

contributions to nonattainment of PM<sub>2.5</sub> and ozone NAAQS, or to prevent widespread exposure to significant concentrations of nonroad engine air toxics. In addition, after the 2010 to 2015 time period we project that this trend reverses and emissions rise into the future in the absence of additional regulation of these engines. (This phenomenon is further described later in this section.) The initial downward trend occurs as the nonroad fleet becomes increasingly dominated over time by engines that comply with existing emission regulations. The upturn in emissions beginning around 2015 results as growth in the nonroad sector overtakes the effect of the existing emission standards.

The engine and fuel standards in this proposal will affect fine particulate matter (PM<sub>2.5</sub>), oxides of nitrogen (NO<sub>x</sub>), sulfur oxides (SO<sub>2</sub>), volatile organic hydrocarbons (VOC), and air toxics. For locomotive, commercial marine vessel (CMV), and recreational marine vessel (RMV) engines, the proposed fuel standards will affect PM<sub>2.5</sub> and SO<sub>2</sub>. CO is not specifically targeted in this proposal but its reductions are discussed in the draft RIA.<sup>100</sup>

Each sub-section within section II discusses the emissions of a pollutant that the proposal addresses.<sup>101</sup> This is followed by a discussion of the expected emission reductions associated with the proposed standards for land-based nonroad diesel engines.<sup>102</sup> The tables and figures illustrate the Agency's projection of future emissions from nonroad diesel engines for each pollutant.<sup>103</sup> The baseline case

represents future emissions from land-based nonroad diesel engines with current standards. The controlled case estimates the future emissions of these engines based on the proposed standards in this notice.

#### 1. PM<sub>2.5</sub>

As described earlier in this section of the preamble, the Agency believes that reductions of diesel PM<sub>2.5</sub> emissions are needed as part of the Nation's progress toward clean air and to reach attainment of the NAAQS for PM<sub>2.5</sub>. The nonroad engines controlled by this proposal are the major sources of nonroad diesel emissions. Table II.E-1 shows that the PM<sub>2.5</sub> emissions from land-based nonroad diesels amount to increasingly large percentages of total manmade diesel PM<sub>2.5</sub> in the years 1996, 2020 and 2030.<sup>104 105</sup>

TABLE II.E-1—BASE-CASE NATIONAL (48 STATE) DIESEL PM<sub>2.5</sub>  
(Short tons)

Year	Total diesel PM <sub>2.5</sub>	Nonroad land-based diesel PM <sub>2.5</sub>	Nonroad land-based percent of total diesel PM <sub>2.5</sub> (percent)
1996 .....	414,000	177,000	43
2020 .....	206,000	124,000	60
2030 .....	220,000	140,000	64

The contribution of land-based nonroad CI engines to PM<sub>2.5</sub> inventories can be significant, especially in densely populated urban areas.<sup>106</sup> As illustrated in Table II.E-2, our city-specific analysis of selected metropolitan areas for 1996 and 2020 shows that the land-based nonroad diesel engine contribution to total PM<sub>2.5</sub>

modeling assumptions. Chapter 3 of the draft RIA and the technical support documents fully describe this inventory, as well as the differences between it and the inventory reflecting the proposal.

<sup>104</sup> Nitrate and sulfate secondary fine particulate as described in section II.B and are not included in the values reported here or elsewhere, but are discussed in the Regulatory Impact Analysis, chapter X.

<sup>105</sup> As a function of the available national inventories from other sources, we are only able to present a 48-state inventory. Wherever possible we present a 50-state inventory.

<sup>106</sup> Construction, industrial, and commercial nonroad diesel equipment comprise most of the land-based nonroad emissions inventory. These types of equipment are more concentrated in urban areas where construction projects, manufacturing, and commercial operations are prevalent. For more information, please refer to the report, "Geographic Allocation of State Level Nonroad Engine Population Data to the County Level," NR-014b, EPA 420-P-02-009.

ranges up to 18 percent in 1996 and 19 percent in 2020.<sup>107</sup>

TABLE II.E-2—BASELINE LAND-BASED NONROAD DIESEL PERCENT CONTRIBUTION TO PM<sub>2.5</sub> INVENTORIES IN SELECTED URBAN AREAS IN 1996 AND 2020

MSA, State	Land-Based Nonroad PM <sub>2.5</sub> Contribution to Total PM <sub>2.5</sub> <sup>a</sup> in 1996	Land-Based Nonroad PM <sub>2.5</sub> Contribution to Total PM <sub>2.5</sub> <sup>a</sup> in 2020
Atlanta, GA .....	7	6
Boston, MA .....	18	18
Chicago, IL .....	8	7
Dallas-Ft. Worth, TX .....	13	10
Indianapolis, IN .....	15	13
Minneapolis-St. Paul, MN .....	10	8
New York, NY .....	13	12
Orlando, FL .....	14	12
Sacramento, CA .....	7	7
San Diego, CA .....	9	7
Denver, CO .....	11	8
El Paso, TX .....	15	19
Las Vegas, NV .....	15	12
Phoenix-Mesa, AZ ....	15	12
Seattle, WA .....	7	7
National Average <sup>b</sup> ....	8	6

<sup>a</sup> Includes only direct exhaust diesel emissions; see Section II.C for a discussion of secondary fine PM levels.

<sup>b</sup> This is a 48 state national average.

Emissions of PM<sub>2.5</sub> from land-based nonroad diesel engines based on a 50 state inventory are shown in Table II.E-3, along with our estimates of the reductions in 2020 and 2030 we expect would result from our proposal for a PM<sub>2.5</sub> exhaust emission standard and changes in the sulfur level in nonroad diesel fuel. For comparison purposes, PM<sub>2.5</sub> emissions based on lowering nonroad diesel fuel sulfur levels to about 340 ppm in-use<sup>108</sup> (500 ppm maximum) without any other controls are shown, along with the estimated emissions with the proposed PM<sub>2.5</sub> standard and a sulfur level of 11 ppm in-use (15 ppm maximum). Figure II.E-1 shows our estimate of PM<sub>2.5</sub> emissions between 2000 and 2030 both without

<sup>107</sup> We selected these cities to show a collection of typical cities spread across the United States in order to compare typical urban inventories with national average ones.

<sup>108</sup> This value (340 ppm) represents the average in-use sulfur concentration of fuel produced to meet a 500 ppm sulfur standard. In practice, off-highway equipment will sometimes be refueled with diesel fuel meeting the more stringent highway standard of 15 ppm. Therefore, the actual average in-use sulfur level of the fuel used by off-highway equipment will be somewhat lower than 340 ppm. The emission benefits shown here reflect this lower in-use sulfur level.

<sup>100</sup> We are proposing only a few minor adjustments of a technical nature to current CO standards.

<sup>101</sup> The estimates of baseline emissions and emissions reductions from the proposed rule reported here for nonroad land-based, recreational marine, locomotive, and commercial marine vessel diesel engines are based on 50 state emissions inventory estimates. However, 50 state emissions inventory data are not available for other emission sources. Thus, emissions estimates for other sources are based on a 48 state inventory that excludes Alaska and Hawaii. The 48 state inventory was done for air quality modeling that EPA uses to analyze regional ozone transport, of which Alaska and Hawaii are not a part. In cases where land-based nonroad diesel engine emissions are summed or compared with other emissions sources, we use a 48 state emissions inventory.

<sup>102</sup> For the purpose of this proposal, land-based nonroad diesel engines include engines used in equipment modeled by the draft NONROAD emissions model, except for recreational marine engines. Recreational marine diesel engines are not subject to the exhaust emission standards contained in this proposal but would be affected by the fuel sulfur requirements applicable to locomotive and commercial marine vessel engines.

<sup>103</sup> The air quality modeling results described in sections II.B and II.C use a slightly different emissions inventory based on earlier, preliminary