



Regulatory Announcement

New Phase 2 Standards for Small Spark-Ignition Nonhandheld Engines

The U.S. Environmental Protection Agency (EPA) is setting stringent new Phase 2 emission standards for nonroad small spark-ignition (SI) nonhandheld engines that will reduce hydrocarbons plus oxides of nitrogen (HC+NO_x) by an additional 59 percent beyond the current Phase 1 standards. The adopted rule includes provisions that give industry flexibility and ease the transition to the more stringent Phase 2 program, especially for small volume engine and equipment manufacturers. The new standards will be phased in between 2001 and 2007.

History of Rulemaking

In July 1995, EPA finalized the first federal regulations affecting small nonroad SI engines at or below 19 kilowatts (kW), or 25 horsepower. The regulations, commonly known as "Phase 1," took effect for most new handheld and nonhandheld engines beginning in model year 1997 and are expected to result in a 32 percent reduction in hydrocarbon (HC) emissions from these engines. (See Table 1 for examples of small nonroad SI engines.)

Nonhandheld		Handheld		
Class I	Class II	Class III	Class IV	Class V
<225 cc	>=225 cc	<20 cc	20 cc <=XX <50cc	>=50 cc
Examples: lawn mowers, lawn tractors, generator sets, pumps, air compressors, commercial turf equipment		Examples: augers, brush cutters, chain saws, string trimmers, leaf blowers		

Table 1. Small SI Engine Classes

In September 1993, the Agency initiated a regulatory negotiation to develop a framework for a “Phase 2” rule. This process ended in February 1996 without a consensus among all the participants on a Phase 2 program. However, EPA continued to work with several former regulatory negotiation members.

In March of 1997, EPA published an Advance Notice of Proposed Rulemaking (ANPRM) announcing the Agency’s intent to issue a proposed rule which would cover both handheld and nonhandheld engines. This ANPRM also published the text of two Statements of Principles (SOPs) which were developed between EPA and other interested parties in 1996. In January of 1998, the Agency published a Notice of Proposed Rulemaking (NPRM) for the Phase 2 regulations for small SI engines.

Based on the public comments EPA received on the NPRM, this final rule for nonhandheld engines adopts emission standards considerably more stringent than those proposed for Class I nonhandheld engines, as well as compliance program provisions reflecting closer harmonization with those required by the State of California.

In addition, there have been rapid advances in emission reduction technologies for handheld engines since the publication of the NPRM. EPA has very recently received information which could potentially support handheld standards much more stringent than those originally proposed. In light of this new information, which addresses a new technology that EPA did not analyze at the NPRM stage, and in the interest of providing an opportunity for public comment on more stringent levels for

handheld engine emission standards, Phase 2 regulations for handheld engines (such as trimmers, brush cutters, and chainsaws) will be addressed in a separate Supplemental Notice of Proposed Rulemaking (SNPRM) in June of 1999, with a final rule in March of 2000.

Overview of the Final Rule

This final rule adopts emission standards and other regulatory requirements only for Class I and II engines as used in nonhandheld equipment applications. The adopted Phase 2 program for nonhandheld engines is expected to result in a shift to cleaner, more durable engine technology. Notably, the Phase 2 program will lead to increased use of automotive-style overhead valve (OHV) technology in nonhandheld engines. In addition, these Phase 2 rules include new programmatic requirements to ensure that engines meet the tighter standards throughout the useful life of the equipment. Highlights of the final rule include:

- Tighter emission standards for HC+NO_x (in grams per kilowatt-hour (g/kW-hr) to be phased-in over a number of years, allowing the manufacturers an orderly and efficient transition of engine designs and technologies from those complying with the existing Phase 1 standards to those necessary to meet the Phase 2 requirements.

Engine Class	HC+NO _x (g/kW-hr)	Time Line
Class I	16.1	August 1, 2007; in addition, any Class I engine family initially produced on or after August 1, 2003 must meet the Phase 2 Class I standards before they may be introduced into commerce.
Class II	12.1	2001-2005

Table 2. Phase 2 HC+NO_x Emission Standards for Nonhandheld Engines

- Three useful life categories for nonhandheld engines to account for widely varying product lives.

	Category C	Category B	Category A
Class I	125	250	500
Class II	250	500	1000

Table 3. Useful Life Categories for Nonhandheld Engines (hours)

- A compliance program to ensure engines continue meeting the standards for the useful life of the engine, including certification, production line testing, and in-use testing.

Health and Environmental Benefits

EPA's primary reason for controlling emissions from small SI nonhandheld engines is the role of their HC emissions in forming ozone, a significant component of smog. Of the major air pollutants for which National Ambient Air Quality Standards (NAAQS) have been designated under the Clean Air Act, the most widespread problem continues to be ozone. The Phase 2 nonhandheld engine standards should result in a 59 percent reduction in HC + NO_x emissions from these engines beyond the 32 percent reduction expected from the Phase I standards. This is equivalent to an annual reduction of 390,000 tons of HC+NO_x emissions by year 2027. In addition, this reduction in HC + NO_x emissions will be accompanied by an overall reduction in fuel consumption.

Small SI engines produce approximately one tenth of U.S. mobile source HC emissions and are the largest single contributor to nonroad HC inventories. Thus, the final Phase 2 standards would help the States in their progress towards compliance with the National Ambient Air Quality Standards for ozone.

The final standards will generate significant reductions in emissions from these engines at very low costs. When fuel savings are considered, costs are lower and a net savings may actually result for some larger nonhandheld engines.

Class	Cost Per Engine	Savings Per Engine	Resultant Cost Per Engine
I	\$19.63	\$14.22	\$5.41
II	\$12.64	\$55.72	(\$43.08)

Table 4. Engine Yearly Fuel Savings and Resultant Cost Per Engine

The technological changes necessary to bring these engines into compliance with the emission standards will cause a decrease in fuel consumption of approximately 15 percent for nonhandheld Class I and II side-valve (SV) engines. For Class I and II engines, EPA assumes that there will be fuel savings as SV engines are phased-out and replaced with more fuel efficient overhead-valve (OHV) engines. The high savings per equipment in Class II are influenced by the fact that the engines in this class are utilized for longer hours compared to the equipment in Class I.

	Cost Effectiveness (\$ cost/ton HC+NO_x)
Without Fuel Savings	\$852
With Fuel Savings	(\$507)

Table 5. Cost Effectiveness of Phase 2 Nonhandheld Engine Final Rule

Effect on Industry

The final rule will require engine manufacturers to:

- build cleaner, more durable engines; and
- certify that those engines will meet standards for their full regulatory useful lives.

One of the technology changes available to achieve these standards (adopting an overhead-valve configuration) has already been done on some Class I engines and is also anticipated to be a primary choice for manufacturers of Class II engines to meet their Phase 2 emission levels. The rule will not require the use of catalysts for any group of engines.

The final rule includes provisions to ease the transition from Phase 1 to the Phase 2 program, to ensure that the Phase 2 standards are cost-effective and achievable, and to minimize the compliance burden while maintaining the environmental benefits of the rule. These provisions include phase-in schedules, a certification averaging, banking, and trading program, special compliance provisions for very low emitting engines, and special provisions to ease and/or delay the impact of the rule on low volume engines and equipment.

For More Information

Additional documents on this small nonroad SI engines are available electronically from the EPA Internet server at:

<http://www.epa.gov/oms/equip-ld.htm>

Document information is also available by writing to:

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