial attainment date for 1 to 5 years (in no case later than 10 years after the designation date for the area). A state requesting an extension must submit an implementation plan (SIP) by the required deadline that includes, among other things, sufficient information demonstrating that attainment by the initial attainment date is "impracticable."

[77] For more information on the implementation of the 1997 $PM_{2.5}$ NAAQS promulgated in 1997, see CRS Report RL32431, *Particulate Matter ($PM_{2.5}$): National Ambient Air Quality Standards (NAAQS) Implementation*, by Robert Esworthy.

[78] *American Trucking Ass'ns v. EPA*, 175 F.3d 1027, 1055-56 (D.C. Cir. 1999), rehearing granted in part and denied in part, 195 F.3d 4 (D.C. Cir. 1999), affirmed in part and reversed in part, *Whitman v. American Trucking Ass'ns*, 531 U.S. 457 (2001). In March 2002, the Court of Appeals rejected all remaining challenges to the standards, *American Trucking*

(continued...)

"Implementation of the 1997 PM2.5 NAAQS: Timeline and Delays.") The final form of the new 2006 particulates NAAQS, and therefore the associated potential impacts of implementation of the 1997 $PM_{2.5}$ standards, may not be known for some time.

Impacts of Actions Regarding the 1997 Ozone NAAQS. The final 1997 particulates NAAQS were signed by the EPA Administrator at the same time as new NAAQS for ground-level ozone. The two NAAQS were jointly published on July 18, 1997.[79] Generally referred to as the "eight-hour ozone standard," the new standard for ground-level ozone requires a more stringent concentration limit (0.08 parts per million versus the previous 0.12), but it averages the ozone concentrations measured over eight hours rather than the previous one hour.

On April 15, 2004, the EPA designated areas in 32 states and the District of Columbia (474 counties in all) as nonattainment for the new ozone air quality standard.[80] The EPA designations, and the implementation rule[81] that accompanied the designations, have been challenged for being too lenient by several states and various public interest groups, and too restrictive by industry groups. A number of general issues, such as cost and interpretation of boundaries, are expected to be similar for the eight-hour ozone and $PM_{2.5}$ rules, but the EPA deems the CAA requirements regarding $PM_{2.5}$ to be less complicated, relative to ozone requirements. The $PM_{2.5}$ implementation rule will be new rather than a transformation of an existing one, as in the case of eight-hour ozone. In addition, fewer areas have been designated as nonattainment for $PM_{2.5}$ than were designated under the eight-hour ozone NAAQS. Nevertheless, implementation of the eight-hour ozone NAAQS, and associated challenges or other delays, will likely affect the implementation of the 1997 $PM_{2.5}$ NAAQS.

Congressional Action Related to Particulates NAAQS Implementation

Concerns regarding the potential impacts of the new ozone and particulate standards have led to several attempts over the years to modify the implementation requirements.[82] Most recently, attempts during the 109th Congress were generally attached to larger pieces of legislation, such as the proposed multipollutant (Clear Skies), energy, and transportation bills.

---

[78] (...continued)
Ass'ns v. EPA, 283 F. 3d 355, 369-72 (D.C. Cir. 2002).

[79] 62 *Federal Register* 38652-38896, July 18, 1997.

[80] 69 *Federal Reg*ister 23857, Apr. 15, 2004.

[81] 69 *Federal Register* 23951, Apr. 30, 2004. See 8-hour Ground-Level Ozone Designations: Regulatory Actions, an EPA website, at [http://www.epa.gov/ozonedesignations/regs.htm].

[82] For a historical perspective, see CRS Issue Brief IB10107, *Clean Air Act Issues in the 108th Congress* (available from the author), and CRS Report RL33552, *Clean Air Act Issues in the 109th Congress*, by James E. McCarthy.

The Energy Policy Act of 2005 (P.L. 109-58), signed by the President on August 8, 2005, included provisions that could affect NAAQS implementation through programs that could contribute to reductions in particulates (and ozone). Title VII, Subtitle G, requires the EPA to establish a program to provide grants and loans to retrofit vehicles with diesel engines with new emission reduction technology. Eligible vehicles include heavy-duty trucks, locomotives, and boats. Subtitle G, referred to as the Diesel Emissions Reduction Act (DERA) of 2005 (the same as the proposed stand-alone legislation S. 1265, S.Rept. 109-133), authorizes $200 million annually for FY2007 through FY2011 (Title VII, Subtitle G, Section 797). Other provisions may also contribute to reducing particulates to some extent. For example, Title XVI establishes a program to promote the development and deployment of low-carbon technologies, both domestically and in developing countries. Various sections in Titles VII, VIII, and XIII authorize research and development (R&D) funding for hydrogen, fuel cells, and alternative fuel vehicles or establish tax incentives for their use.[83]

Multipollutant legislation to reduce emissions from coal-fired power plants considered during the 109th Congress could have potentially contributed to reducing $PM_{2.5}$ concentrations. In the 109th Congress, six bills were introduced that would have imposed multipollutant controls on utilities. Two of the bills, H.R. 227 and S. 131 (Clear Skies), were modified versions of the Administration's three-pollutant proposal for sulfur dioxide (SO_2), nitrogen oxides (NOx), and mercury (Hg) emissions. The other four bills, S. 150, S. 730, H.R. 1451, and H.R. 1873, were four-pollutant proposals that included carbon dioxide (CO_2).

In addition to the effects of reducing emissions of the pollutants of concern on $PM_{2.5}$, Clear Skies legislation would have created a new "transitional" area classification in place of nonattainment for areas that can demonstrate through modeling that they will attain the 1997 $PM_{2.5}$ and ozone standards by December 2015. Until that date, transitional areas would not have incurred penalties or faced additional requirements beyond those identified in EPA or state modeling. After 2015, if an area failed to achieve the standard, it would have been designated nonattainment by June 2017 and would have been required to impose controls to reach attainment by 2022. By reclassifying most ozone and $PM_{2.5}$ nonattainment areas as "transitional," Clear Skies would have eliminated the application of conformity in those areas until 2018. The Senate Environment and Public Works Committee blocked S. 131 from advancing to the Senate floor, on a tie vote, on March 9, 2005.[84]

---

[83] See CRS Report RL32873, *Key Environmental Issues in the Energy Policy Act of 2005 (P.L. 109-58, H.R. 6)*, by Brent D. Yacobucci.

[84] See CRS Report RL32782, *Clear Skies and the Clean Air Act: What's the Difference?* by Larry B. Parker and James E. McCarthy, and CRS Report RL32755, *Air Quality: Multi-Pollutant Legislation in the 109th Congress*, by Larry B. Parker and John E. Blodgett.

Implementation of the 1997 $PM_{2.5}$ NAAQS: Timeline and Delays

Because of legal challenges, the lack of a national monitoring network, and other factors, implementation of the 1997 $PM_{2.5}$ NAAQS has been delayed since it was promulgated. The timeline presented in **Table 2**, driven primarily by statutory requirements, reflects the most recent key milestone dates for implementing the 1997 $PM_{2.5}$ NAAQS, including actual completions. It follows an EPA milestone schedule outlined in an April 21, 2003, memorandum to EPA regional administrators that also provided the nonbinding guidance for implementation of the $PM_{2.5}$ area designations.[85] Recognizing 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 eight-hour ozone program.

Table 2. Estimated Schedule for Implementation of the 1997 $PM_{2.5}$ NAAQS

Date	1997 $PM_{2.5}$ NAAQS Milestones
February 2004 (completed)	State-tribal area designation recommendations (based on 2000-2002 monitoring data)
June-July 2004 (completed)	EPA notifies states and tribes regarding modifications to their recommendations
January 5, 2005 (completed) (published in 70 *Federal Register* 944)	EPA promulgates final area designations (required 1 year after states and tribes make recommendations)
February 2005 (completed November 1, 2005) (published in 70 *Federal Register* 65984)	EPA proposes $PM_{2.5}$ implementation rule
April 5, 2006 (1 year after the final designation April 5, 2005 effective date)	States with new transportation projects submit conformity determination within 1 year of the effective date of nonattainment designation
Early 2007 (estimated)	EPA promulgates final $PM_{2.5}$ implementation rule
April 2008 (3 years after final area designations effective date)	States and tribes submit revised implementation plans (SIPs) to achieve $PM_{2.5}$ compliance in nonattainment areas
2010-2015 (5-10 years after final area designations effective date)	NAAQS statutory compliance deadline for attainment

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

---

[85] EPA memorandum, Apr. 21, 2003, from the Office of Air and Radiation Assistant Administrator Jeffrey R. Holmstead to EPA Regional Administrators, available at [http://www.epa.gov/ttn/naaqs/pm/pm25_guide.html], accessed January 2006.

The $PM_{2.5}$ NAAQS requirement for three years of monitoring data to determine whether areas were meeting the established limits was 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; P.L. 105-178, Title VI), 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 required the 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 and tribal recommendations and final EPA designations. The 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 were the result of Congress amending the CAA in the FY2004 omnibus appropriations (P.L.108-199).

In addition to the delay in establishing a monitoring network, the 1997 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.[86]

Conclusion

Implementation of the 1997 $PM_{2.5}$ NAAQS is affecting a number of areas, including some that were not previously designated "nonattainment" for a NAAQS. A number of concerns have been raised regarding the potential impacts, and numerous questions have been triggered regarding the specifics of the implementation process.

According to EPA projections, federal measures, such as recent auto and truck emission standards and controls on power plants and regional regulations, 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. Some Members of Congress and others questioned the EPA's predictions regarding

---

[86] United States Court of Appeals for the District of Columbia Circuit, argued Dec. 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, Feb. 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 Assn's*, by Robert Meltz and James E. McCarthy.

the relative magnitude of the emission reductions associated with existing and proposed air quality controls. Considerable debate also continues regarding the potential economic consequences associated with nonattainment.

The final form of $PM_{2.5}$ implementation and its effects may not be known for some time. Some states and other stakeholders continue to disagree with the EPA's $PM_{2.5}$ nonattainment area designations and to suggest that fewer counties should have been designated. Other stakeholder groups contend that the EPA should have included additional counties. The agency's $PM_{2.5}$ implementation rule, which has yet to be promulgated, may be challenged (like many EPA rules) in the courts. The EPA's first attempt at an implementation plan was among the issues remanded by the Supreme Court in the 2001 decision that addressed a number of issues related to the setting of the $PM_{2.5}$ and the eight-hour ozone standard.

The EPA's review and October 2006 revisions of the existing particulates NAAQS may face challenges that could affect implementation of the 1997 $PM_{2.5}$ NAAQS. In addition to the divergence from recommendations of the scientific advisory committee (CASAC) mandated under the CAA, several elements of the new 2006 particulates standard have been controversial, including the decision not to exclude rural sources from the coarse particle standard. Some also questioned the EPA's strengthening of the standard for *all* fine particles, without distinguishing their source or chemical composition. In late December 2006, several state, industry, agriculture, business, and public advocacy groups petitioned the court to review new 2006 particulates NAAQS. Recommendations to modify the statutory provisions affecting implementation of the particulates (and the ozone) standards are also likely to be advocated.

Many critical milestones are scheduled to be completed in the coming months, and $PM_{2.5}$ will likely remain an area of focus for many stakeholders and interest groups, as well as Congress, in 2007.