

Proposed Emission Standards for New Nonroad Spark-Ignition Engines, Equipment, and Vessels

The U.S. Environmental Protection Agency (EPA) is proposing exhaust emission standards for marine spark-ignition engines and small land-based nonroad engines. EPA is also proposing new evaporative emission standards for equipment and vessels using these engines. These standards would apply only to newly manufactured products. The proposed standards would reduce the harmful health effects of ozone and carbon monoxide from these engines, equipment, and vessels.

Which engines and vehicles would be covered?

At EPA, we are proposing new standards for emissions of hydrocarbons (HC), nitrogen oxides (NO_x), and carbon monoxide (CO) from a variety of nonroad engines, equipment, and vessels that cause or contribute to air pollution. The controls for these products have been combined into one proposal because these engines and vehicles share many common characteristics. Differences in their design and use led us to propose separate emission standards for each group.

- **Small Nonroad Spark-Ignition Engines and Equipment:** Spark-ignition (SI) nonroad engines rated below 25 horsepower (19 kW) used in household and commercial applications, including lawn and garden equipment, utility vehicles, generators, and a variety of other construction, farm, and industrial equipment.
- **Marine Spark-Ignition Engines and Vessels:** Spark-ignition engines used in marine vessels, including outboard engines, personal watercraft, and stern-drive/inboard engines.

Why is EPA regulating these engines, equipment, and vessels?

The engines and vehicles covered by this proposal are significant sources of air pollution. They account for about 25 percent of mobile source hydrocarbon emissions and 30 percent of mobile source carbon monoxide emissions.

The proposed standards continue the process of establishing nonroad standards as required by the Clean Air Act. We are required to study emissions from nonroad engines and vehicles and to set emissions standards if the level of pollutants from these sources cause or significantly contribute to air pollution and, more specifically, if the emissions of CO, NO_x or hydrocarbons contribute significantly to the formation of ozone and carbon monoxide in more than one area of the country currently not meeting ozone and carbon monoxide standards. We completed the Nonroad Engine and Vehicle Emission Study in 1991, and in 1994 determined that these sources contribute significantly to ozone or CO nonattainment. We have already set emission standards for most nonroad engines, including farm and construction equipment, locomotives, commercial marine, and recreational vehicles.

What are the Proposed Requirements?

The proposed requirements vary depending on the kind of engine or vehicle. In developing these requirements, we considered specific factors for each type. Among the factors considered were the environmental impacts, the number of hours each year that the engine is used, the need for high-performance operation, and the costs. The proposed requirements for each type of engine and vehicle are:

Small Nonroad Engines

We are proposing HC+NO_x exhaust emission standards of 10 g/kW-hr for Class I engines starting in the 2012 model year and 8 g/kW-hr for Class II engines starting in the 2011 model year. We expect manufacturers to meet these standards by improving engine combustion and adding catalysts. These standards are consistent with the requirements recently adopted by the California Air Resources Board (ARB). We are not proposing new exhaust emission standards for handheld emissions.

For spark-ignition engines used in marine generators, we are proposing a more stringent Phase 3 CO emission standard of 5 g/kW-hr. This would apply equally to all sizes of engines subject to the Small SI standards.

We are proposing new evaporative emission standards for both handheld and nonhandheld equipment. The new standards include requirements to control fuel tank permeation, fuel line permeation, and diffusion emissions. For nonhandheld engines we are also proposing to require control of running losses.

When fully implemented, the proposed standards would result in a 35 percent reduction in HC+NO_x emissions from new engines' exhaust. The proposed standards would result in a 45 percent reduction in evaporative emissions.

Marine spark-ignition engines and vessels

We are proposing a more stringent level of emission standards for outboard and personal watercraft engines starting with the 2009 model year. The proposed standards for engines above 40 kW are 16 g/kW-hr for HC+NO_x and 200 g/kW-hr for CO. For engines below 40 kW, the standards increase gradually based on the engine's maximum power. We expect manufacturers to meet these standards with improved fueling systems and other in-cylinder controls. The levels of

the standards are consistent with the requirements recently adopted by California ARB with the advantage of a simplified form of the standard for different power ratings and with a CO standard.

We are proposing new exhaust emission standards for sterndrive and inboard marine engines. The proposed standards are 5 g/kW-hr for HC+NO_x and 75 g/kW-hr for CO starting with the 2009 model year. We expect manufacturers to meet these standards with three-way catalysts and closed-loop fuel injection. To ensure proper functioning of these emission control systems in use, we are proposing a requirement that engines have a diagnostic system for detecting a failure in the emission control system. For sterndrive and inboard marine engines above 373 kW with high-performance characteristics (generally referred to as “SD/I high-performance engines”), we are proposing a CO standard of 350 g/kW-hr. We are also proposing a variety of other special provisions for these engines to reflect unique operating characteristics and to make it feasible to meet emission standards using emission credits. These standards are consistent with the requirements recently adopted by California ARB, with some adjustment to the provisions for SD/I high-performance engines and with a CO standard.

The emission standards described above relate to engine operation over a prescribed duty cycle for testing in the laboratory. We are also proposing “not-to-exceed” standards that require manufacturers to maintain a certain level of emission control when engines operate under normal speed-load combinations that are not included in the certification duty cycle.

We are proposing new standards to control evaporative emissions for all vessels using marine spark-ignition engines. The new standards include requirements to control fuel tank permeation, fuel line permeation, and diurnal emissions, including provisions to ensure that refueling emissions do not increase.

When fully implemented, the proposed standards would result in a 70 percent reduction in HC+NO_x emissions, and a 20 percent reduction in CO from new engines’ exhaust. The proposed standards would result in a 70 percent reduction in evaporative emissions.

Health and Environmental Benefits

We estimate that by 2030, the proposed standards would result in significant annual reductions of pollutant emissions from regulated engine and equipment sources nationwide, including 630,000 tons of volatile organic hydrocarbon emissions, 98,000 tons of NO_x emissions, and 6,300 tons of direct particulate matter (PM_{2.5}) emissions. These reductions correspond to significant reductions in the formation of ground-level ozone and ambient PM_{2.5}. We also expect to see annual reductions of 2.7 million tons of carbon monoxide emissions, with the greatest reductions in areas where there have been problems with individual exposures. The requirements in this proposal would result in substantial benefits to public health and welfare and the environment. We estimate that by 2030, on an annual basis, these emission reductions would prevent 450 PM-related premature deaths, approximately 500 hospitalizations, 52,000 work days lost, and other quantifiable benefits every year. The total estimated annual benefits of this rule in 2030 are approximately \$3.4 billion. Estimated costs in 2030 are many times less at approximately \$240 million.

Costs

The estimated costs of the new standards range from \$9.5 million in 2008 to \$620 million in 2037. These control costs are partially offset by estimated annual fuel savings of about \$360 million in 2037 once standards are fully implemented. As a result, the net cost of the program in each year ranges from \$6.4 million in 2008 to \$260 million in 2037.

The results of the economic impact modeling performed for the Small SI and Marine SI engines and equipment control programs suggest that the social costs of those programs are expected to be about \$570 million in 2030 with consumers of these products expected to bear about 66 percent of these costs. We estimate fuel savings of about \$330 million in 2030 that will accrue to consumers. There are \$240 net social costs associated with the program in 2030.

Public Participation Opportunities

We welcome your comments on this proposed rule. Comments will be accepted until August 3, 2007. All comments should be identified by Docket ID No. EPA-HQ-OAR-2004-0008 and submitted by one of the following methods:

Internet: www.regulations.gov

E-mail: A-and-R-Docket@epa.gov

Mail:

Environmental Protection Agency
Air and Radiation Docket and Information Center (6102T)
1200 Pennsylvania Avenue NW
Washington, DC 20460

Hand Delivery:

EPA West Building
EPA Docket Center (Room 3340)
1301 Constitution Avenue NW
Washington, DC

For More Information

You can access the rule and related documents on EPA's Office of Transportation and Air Quality (OTAQ) Web site at:

www.epa.gov/otaq/equip-ld.htm or www.epa.gov/otaq/marinesi.htm

For more information on this rule, please contact the Assessment and Standards Division at:

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