

**PROPOSAL FOR INCLUSION ON THE
COMPENDIUM OF CANDIDATE GLOBAL TECHNICAL REGULATIONS**

Transmitted by the representative of the United States of America

U.S. Environmental Protection Agency Program for Cleaner Nonroad Engine and Nonroad Diesel Fuel Sulfur Control (Clean Air Nonroad Diesel Program)

On May 11, 2004, the U.S. Environmental Protection Agency (EPA) established a comprehensive national control program that will reduce emissions from nonroad diesel engines by integrating engine and fuel controls as a system to gain the greatest emission reductions. Engine manufacturers will produce engines with advanced emission-control technologies similar to those planned for 2007 and later highway diesel trucks and buses. Exhaust emissions from these engines will decrease by more than 90 percent.

Closely linked to these engine provisions are new fuel requirements that will decrease the allowable levels of sulfur in fuel used in nonroad diesel engines, locomotives, and marine vessels by more than 99 percent. These fuel improvements will create immediate and significant environmental and public health benefits and will enable the use of new, high-efficiency emission-control devices on nonroad engines.

By greatly reducing diesel emissions, this rule will result in significant benefits to public health. These benefits include about 12,000 fewer premature deaths and hundreds of thousands fewer incidences of respiratory problems. The overall benefits of the program in dollars significantly outweigh the costs by a factor of about 40 to 1 (\$80 billion annual benefits versus \$2 billion in costs) when the program is fully implemented.

This rule culminates a multi-year collaborative process to reduce nonroad diesel emissions. EPA worked closely with stakeholders from industry, state and local governments, environmental and public health organizations, international organizations, and others in the design of this program.

Background

The new emission standards apply to diesel engines used in most construction, agricultural, industrial, and airport equipment. The standards will take effect for new engines beginning in 2008 and be fully phased-in for most engines by 2014. Larger mobile engines (greater than 750 horsepower) have one year of additional flexibility to meet their emission standards.

Nonroad diesel engines contribute greatly to air pollution in many cities and towns across the United States. Nonroad engines currently meet relatively modest emission requirements and therefore

continue to emit large amounts of nitrogen oxides (NOx) and particulate matter (PM), both of which contribute to serious public health problems.

New Standards for Nonroad Diesel Engines

This program sets emission standards for different sizes of nonroad engines. It also includes new provisions to help ensure that emission-control systems perform as well when operating in actual use as they do in the laboratory. The standards are phased in over several years to provide adequate lead time to engine and equipment manufacturers. Table 1 shows the new emission standards.

Table 1: Final Emission Standards in grams per horsepower-hr (g/hp-hr)

Rated Power	First Year that Standards Apply	PM	NOx
hp < 25	2008	0.30	-
25 ≤ hp < 75	2013	0.02	3.5*
75 ≤ hp < 175	2012-2013	0.01	0.30
175 ≤ hp < 750	2011-2013	0.01	0.30
hp ≥ 750	2011-2014 2015	0.075 0.02/0.03**	2.6/0.50*** 0.50****

* The 3.5 g/hp-hr standard includes both NOx and nonmethane hydrocarbons.

** The 0.50 g/hp-hr standard applies to gensets over 1200 hp.

*** The 0.02 g/hp-hr standard applies to gensets; the 0.03 g/hp-hr standard applies to other engines.

**** Applies to gensets only.

New Standards for Diesel Fuel

Just as lead was phased out of gasoline to prevent damage to catalytic converters, decreasing sulfur levels in nonroad diesel fuel will prevent damage to the emission control systems. In addition, reducing sulfur levels will provide immediate public health benefits by reducing particulate matter from engines in the existing fleet of nonroad equipment, while reducing engine maintenance cost. This rule will reduce current sulfur levels from about 3,000 parts per million (ppm) to 15 ppm when fully implemented (a reduction of greater than 99 percent).

This rule will reduce nonroad diesel fuel sulfur levels in two steps. First, starting in 2007, fuel sulfur levels in nonroad diesel will be limited to a maximum of 500 ppm, the same as for current highway diesel fuel. This limit also covers fuels used in locomotive and marine applications (though not to the marine residual fuel used by very large engines on ocean-going vessels).

Second, starting in 2010, fuel sulfur levels in most nonroad diesel fuel will be reduced to 15 ppm. This ultra-low sulfur fuel will create immediate public health benefits and will make it possible for engine manufacturers to use advanced emission control systems that will dramatically reduce both PM and NOx emissions. In the case of locomotive and marine diesel fuel, this second step will occur in 2012.

Flexibility to Industry

EPA worked extensively with the engine and equipment industry, the petroleum industry, states, and environmental and public health groups in developing this program. EPA included several measures in the rule that will ensure flexibility and cost-effectiveness for the nonroad diesel engine and equipment manufacturers and petroleum industries. These flexibilities include:

1. establishing a credit system for engine manufacturers which will reward those companies who lead the way in reducing pollution sooner than required;
2. providing significant lead time for industry to plan for development of new compliant products and
3. providing small refiners with extra time to meet the sulfur standards.

Health and Environmental Benefits

The new standards will result in substantial benefits to the public health and welfare through significant annual reductions in emissions of NO_x, PM, NMHC, carbon monoxide, sulfur dioxide, and air toxics. The clean air impact of this program will be dramatic when fully implemented. These emission reductions will annually prevent 12,000 premature deaths, more than 8,900 hospitalizations, 280,000 cases of respiratory problems in children, and one million work days lost as just some of the quantified benefits.

In dollars, the health benefits of this rule are estimated to \$ 80 billion annually once essentially all older engines are replaced. Estimated costs for the engine and fuel requirements are many times less, amounting to about \$2 billion in the same time frame. Thus, the benefit-cost ratio of this program at that time will be approximately 40-to-1.

As a result of this program, each new nonroad diesel engine will be more than 90 percent cleaner than current U.S. nonroad diesel engines. In the United States, this program will achieve a 740,000 ton reduction in NO_x emissions in 2030 when the current nonroad diesel equipment fleet is completely replaced with newer engines and equipment that comply with these new standards. By 2030, this program will also reduce annual emissions of PM by 128,000 tons.

Ozone can aggravate asthma and other respiratory diseases, leading to more asthma attacks, use of additional medication, and more severe symptoms that require a doctor's attention, more visits to the emergency room, and increased hospitalizations. Ozone can inflame and damage the lining of the lungs, which may lead to permanent changes in lung tissue, irreversible reductions in lung function if the inflammation occurs repeatedly over a long period of time and may lead to a lower quality of life. Children, people with heart and lung disease, and the elderly are most at risk.

Fine particulates (PM 2.5) have been associated with an increased risk of premature mortality, hospital admissions for heart and lung disease, and increased respiratory symptoms. Long-term exposure to diesel exhaust is likely to pose a lung cancer hazard. In addition, PM, NO_x, and ozone adversely affect the environment in various ways including visibility impairment, crop damage, and acid rain.

Costs of the Program

The cost of producing 15 ppm sulfur fuel for this program is expected to total seven cents per gallon. Because the use of ultra-low sulfur fuel will significantly reduce engine maintenance expenses, we estimate that this net cost will average about four cents per gallon.

The estimated costs for a nonroad equipment manufacturer to comply with this program vary depending on size and complexity of the equipment. As an example, we estimate that for a typical 175-horsepower bulldozer, the modifications will cost approximately \$2,600, compared to the overall price of such a bulldozer of approximately \$240,000. The anticipated costs for most categories of nonroad diesel equipment are in the range of 1-3 percent of the total purchasing price.

Preamble and Regulatory Text

The preamble and regulatory text for this program can be found in the files below. They are also accessible through the web site shown in the “For More Information” section below.

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293a.htm>

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293b.htm>

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293c.htm>

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293d.htm>

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293e.htm>

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293f.htm>

<http://www.epa.gov/fedrgstr/EPA-AIR/2004/June/Day-29/a11293g.htm>

For More Information

You can access the final rule and related documents electronically on the Office of Transportation and Air Quality web site at:

<http://www.epa.gov/nonroad-diesel/2004fr.htm>

The Clean Air Nonroad Diesel program is part of EPA’s overall mobile source control program. For information about related subjects, such as engine certification requirements, see www.epa.gov/otaq.