

in the absence of additional controls.⁵⁸ For example, in 2020 based on emission controls currently adopted, we project that 66 million people will live in 79 counties with average PM_{2.5} levels above 15 µg/m³. In 2030, the number of people projected to live in areas exceeding the PM_{2.5} standard is expected to increase to 85 million in 107 counties. An additional 24 million people are projected to live in counties within 10 percent of the standard in 2020, which will increase to 64 million people in 2030.

While the final implementation process for bringing the nation's air into attainment with the PM_{2.5} NAAQS is still being completed in a separate rulemaking action, the basic framework is well defined by the statute. EPA's current plans call for designating PM_{2.5} nonattainment areas in late 2004.

Following designation, section 172(b) of the Clean Air Act allows states up to three years to submit a revision to their state implementation plan (SIP) that provides for the attainment of the PM_{2.5} standard. Based on this provision, states could submit these SIPs as late as the end of 2007. Section 172(a)(2) of the Clean Air Act requires that these SIP revisions demonstrate that the nonattainment areas will attain the PM_{2.5} standard as expeditiously as practicable but no later than five years from the date that the area was designated nonattainment. However, based on the severity of the air quality problem and the availability and feasibility of control measures, the Administrator may extend the attainment date "for a period of no greater than 10 years from the date of designation as nonattainment." Therefore, based on this information, we expect that most or all areas will need to attain the PM_{2.5} NAAQS in the 2009 to 2014 time frame, and then be required to maintain the NAAQS thereafter.

B. Other Environmental Effects

The following section presents information on four categories of public welfare and environmental impacts related to NO_x and fine PM emissions: acid deposition, eutrophication of water bodies, plant damage from ozone, and visibility impairment.

1. Acid Deposition

Acid deposition, or acid rain as it is commonly known, occurs when NO_x

and SO₂ react in the atmosphere with water, oxygen, and oxidants to form various acidic compounds that later fall to earth in the form of precipitation or dry deposition of acidic particles.⁵⁹ It contributes to damage of trees at high elevations and in extreme cases may cause lakes and streams to become so acidic that they cannot support aquatic life. In addition, acid deposition accelerates the decay of building materials and paints, including irreplaceable buildings, statues, and sculptures that are part of our nation's cultural heritage. To reduce damage to automotive paint caused by acid rain and acidic dry deposition, some manufacturers use acid-resistant paints, at an average cost of \$5 per vehicle—a total of \$80–85 million per year when applied to all new cars and trucks sold in the U.S.

Acid deposition primarily affects bodies of water that rest atop soil with a limited ability to neutralize acidic compounds. The National Surface Water Survey (NSWS) investigated the effects of acidic deposition in over 1,000 lakes larger than 10 acres and in thousands of miles of streams. It found that acid deposition was the primary cause of acidity in 75 percent of the acidic lakes and about 50 percent of the acidic streams, and that the areas most sensitive to acid rain were the Adirondacks, the mid-Appalachian highlands, the upper Midwest and the high elevation West. The NSWS found that approximately 580 streams in the Mid-Atlantic Coastal Plain are acidic primarily due to acidic deposition. Hundreds of the lakes in the Adirondacks surveyed in the NSWS have acidity levels incompatible with the survival of sensitive fish species. Many of the over 1,350 acidic streams in the Mid-Atlantic Highlands (mid-Appalachia) region have already experienced trout losses due to increased stream acidity. Emissions from U.S. sources contribute to acidic deposition in eastern Canada, where the Canadian government has estimated that 14,000 lakes are acidic. Acid deposition also has been implicated in contributing to degradation of high-elevation spruce forests that populate the ridges of the Appalachian Mountains from Maine to Georgia. This area includes national parks such as the Shenandoah and Great Smoky Mountain National Parks.

⁵⁹ Much of the information in this subsection was excerpted from the EPA document, *Human Health Benefits from Sulfate Reduction*, written under Title IV of the 1990 Clean Air Act Amendments, U.S. EPA, Office of Air and Radiation, Acid Rain Division, Washington, DC 20460, November 1995. A copy of this document is available in Docket No. OAR 2002–0030.

A study of emissions trends and acidity of water bodies in the Eastern U.S. by the General Accounting Office (GAO) found that from 1992 to 1999 sulfates declined in 92 percent of a representative sample of lakes, and nitrate levels increased in 48 percent of the lakes sampled.⁶⁰ The decrease in sulfates is consistent with emissions trends, but the increase in nitrates is inconsistent with the stable levels of nitrogen emissions and deposition. The study suggests that the vegetation and land surrounding these lakes have lost some of their previous capacity to use nitrogen, thus allowing more of the nitrogen to flow into the lakes and increase their acidity. Recovery of acidified lakes is expected to take a number of years, even where soil and vegetation have not been "nitrogen saturated," as EPA called the phenomenon in a 1995 study.⁶¹ This situation places a premium on reductions of NO_x (and SO_x) from all sources, including aircraft engines, in order to reduce the extent and severity of nitrogen saturation and acidification of lakes in the Adirondacks and throughout the U.S.

The NO_x reductions from today's action would help reduce acid rain and acid deposition, thereby helping to reduce acidity levels in lakes and streams throughout the country and help accelerate the recovery of acidified lakes and streams and the revival of ecosystems adversely affected by acid deposition. Reduced acid deposition levels will also help reduce stress on forests, thereby accelerating reforestation efforts and improving timber production. Deterioration of our historic buildings and monuments, and of buildings, vehicles, and other structures exposed to acid rain and dry acid deposition also will be reduced, and the costs borne to prevent acid-related damage may also decline. While the reduction in nitrogen acid deposition would be roughly proportional to the reduction in NO_x emissions the precise impact of today's action would differ across different areas.

2. Eutrophication and Nitrification

Eutrophication is the accelerated production of organic matter, particularly algae, in a water body. This

⁶⁰ *Acid Rain: Emissions Trends and Effects in the Eastern United States*, U.S. General Accounting Office, March, 2000 (GAO/RCED–00–47). A copy of this document is available in Docket No. OAR 2002–0030.

⁶¹ *Acid Deposition Standard Feasibility Study: Report to Congress*, EPA 430R–95–001a, October, 1995. A copy of this document is available in Docket No. OAR–2002–0030.

⁵⁸ See the Regulatory Impact Analysis: "Draft Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines," EPA420–R–03–008, April 2003. This document is available at <http://www.epa.gov/nonroad/>. A copy of this document can also be found in Docket No. A–2001–28.