United States Environmental Protection Agency | Air and Radiation | EPA420-F-99-027 June 1999

Office of Mobile Sources

Regulatory Announcement

Reproposed Phase 2 Standards for Small Spark-Ignition Handheld Engines

The U.S Environmental Protection Agency (EPA) is reproposing Phase 2 emission standards and other regulatory requirements for nonroad small spark ignition (SI) handheld engines (such as trimmers, brush cutters, and chainsaws). Small SI engines currently produce approximately one tenth of U.S. mobile source hydrocarbon (HC) emissions and are the largest single contributor to nonroad HC inventories. Thus, the proposed Phase 2 standards would help the States in their progress towards compliance with the National Ambient Air Quality Standard (NAAQS) for ozone.

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 HC emissions from these engines. Table 1 lists the different small SI engine categories, including the newly proposed Class I-A and I-B designations.

Table 1: Small SI Engine Classes						
Nonhandheld				Handheld		
Class I-A	Class I-B	Class I	Class II	Class III	Class IV	Class V
<66cc	66 to <100cc	100 to <225 cc	≥225cc	<20cc	20cc to <50cc	≥50cc

In September 1993, the Agency initiated a regulatory negotiation (or "reg-neg") to develop a framework for a “Phase 2” rule. The reg-neg ended in February 1996 without a consensus among all the participants on a Phase 2 program. However, EPA continued to work with several former reg-neg members.

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

Since the publication of the January 1998 NPRM, there have been rapid and dramatic advances in emission reduction technologies for handheld engines used in applications such as trimmers, brush cutters, and chainsaws. EPA had not been able to fully evaluate these technologies or discuss their possible availability at the time of the January 1998 NPRM. Having reviewed the available information regarding these new technologies, EPA now believes this new information supports proposed Phase 2 standards for handheld engines that are significantly more stringent than those proposed in the January 1998 NPRM.

In light of this information, and in the interest of providing an opportunity for public comment on the stringent levels being considered for the Phase 2 handheld engine emission standards and the technologies available for meeting these standards, EPA is reproposing the Phase 2 regulations for handheld engines in this Supplemental Notice of Proposed Rulemaking (SNPRM). EPA finalized Phase 2 regulations for nonhandheld engines in a Final Rulemaking (FRM) in March of 1999.

Reproposed Standards

The reproposed emission standards are considerably more stringent than those originally proposed in the January 1998 NPRM for handheld engines. In addition, the reproposed compliance program provisions are similar to those recently adopted for nonhandheld engines and reflect closer harmonization with those required by the State of California.

This proposal will reduce hydrocarbons plus oxides of nitrogen (HC+NOx) by an additional 78 percent beyond the current Phase 1 standards. The reproposed 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 would be phased in beginning with the 2002 model year. EPA is also proposing standards for two additional classes of nonhandheld engines that would apply to engines below 100 cubic centimeters displacement used in nonhandheld equipment applications.

Overview of the Reproposed Rule for Handheld Class III, IV and V Engines

This SNPRM proposes emission standards and other regulatory requirements for Class III, IV and V engines as used in handheld equipment applications. The reproposed Phase 2 program for handheld engines is expected to result in a shift to dramatically cleaner engine technology. In addition, the proposed 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 proposed rule include:

- Tighter emission standards for HC+NOx (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. Table 2 contains the reproposed emission standards for handheld engines.

Engine Class	Table 2: Re-Proposed HC+NOx Emission Standards for Handheld Engines (in g/kW-hr) by Model Year						
	2002	2003	2004	2005	2006	2007	2008 and later
Class III	226	200	150	100	50	50	50
Class IV	187	168	129	89	50	50	50
Class V	---	---	138	129	110	91	72

- Three useful life categories for handheld engines to account for widely varying product lives as noted in Table 3.

Table 3: Useful Life Categories for Handheld Engines (hours)			
All Handheld Classes	50	125	300

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

- An Averaging, Banking, and Trading (ABT) program to provide engine manufacturers with additional flexibility in meeting the reproposed Phase 2 handheld standards.

Health and Environmental Benefits

Both HC and NOx contribute to the formation of tropospheric ozone through a complex series of reactions. In a recent report, researchers emphasize that both HC and NOx controls are needed in most areas of the United States. EPA's primary reason for controlling emissions from small SI handheld engines is the role of their HC emissions in forming ozone. Of the major air pollutants for which National Ambient Air Quality Standards (NAAQS) have been designated under the Clean Air Act (CAA), the most widespread problem continues to be ozone, which is the most prevalent photochemical oxidant and an important component of smog.

The reproposed Phase 2 handheld engine standards should result in a 78 percent reduction in HC+NOx emissions from these engines beyond the 32 percent reduction expected from the Phase 1 standards. This is equivalent to an annual reduction of 258,000 tons of exhaust HC+NOx emissions by the year 2027. This reduction in HC+NOx emissions will be accompanied by an overall reduction in fuel consumption.

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

The proposed standards will generate significant reductions in emissions from these engines with small increases in cost. In addition, the technological changes necessary to bring these engines into compliance with the proposed emission standards would cause a decrease in fuel consumption of approximately 30 percent for handheld engines, resulting in even lower costs to the consumer. Table 4 presents the cost effectiveness of the reproposed Phase 2 program for handheld engines.

Table 4: Cost Effectiveness of Proposed Phase 2 Handheld Engine Rulemaking	
Without Fuel Savings	$2,150/ton HC+NOx
With Fuel Savings	$1,900/ton HC+NOx

Effect on Industry

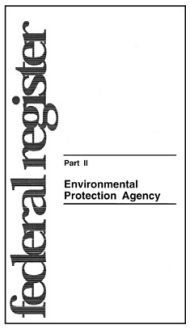
The proposed rule would require engine manufacturers to:

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

Some of the technologies currently in development to achieve these standards with the use of a catalyst (e.g., John Deere's "LE technology" and Komatsu Zenoah's "Stratified Scavenged" design) are anticipated to be a primary choice for manufacturers of Class III and IV engines to meet their Phase 2 emission levels. Class V engines are expected to use the same technologies without catalysts to meet their Phase 2 emission levels.

The proposed 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 a declining set of average standards, a certification ABT program, and special provisions to ease and/or delay the impact of the proposed rule on small volume engines and equipment.

Public Participation Opportunities



We welcome public comments on this proposed rule from all interested parties. For instructions on submitting written comments, please see the *Federal Register* notice. It is available from the EPA Air Docket by calling 202-260-7548; please refer to Docket No. A-96-55. In addition, the proposed rule and related documents are available electronically via the EPA Internet server at:

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

For More Information

Additional documents on small nonroad SI engines are available electronically at the Internet site given above, or by writing to:

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