

elsewhere.¹³ At that time, we conducted 1996 base year modeling to reproduce the atmospheric processes resulting in formation and dispersion of PM_{2.5} across the U.S. This 1996 modeling included emissions subject to this final rule. According to our national model predictions, there were a total of 76 million people (1996 population) living in areas with modeled annual average PM_{2.5} concentrations at or above 16 µg/m³ (29 percent of the population).¹⁴

While the final implementation process for bringing the Nation's air into attainment with the PM_{2.5} NAAQS is still being completed, the basic framework is well defined. 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} standards. We expect states to submit these SIPs in late-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} standards 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, we expect that areas will be ultimately be required to attain the PM_{2.5} air quality standard in the 2009 to 2014 time frame.

c. Diesel Exhaust. Diesel emissions are of concern beyond their contribution to ambient PM. There have been health studies specific to diesel exhaust emissions indicating that potential hazards to human health are specific to this emission source. For chronic exposure, these hazards included respiratory system toxicity and carcinogenicity. Acute exposure also causes transient effects (a wide range of physiological symptoms stemming from irritation and inflammation mostly in

the respiratory system) in humans though they are highly variable depending on individual human susceptibility. The chemical composition of diesel exhaust includes several hazardous air pollutants, or air toxics.

EPA recently released its final "Health Assessment Document for Diesel Engine Exhaust" (the Diesel HAD).¹⁵ There, we concluded that diesel exhaust is likely to be carcinogenic to humans by inhalation and environmental exposures in accordance with the revised draft 1996/1999 EPA cancer guidelines. A number of other agencies (e.g., National Institute for Occupational Safety and Health, the International Agency for Research on Cancer, the World Health Organization, California EPA, and the U.S. Department of Health and Human Services) have made similar determinations.

EPA concluded in the Diesel HAD that it is not possible to currently calculate a cancer unit risk for diesel particles due to a variety of factors that limit the current studies such as lack of adequate dose-response relations between exposure versus cancer incidence. Even though EPA does not have a carcinogenic potency with which to accurately estimate the carcinogenic impact of diesel exhaust, the likely hazard to humans together with the potential for significant environmental risks leads us to conclude that diesel exhaust emissions should be reduced from nonroad engines in order to protect public health.

d. Carbon Monoxide. Carbon monoxide is a colorless, odorless gas produced through the incomplete combustion of carbon-based fuels. Carbon monoxide enters the bloodstream through the lungs and reduces the delivery of oxygen to the body's organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Healthy individuals also are affected, but only at higher CO levels. Exposure to elevated CO levels is associated with impairment of visual perception, work capacity, manual dexterity, learning ability and performance of complex tasks.

High concentrations of CO generally occur in areas with elevated mobile-source emissions. Peak concentrations typically occur during the colder

months of the year when mobile-source CO emissions are greater and nighttime inversion conditions are more frequent. This is due to the enhanced stability in the atmospheric boundary layer, which inhibits vertical mixing of emissions from the surface.

The current primary NAAQS for CO are 35 parts per million for the one-hour average and 9 parts per million for the eight-hour average. These values are not to be exceeded more than once per year. Air quality carbon monoxide value is estimated using EPA guidance for calculating design values. In 1999, 30.5 million people (1990 census) lived in 17 areas designated nonattainment under the CO NAAQS.¹⁶

Nationally, significant progress has been made over the last decade to reduce CO emissions and ambient CO concentrations. Total CO emissions from all sources have decreased 16 percent from 1989 to 1998, and ambient CO concentrations decreased by 39 percent. During that time, while the mobile source CO contribution of the inventory remained steady at about 77 percent, the highway portion decreased from 62 percent of total CO emissions to 56 percent while the nonroad portion increased from 17 percent to 22 percent.¹⁷ Over the next decade, we would expect there to be a minor decreasing trend from the highway segment due primarily to the more stringent standards for certain light-duty trucks (LDT2s).¹⁸ CO standards for passenger cars and other light-duty trucks and heavy-duty vehicles did not change as a result of other recent rulemakings.

e. Environmental Effects. In addition to the health and welfare concerns just described, Category 3 marine diesel engines can contribute to visibility degradation, haze, acid deposition, and eutrophication and nitrophication. Further information on these effects can

¹³ See the Final Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (EPA420-R-00-026, December 2000). Docket No. A-2001-11, Document II-A-55. This document is also available at <http://www.epa.gov/otaq/diesel.htm#documents>.

¹⁴ Memorandum to Docket A-99-06 from Eric O. Ginsburg, Senior Program Advisor, "Summary of Absolute Modeled and Model-Adjusted Estimates of Fine Particulate Matter for Selected Years," December 6, 2000; Docket No. A-2001-11, Document II-A-61.

¹⁵ U.S. EPA (2000) Health Assessment Document for Diesel Exhaust: SAB Review Draft. EPA/600/8-90-057E Office of Research and Development, Washington DC. This document is available electronically at <http://cfpub.epa.gov/ncea/cfm/dieslexh.cfm>.

¹⁶ National Air Quality and Emissions Trends Report, 1999, EPA, 2001, at Table A-19. This document is available at <http://www.epa.gov/oar/aqtrnd99>. The data from the Trends report are the most recent EPA air quality data that have been quality-assured. A copy of this table can also be found in Docket No. A-2001-11, Document II-A-59.

¹⁷ National Air Quality and Emissions Trends Report, 1998, March, 2000; this document is available at <http://www.epa.gov/oar/aqtrnd98>. National Air Pollutant Emission Trends, 1900-1998 (EPA-454/R-00-002), March, 2000. These documents are available at Docket No. A-2001-11, Document II-A-60. See also Air Quality Criteria for Carbon Monoxide, U.S. EPA, EPA 600/P-99/001F, June 2000, at page 3-10; Docket No. A-2001-11, Document II-A-56. This document is also available at <http://www.epa.gov/ncea/coabstract.htm>.

¹⁸ LDT2s are light light-duty trucks greater than 3750 pounds loaded vehicle weight, up through 6000 pounds gross vehicle weight rating.