

to exist in the future in the absence of additional controls. For example, in 2020 based on emission controls currently adopted, we project that 66 million people will live in 79 counties with average PM<sub>2.5</sub> levels above 15 ug/m<sup>3</sup>. In 2030, the number of people projected to live in areas exceeding the PM<sub>2.5</sub> 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.

Our modeling also indicates that the reductions we are expecting will make a substantial contribution to reducing exposures in these areas.<sup>28</sup> In 2020, the number of people living in counties with PM<sub>2.5</sub> levels above the NAAQS would be reduced from 66 million to 60 million living in 67 counties, which reflects a reduction of 9 percent in potentially exposed population and 15 percent of the number of counties. In 2030, there would be a reduction from 85 million people to 71 million living in 84 counties. These represent even greater improvements than projected for 2020 (numbers of people potentially exposed down 16 percent and number of counties down 21 percent). Furthermore, our modeling also shows that the emission reductions would assist areas with future maintenance of the standards.

We estimate that the reduction of PM levels expected from this proposed rule would produce nationwide air quality improvements in PM levels. On a population weighted basis, the average change in future year annual averages would be a decrease of 0.33 ug/m<sup>3</sup> in 2020, and 0.46 ug/m<sup>3</sup> in 2030. The reductions are discussed in more detail in chapter 2 of the draft RIA.

While the final implementation process for bringing the nation's air into attainment with the PM<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> NAAQS in the 2009 to 2014 time frame, and then be required to maintain the NAAQS thereafter.

Since the emission reductions expected from this proposal would begin in this same time frame, the projected reductions in nonroad emissions would be used by states in meeting the PM<sub>2.5</sub> NAAQS. States and state organizations have told EPA that they need nonroad diesel engine reductions in order to be able to meet and maintain the PM<sub>2.5</sub> NAAQS as well as visibility regulations, especially in light of the otherwise increasing emissions from nonroad sources without more stringent standards.<sup>29 30 31</sup> Furthermore, this action would ensure that nonroad diesel emissions will continue to decrease as the fleet turns over in the years beyond 2014; these reductions will be important for maintenance of the NAAQS following attainment. The future reductions are also important to achieve visibility goals, as discussed later.

## 2. Air Toxics

### a. Diesel Exhaust

A number of health studies have been conducted regarding diesel exhaust including epidemiologic studies of lung cancer in groups of workers, and animal studies focusing on non-cancer effects specific to diesel exhaust. Diesel exhaust PM (including the associated organic compounds which are generally high molecular weight hydrocarbon

types but not the more volatile gaseous hydrocarbon compounds) is generally used as a surrogate measure for diesel exhaust.

### i. Potential Cancer Effects of Diesel Exhaust

In addition to its contribution to ambient PM inventories, diesel exhaust is of specific concern because it has been judged to pose a lung cancer hazard for humans as well as a hazard from noncancer respiratory effects.

EPA recently released its "Health Assessment Document for Diesel Engine Exhaust," (the Diesel HAD).<sup>32</sup> There, diesel exhaust was classified as likely to be carcinogenic to humans by inhalation at environmental exposures, in accordance with the revised draft 1996/1999 EPA cancer guidelines. A number of other agencies (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 classifications. It should be noted that the conclusions in the Diesel HAD were based on diesel engines currently in use, including nonroad diesel engines such as those found in bulldozers, graders, excavators, farm tractor drivers and heavy construction equipment. As new diesel engines with significantly cleaner exhaust emissions replace existing engines, the conclusions of the Diesel HAD will need to be reevaluated.

For the EPA Diesel HAD, EPA reviewed 22 epidemiologic studies in detail, finding increased lung cancer risk in 8 out of 10 cohort studies and 10 out of 12 case-control studies. Relative risk for lung cancer associated with exposure range from 1.2 to 2.6. In addition, two meta-analyses of occupational studies of diesel exhaust and lung cancer have estimated the smoking-adjusted relative risk of 1.35 and 1.47, examining 23 and 30 studies, respectively.<sup>33 34</sup> That is, these two studies show an overall increase in lung cancer for the exposed groups of 35 percent and 47 percent compared to the groups not exposed to diesel exhaust. In the EPA Diesel HAD, EPA selected 1.4

<sup>28</sup> The results illustrate the type of PM changes for the preliminary control option, as discussed in the Draft RIA in section 3.6. The proposal differs from the modeled control case based on updated information; however, we believe that the net results would approximate future emissions, although we anticipate the PM reductions might be slightly smaller.

<sup>29</sup> California Air Resources Board and New York State Department of Environmental Conservation (April 9, 2002), Letter to EPA Administrator Christine Todd Whitman.

<sup>30</sup> State and Territorial Air Pollution Program Administrators (STAPPA) and Association of Local Air Pollution Control Officials (ALAPCO) (December 17, 2002), Letter to EPA Assistant Administrator Jeffrey R. Holmstead.

<sup>31</sup> Western Regional Air Partnership (WRAP) (January 28, 2003), Letter to Governor Christine Todd Whitman.

<sup>32</sup> U.S. EPA (2002). Health Assessment Document for Diesel Engine Exhaust. EPA/600/8-90/057F Office of Research and Development, Washington DC. This document is available electronically at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060>.

<sup>33</sup> Bhatia, R., Lopipero, P., Smith, A. (1998). Diesel exhaust exposure and lung cancer. *Epidemiology* 9(1):84-91.

<sup>34</sup> Lipsett, M.; Campleman, S.; (1999). Occupational exposure to diesel exhaust and lung cancer: a meta-analysis. *Am J Public Health* 80(7):1009-1017.