

standards we finalized in 1999 will go into effect.

We proposed to apply all the Tier 2 certification and compliance requirements to the proposed Tier 1 standards as well. After considering the public comments, we are finalizing this approach with two exceptions. First, we allow manufacturers to use test data generated using the procedures in the NO_x Technical Code on an interim basis. Second, we will not require manufacturers to perform production-line testing on their Tier 1 engines.

3. Foreign-Trade Exemption

We are eliminating the foreign-trade exemption for all marine diesel engines, which was available for engines installed on U.S. vessels that spend less than 25 percent of total operating time within 320 kilometers of U.S. territory.

4. Fuel Controls

We are not setting standards for the fuel used by marine diesel engines in this final rule. With regard to the residual fuel used by Category 3 marine diesel engines, we remain concerned that regulating fuel sold in the United States would not necessarily ensure that lower-sulfur fuel is used in U.S. waters, since ships could purchase their fuel in other countries. To obtain the benefits of lower-sulfur fuel, we plan to investigate designation of one or more areas in the United States as SO_x Emission Control Areas pursuant to the international process for this purpose. This is described further in Section IV.B.

With regard to the fuel used by Category 1 and Category 2 marine diesel engines, we are considering distillate marine diesel fuel controls as part of the nonroad diesel rule that is currently under development.

D. Why Is EPA Taking This Action?

Category 3 marine diesel engines generate NO_x, HC, PM and CO emissions that contribute to ozone and CO levels above the National Ambient Air Quality Standards (NAAQS) for ozone and CO (*i.e.*, they contribute to ozone and CO nonattainment) as well as adverse health effects associated with ambient concentrations of PM. As described in more detail below and in the Final Regulatory Support Document, Category 3 marine diesel engines accounted for about 1.6 percent of nationwide mobile source NO_x emissions in 2000. They also accounted for about 2.8 percent of nationwide mobile source PM emissions in 2000. These percentages are expected to increase as a result of increased trade and decreases in emissions from other nonroad sources. The contribution of

Category 3 marine diesel engines to nationwide mobile source HC and CO levels is small, at 0.1 and 0.02 percent, respectively, in 2000.

The inventory contribution of Category 3 marine diesel engines can be higher on a port-specific basis. We estimate that these engines contribute about 7 percent of mobile source NO_x in Baton Rouge/New Orleans and Wilmington, NC, and about 5 percent in Miami/ Fort Lauderdale and Corpus Christi. These ships can also have a significant impact on inventories in areas without large commercial ports. For example, they contribute about 37 percent of total area NO_x in the Santa Barbara area.

1. What Are the Health and Welfare Effects of Category 3 Marine Diesel Engine Emissions?

There are important public health and welfare concerns related to Category 3 marine diesel engine emissions.⁷ This section contains a summary of the general health effects associated with exposure to ozone, PM, and CO. Further information can be found in Chapter 1 of the Final Regulatory Support Document.

a. Ozone. Volatile organic compounds (VOC) and NO_x are precursors in the photochemical reaction which forms tropospheric ozone. Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of VOCs and NO_x in the presence of heat and sunlight. Hydrocarbons are a large subset of VOC, and to reduce mobile-source VOC levels we set maximum emission limits for hydrocarbon and particulate emissions.

Based on a large number of studies, we have identified several key health effects caused when people are exposed to levels of ozone found today in many areas of the country. A large body of evidence shows that ozone can cause harmful respiratory effects including chest pain, coughing, and shortness of breath, which affect people with compromised respiratory systems most severely. When inhaled, ozone can cause acute respiratory problems; aggravate asthma; cause significant temporary decreases in lung function of 15 to over 20 percent in some healthy adults; cause inflammation of lung tissue; produce changes in lung tissue and structure; may increase hospital admissions and emergency room visits; and impair the body's immune system defenses, making people more

susceptible to respiratory illnesses. Children and outdoor workers are likely to be exposed to elevated ambient levels of ozone during exercise and, therefore, are at a greater risk of experiencing adverse health effects. Beyond its human health effects, ozone has been shown to injure plants, which has the effect of reducing crop yields and reducing productivity in forest ecosystems.

There is strong and convincing evidence that exposure to ozone is associated with exacerbation of asthma-related symptoms. Increases in ozone concentrations in the air have been associated with increases in hospitalization for respiratory causes for individuals with asthma, worsening of symptoms, decrements in lung function, and increased medication use, and chronic exposure may cause permanent lung damage. The risk of suffering these effects is particularly high for children and for people with compromised respiratory systems.

In addition to the health effects described above, there exists a large body of scientific literature that shows that harmful effects can occur from sustained levels of ozone exposure at low levels.⁸ Studies of prolonged exposures, those lasting about 7 hours, show health effects from prolonged and repeated exposures at moderate levels of exertion to ozone concentrations as low as 0.08 ppm. The health effects at these levels of exposure include transient pulmonary function responses, transient respiratory symptoms, effects on exercise performance, increased airway responsiveness, increased susceptibility to respiratory infection, increased hospital and emergency room visits, and transient pulmonary respiratory inflammation.

The current primary and secondary ozone National Ambient Air Quality Standard (NAAQS) is 0.12 ppm daily maximum 1-hour concentration, not to be exceeded more than once per year on average. EPA is replacing the previous 1-hour ozone standard with a new 8-hour standard. The new standard is set at a concentration of 0.08 parts per million (ppm), and the measurement period is 8 hours. Areas are allowed to disregard their three worst measurements every year and average performance over three years to determine if they meet the standard.

⁸ Additional information about these studies can be found in Chapter 2 of "Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements," December 2000, EPA420-R-00-026. Docket No. A-2001-11, Document II-A-55. This document is also available at <http://www.epa.gov/otaq/diesel.htm#documents>.

⁷ Sections II and VI of the preamble for our proposal contain an extensive description of the air quality problems we are addressing in this rulemaking, which we are not repeating here.