**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Part 90**

**[FRL–5942–9]**

**RIN 2060–AE29**

## Phase 2 Emission Standards for New Nonroad Spark-Ignition Engines At or Below 19 Kilowatts

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice of proposed rulemaking (NPRM).

**SUMMARY:** Today's action proposes a second phase of regulations to control emissions from new nonroad spark-ignition engines at or below 19 kilowatts (25 horsepower). These engines are used principally in lawn and garden equipment, both in nonhandheld applications such as lawnmowers, and also in handheld applications such as trimmers and chainsaws. The proposed standards are expected to result in a 30 percent reduction of emissions of hydrocarbons plus oxides of nitrogen from the current Phase 1 standards. If adopted, the standards would result in important reductions in emissions which contribute to excessively high ozone levels in many areas of the United States.

**DATES:** Written comments on this NPRM must be submitted on or before March 13, 1998. EPA will hold a public hearing on February 11, 1998 starting at 10:00; requests to present oral testimony must be received on or before February 6, 1998.

**ADDRESSES:** Written comments should be submitted (in duplicate if possible) to: EPA Air and Radiation Docket, Attention Docket No. A–96–55, Room M–1500 (mail code 6102), 401 M Street, SW, Washington, D.C. 20460. Materials relevant to this rulemaking are contained in this docket and may be viewed from 8:00 a.m. until 5:30 p.m. weekdays. The docket may also be reached by telephone at (202) 260–7548. As provided in 40 CFR part 2, a reasonable fee may be charged by EPA for photocopying. The public hearing will be held in Ann Arbor, MI at a location to be determined; call (313) 668–4278 for further information.

**FOR FURTHER INFORMATION CONTACT:** Robert Larson, Office of Mobile Sources, Engine Programs and Compliance Division, (313) 668–4278, larson.robert@epamail.epa.gov.

**SUPPLEMENTARY INFORMATION:**

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### I. Regulated Entities

Entities potentially regulated by this action are those that manufacture or introduce into commerce new small spark-ignition nonroad engines or equipment. Regulated categories and entities include:

| Category | Examples of regulated entities |
|---|---|
| Industry ..... | Manufacturers or importers of new nonroad small (at or below 19 kW) spark-ignition engines and equipment. |

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your company is regulated by this action, you

should carefully examine the applicability criteria in § 90.1 of title 40 of the Code of Federal Regulations. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

## II. Legal Authority and Background

Authority for the actions set forth in this rule is granted to EPA by sections 202, 203, 204, 205, 206, 207, 208, 209, 213, 215, 216, and 301(a) of the Clean Air Act as amended (42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a)).

In the summer of 1992, EPA initiated a convening process to determine the feasibility of a negotiated rulemaking for the development of the regulatory program for small nonroad spark-ignited (SI) engines at or below 19 kilowatts (hereafter referred to as ''small SI engines''). An August 1992 report recommended an ''Exploratory Meeting'' which was held November 1992. Following meetings in January and June 1993, the group decided to pursue a regulatory negotiation process for the development of Phase 2 regulations for these engines, while EPA developed a first phase of controls for small SI engines through the traditional rulemaking process.

On July 3, 1995, EPA published the Phase 1 final rule, Emission Standards for New Nonroad Spark-ignition (SI) Engines At or Below 19 Kilowatts, hereafter referred to as the Phase 1 small SI engine regulations.[1] The Phase 1 small SI engine regulations established an effective date of model year 1997. Although the Phase 1 regulations were the first to establish nationwide new engine emission standards for this industry, the federal regulations were developed to harmonize with the Tier I[2] standards established by California's Air Resources Board.[3]

The engines covered by the existing Phase 1 rule include nonhandheld engines (Class I and II) used in applications such as lawnmowers, generator sets and riding mowers, and handheld engines, (Class III, IV and V), used in applications such as trimmers, edgers, brush cutters, leaf blowers, leaf vacuums, chain saws, augers and tillers. The proposed Phase 2 rules contained in today's notice would apply to the same types of engines and applications covered by Phase 1.

On September 30, 1993, the charter for the Small Nonroad Engine Negotiated Rulemaking Advisory Committee was filed with Congress. The purpose of the committee was to help EPA develop Phase 2 small SI engine regulations. The committee consisted of eleven members representing the range of stakeholders.[4] The committee adopted protocols and formed four task groups to examine key issues and bring recommendations to the full committee. The task groups included: Test Procedure; Technology; Certification; and Public Education and Market Incentives.

The committee and the task groups met numerous times between September 1993 and February 1996, with the final committee meeting on February 16, 1996, in Ann Arbor, Michigan. During the course of its work, the committee addressed many issues, including: applicability of the rule; engine/equipment classification; test procedures for engines; standards and standard structure; effective dates and lead time of the program; certification, enforcement and compliance strategies; in-use program; market-based incentive programs; public education programs; technologies; and dealer responsibility.

The committee developed data and draft language to address most of these issues, both through the work of the task groups and the work of the committee as a whole. However, the committee did not reach consensus on an agreement in principle or draft regulatory language during the course of the negotiations. While the committee did not achieve consensus, the regulatory negotiation process produced substantial useful information and provided EPA with input from numerous key stakeholders which has helped EPA develop the Phase 2 small SI engine regulatory program being proposed today.[5] In addition, during the meetings there was much useful discussion which has helped EPA understand the perspectives of the interests represented at the table.[6]

Following the final meeting of the regulatory negotiation committee in February 1996, EPA proceeded to develop the Phase 2 rule. EPA and other interested parties continued working to find areas of agreement on how certain aspects of a Phase 2 program would be addressed in the proposed rule. As these discussions proceeded, the involved parties worked together to develop written documents, Statements of Principles (SOPs), which have partly formed the basis of today's Phase 2 NPRM (see 62 FR 14740, March 27, 1997). A Statement of Principles (SOP) is a joint written statement by the U.S. EPA and supporting parties outlining a comprehensive plan for developing a proposed rulemaking. In this case, the two SOPs lay out the framework for a proposal for Phase 2 regulations covering small handheld and nonhandheld spark-ignited nonroad engines, respectively.

The ''Handheld SOP'', addressing issues affecting engines used in handheld equipment, was signed in May 1996 by EPA, the Auger and Power Equipment Manufacturers Association (APEMA), the North American Equipment Dealers Association (NAEDA), the Portable Power Equipment Manufacturers Association (PPEMA), the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO), and the Wisconsin Department of Natural Resources. The ''Nonhandheld SOP'', addressing issues affecting engines used in nonhandheld equipment, was signed in December 1996 by EPA, Briggs & Stratton Corporation, Kawasaki Motors Corporation, U.S.A., Kohler Company, Kubota, Mitsubishi Engine North America, Inc., Onan Corporation, Suzuki Motor Corporation, Tecumseh Products Company, The Toro Company,

[1] 60 FR 34582, July 3, 1995, codified at 40 CFR part 90. The docket for the Phase 1 small SI engine rulemaking, EPA Air Docket #A–93–25, is incorporated by reference.

[2] The California utility and lawn and garden equipment engine (utility engine) emission regulations are contained in Title 13, California Code of Regulations (CCR), Sections 2400–2407.

[3] Since the July 3, 1995 promulgation of the Phase 1 program, four changes have been made to Phase 1. First, provisions for allowing a streamlined certification process were promulgated May 8, 1996, 61 FR 20738. Second, revisions to the national security exemption provisions were promulgated October 4, 1996, 61 FR 52088. Third, revisions to the carbon monoxide (CO) emission standards for Class I and II engines, and provisions related to crankcase emissions, were promulgated, November 13, 1996, 61 FR 58296. Finally, provisions relating to replacement engines and 2-stroke engines in nonhandheld applications were published August 7, 1997, 62 FR 42637.

[4] The organizations participating in the regulatory negotiations as members of the Committee were: the American Lung Association (ALA); the Auger and Power Equipment Manufacturers Association (APEMA); the Engine Manufacturers Association (EMA); the Manufacturers of Emission Controls Association (MECA); the Natural Resources Defense Counsel (NRDC); the North American Equipment Dealers Association (NAEDA); the Outdoor Power Equipment Institute (OPEI); the Portable Power Equipment Manufacturers Association (PPEMA); the State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials (STAPPA/ALAPCO); the Wisconsin Department of Natural Resources; and U.S. EPA.

[5] EPA initially established EPA Air Docket A–93–29 for the Phase 2 rulemaking; this docket contains background materials on this Phase 2 rulemaking, as well as materials related to the Small Nonroad Engine Negotiated Rulemaking process. EPA Air Docket A–93–29 is hereby incorporated by reference.

[6] The final report by the facilitators to the regulatory negotiation process can be found in EPA Air Docket A–93–29, Item #II–A–10.

and Wis-Con Total Power Corporation. While the two SOPs set out a framework for EPA's development of the proposed Phase 2 program, the Agency wishes to stress that they do not represent final decisions regarding Phase 2 or bind EPA as to how provisions in the final rule must be promulgated.

EPA published an Advanced Notice of Proposed Rulemaking (ANPRM) in March 1997 (see 62 FR 14740, March 27, 1997) which announced the signing of the two SOPs and requested comments on all aspects of the SOPs for purposes of developing today's proposal. EPA also specifically requested information on small business issues in the ANPRM. Significant comments received on the ANPRM are discussed in the context of the description of the program contained in today's proposal.

### III. Overview of Proposed Provisions

EPA is proposing today a second phase of regulations for small SI engines 19 kW and below (hereafter referred to as small SI engines). Two principal goals of the proposed Phase 2 rule are to encourage a shift to cleaner engine technology, and to assure that the air quality benefits anticipated by the rule are achieved in actual use. To achieve these goals, the proposed Phase 2 program builds on the current Phase 1 program in two key ways. First, today's proposal includes more stringent standards for hydrocarbons (HC) plus oxides of nitrogen ($NO_X$) emissions, with a requirement that engines meet these emission standards through their useful lives.[7] Second, the proposal adds an in-use component to the Phase 1 compliance program to assure that the emission benefits are achieved in actual use.

As is clear from the analysis supporting this proposed rule (see Sections V, VI and VII, and draft Regulatory Support Document), further emission reductions from future model year small SI engines beyond those achieved through the Phase 1 program can be achieved in a cost-effective manner. Uncontrolled, small SI engines contribute approximately 3.4 percent of the national HC emission inventory, 9.3 percent of the mobile source HC emission inventory, and 34.4 percent of the nonroad mobile source HC emission inventory.

The Phase 1 small SI regulations are expected to reduce the HC emissions from these engines by 32 percent. However, even with Phase 1 controls in place, small SI engines continue to contribute significantly to the emission inventory that leads to ozone concentrations in nonattainment areas. After Phase 1, small SI engines contribute approximately 3.1 percent HC nationally, 8.4 percent of mobile source HC, and 31.6 percent of the nonroad mobile source HC inventory (note that these values do not reflect changes in inventories from other sectors).

In addition, further control of $HC+NO_X$ emissions from future model year small SI engines beyond Phase 1 levels, as proposed in today's notice for Phase 2 controls, is achievable through technology that will be available for the engines to which the standards would apply, considering cost, lead time noise, energy and safety factors. For nonhandheld engines, proposed Phase 2 emission levels are expected to be achieved through a combination of modifications to current engine technologies, and conversions to cleaner, more durable technology such as overhead valve engine technology. For handheld engines, proposed Phase 2 emission levels are expected to be achieved through improvements to current 2-stroke engine technologies (see discussion in Section IV.A of this preamble).

If the Phase 2 program is adopted as proposed, many elements of the existing Phase 1 program would remain essentially the same in the Phase 2 program. First, the types of engines covered by the proposed Phase 2 rule would remain essentially the same as those covered in the Phase 1 program (see discussion, Section IV.G). In addition, EPA would retain the five engine class categorization from Phase 1 for regulatory purposes as in Table 1 (see discussion, Section IV.G.3). Third, the Phase 1 criteria for determining whether an engine family would be allowed to certify to less stringent handheld standards would be retained (see Section IV.G.2).

TABLE 1.—SMALL SI ENGINE CLASSES

| Nonhandheld | | Handheld | | |
|---|---|---|---|---|
| Class I | Class II | Class III | Class IV | Class V |
| <225 cc | ≥225 cc | <20 cc | 20 cc≤ and <50 cc | ≥50 cc |

In addition, other elements of the existing Phase 1 program that would remain essentially unchanged in this proposed Phase 2 program include: (1) Applicability of the rule and definitions (see 40 CFR Part 90, Subpart A), except as discussed in Section IV.G; (2) certification requirements (see 40 CFR Part 90, Subpart B), except for the proposed requirements to determine deterioration factors and to certify that engines meet the standards through their useful lives (see Section IV.D.1), and proposed flexibilities for small volume engine manufacturers (see Section IV.E); (3) provisions regarding test equipment and test procedures (see 40 CFR Part 90, Subparts D and E), except for minor changes addressed in Section IV.B; (4) provisions for selective enforcement audits (SEAs), (see 40 CFR Part 90, Subpart F), except that for the Phase 2 program SEA would exist primarily as a backstop to manufacturer-run production line testing program (see Section IV.D.2; and (5) provisions pertaining to importation of nonconforming engines, emission-related defect reporting requirements, voluntary emission recall program, exclusion and exemption of nonroad engines from regulations, prohibited acts and general enforcement provisions, and emission warranty and maintenance instructions (see 40 CFR Part 90, Subparts G, I, J, K, and L), except for provisions for ordered recall (see proposed § 90.808) and compliance flexibilities for small volume equipment manufacturers (see proposed § 90.1003). EPA solicits comment on the appropriateness of retaining these elements of the Phase 1 program in Phase 2.

Elements new to the regulatory requirements for small SI engines included in today's proposed Phase 2 program include: (1) proposed emission standard levels and useful life categories (see proposed amendments to Subpart B, and Section IV.A); (2) a certification

[7] EPA is proposing a set of values for the useful life of the engines for regulatory purposes. The term ''useful life'' refers to these regulatory useful life categories, which are discussed in more detail in Section IV.A.4 of this preamble.

averaging, banking and trading program for nonhandheld engines (see proposed Subpart C, and Section IV.A.5); (3) procedures for the determination of deterioration factors at the time of certification (see proposed amendments to Subpart B, and Section IV.D.1; (4) a manufacturer-run production line testing program, called CumSum (see proposed Subpart H, and Section IV.D.2); and (5) in-use testing programs for nonhandheld and handheld engines, with an in-use credit program for handheld engines (see proposed Subparts M and N, and Section IV.D.3).

In addition, this proposal contains a number of flexibilities to ease the transition to this more stringent Phase 2 program, some which would apply to all manufacturers, and others which would be targeted to ease the transition specifically for small production volume manufacturers (see discussion, Section IV.E). Finally, today's notice also describes EPA's intent to pursue a voluntary ''green labeling'' program and a voluntary fuel spillage reduction program for nonhandheld and handheld engines, and a particulate matter (PM) and hazardous air pollutant testing program for handheld engines (see Section IV.F).

The programs proposed today for nonhandheld and handheld engines are similar in many respects. They also have some important differences. The intertwining issues of more stringent standards and assurance of emission reductions in use can be addressed in a number of ways. The remainder of this section provides an overview of the Phase 2 program goals of encouraging a shift to cleaner technology and assuring that emission reductions are achieved in-use, and a description of the basic proposed programs for nonhandheld and handheld engines for achieving these goals.

*A. More Stringent Standards and a Shift to Cleaner Technology*

EPA is proposing today $HC+NO_X$ emission standards for nonhandheld and handheld engines that are expected to achieve important reductions of emissions that contribute to ozone nonattainment. The standards for Classes II–V would be fully phased-in by the 2005 model year, with Class I levels effective in the 2001 model year. Engines would be required to meet these levels throughout their useful lives. For nonhandheld engines, a certification averaging, banking and trading program is proposed as an integral part of feasibility of the proposed $HC+NO_X$ emission standards (see Section IV.A.5). A more complete discussion of the justification of the level of the standards and the technologies expected to meet these levels can be found in Section IV.A. This section contains a brief overview of the proposed nonhandheld engine emission standards, the proposed handheld emission standards, and the proposal for useful life categories for nonhandheld and handheld engines.

1. Nonhandheld Engine $HC+NO_X$ Emission Standards

The emission standards proposed today for nonhandheld engines, indicated in Table 2, represent an approximate 25 percent reduction in $HC+NO_X$ levels from Phase 1 levels. These standards are expected to be achieved in a cost-effective manner by modifications to current engine technologies and, especially in the case of Class II engines, by conversion of current side valve (SV) technology engines to cleaner, more durable technology, such as overhead valve (OHV) technology engines. For Class I, where engine sales are currently dominated by side-valve (SV) technology engines, the proposed levels are expected to result in cleaner and more emissions durable SV technology engines, but are not in themselves expected to result in conversion of SV engines to OHV or comparably clean and durable engine technology. These modifications to SV engines can be accommodated by 2001, the proposed effective date for the Phase 2 standard for Class I engines. For Class II engines, the proposed levels are expected to result in complete conversion to clean OHV or comparable technology. To allow this more significant design change, the proposed Phase II standards are gradually decreased from 2001 through 2005.

TABLE 2.—$HC+NO_X$ EMISSION STANDARDS FOR NONHANDHELD ENGINES IN GRAMS/KILOWATT-HOUR

[g/kW-hr] [1]

| Engine class | Model year 2001 | Model year 2002 | Model year 2003 | Model year 2004 | Model year 2005 |
|---|---|---|---|---|---|
| Class I | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| Class II | 18.0 | 16.6 | 15.0 | 13.6 | [2] 12.1 |

[1] Optional non-methane hydrocarbon (NMHC) plus $NO_X$ emission standards for natural gas fueled engines only, and carbon monoxide (CO) emission standards, are also proposed in today's notice, and are discussed in Section IV.A.

[2] The 12.1 g/kW-hr Class II standard assumes a phase-in from 50 percent in model year 2001 to 100 percent in model year 2005 of OHV or comparably clean and durable technology.

A key aspect of the proposed Phase 2 program for nonhandheld engines is the belief that low emission standards for nonhandheld engines can be met through engine technology that can be low emitting both when the engine is new, and also when the engine has experienced hour accumulation to the engine's useful life. Therefore, these Phase 2 standards are based on useful life emission performance.

*a. OHV and SV Engine Technologies.* EPA believes that features inherent to the design of OHV technology engines are superior to those of SV engines and allow for lower new engine emissions as well as lower emission deterioration characteristics. In general, the combustion chamber and cylinder head design of OHV technology engines give these engines the potential to produce lower emissions both when new and also in-use. These engines have potential to exhibit lower emissions when new due to location of the combustion chamber directly over the piston, rather than partly to the side of the piston as in SV technology engines. This location allows a shorter combustion time, shorter flame propagation, better fuel combustion, and better cooling characteristics. In addition, OHV technology engines are designed with lower surface to volume ratios, which enhance fuel combustion. OHV technology engines also have the potential to exhibit improved in-use engine durability characteristics due to the location of the valves in the cylinder head rather than in the block, which affords more uniform exposure of the valves to heat sources and thus lower distortion of valves and valve seats. However, the Agency recognizes that the design of the engine is all-important,

and that it is possible to improve features of both SV and OHV technology engines to enhance new and in-use emission characteristics (e.g., cylinder heads, advanced carburetion, fuel injection). The Agency requests comment on the fundamental supposition of this rule that OHV technology engines have the potential to be superior to SV technology engines for new and in-use emissions characteristics. Further discussion of SV and OHV technology engines is contained in Section IV.A and Chapter 3 of the Draft Regulatory Support Document (RSD).

*b. Class I Use of OHV Technology.* The nonhandheld small SI engine market has traditionally been dominated by SV technology engines, with SV technology engines accounting for as much as 90 percent of engine sales in Class I and 65 percent of engine sales in Class II. The majority of Class I SV engines are used in low cost, consumer products such as walk-behind mowers. Recently, the market has been moving towards OHV for Class II, in recognition of OHV advantages in engine performance, engine durability, fuel economy, and emissions characteristics. These advantages would be expected to be more important in commercial equipment which tend to make up significant market for Class II engines. For Class I engines, there has not been this same trend to OHV technology.

One barrier to increased penetration of OHV technology engines into the Class I market, which is dominated by residential, low cost equipment, may have been the cost associated with the conversion of product lines from SV technology to OHV technology. These conversion costs to the engine manufacturer are expected to be in the range of $5 to $14 per engine, depending on volume; cost to the consumer would likely be even higher (see Section VI for further discussion of these costs). For residential, low cost equipment, the OHV engine's advantages in performance and durability may not outweigh the associated higher purchase price when compared to equipment using less expensive SV equipment, at least in the near term and in light of the lead time EPA is proposing for the proposed Class I standard. If consumers of residential equipment are particularly price sensitive, they may choose not to purchase new equipment if priced higher due to the use of an OHV engine. Rather, to the extent four stroke SV engines tend to continue providing operable service, consumers may choose to spend money on equipment maintenance, extending both the life of the equipment and the number of hours the existing, non-Phase II SV engines would be used. If this happens, sales of cleaner, Phase II engines could be depressed and the extended use of SV engines toward the end of their useful life would add disproportionately to emission from small engines as the emission performance of these engines tends to continue deteriorating with use. Moreover, promulgation of a more stringent Class I standard, combined with the proposed Class II standard, would raise questions about the need for providing significantly longer lead time before the standards became effective. Additionally lead time might be necessary to allow manufacturers to invest the greater level of engineering and production resources necessary to convert both Class I and Class II engines to OHV technology for their entire product line as could be necessary for a nationwide program. This additional lead time could delay the environmental benefits of the program.

Due to uncertainties as to consumer acceptance of OHV engines in typical Class I equipment applications if required nationwide and how a more stringent Class I standard might effect lead time for the program as a whole and the resulting uncertainty of emissions benefit, the Agency is not at this time proposing Class I standards which would mandate the conversion of Class I engines to OHV technology. However, EPA is requesting comments on the likely impacts of such a standard. Even if it is not appropriate to adopt more stringent Class I standards now, in the future, as uncertainties regarding consumer acceptance of OHV Class I engines and other issues are resolved, EPA will be able to re-evaluate the stringency of the proposed standard and pursue any necessary and appropriate revisions. Additionally, the experience in California will likely provide useful information.

While today's proposed emission standard for Class I engines are not expected to require additional conversion from SV to OHV technology, EPA does desire to encourage the production and sale of OHV engines into the Class I market on a mass volume basis. In order to encourage this, EPA has entered into Memoranda of Understanding (MOUs) with two individual engine manufacturers.[8–10] These two companies currently represent over 80 percent of all Class I engine sales. The two MOUs detail the specifics of Class I OHV engine demonstration programs which are designed as experiments to explore the consumer acceptance and feasibility of developing low cost OHV technology which can be applied to mass production Class I engines. The two programs include a series of reports to EPA on the level of success, impediments encountered, market response, costs, emission rates, and so forth. The two Class I OHV demonstration programs will begin prior to the proposed effective dates for the Phase 2 rule. While the MOUs are outside the scope of the regulatory process, if successful, this voluntary program may generate considerable emission benefits in addition to those anticipated to result from the proposed standards.

In addition, the proposed voluntary ''green labeling'' program is designed to encourage manufacturers to produce engines that are substantially below the standards proposed today. In Class I in particular, manufacturers may decide for market reasons to convert current SV engines to OHV or comparably clean and durable technology engines, in order to qualify for the ''green label'' (see discussion of the program in Section IV.F.1).

EPA requests comment on the general issue of the impact of moving to OHV technology for Class I engines, including the potential impact on sales of new equipment, the extended use of existing SV engines, the impact of a more stringent Class I standard on the ability of manufacturers to meet the proposed Class II standard under the proposed schedule, any options in addition to the voluntary ''green labeling'' program which would encourage the sale of clean OHV technology engines and the implications for emissions impact which would likely result from these actions.

*c. Class II Use of OHV Technology.* The 12.1 g/kW-hr HC + $NO_X$ emission standard proposed to take effect in the 2005 model year for Class II engines is expected to result in complete conversion to clean OHV or comparably clean and durable engine technology. As is discussed below in Section IV.A, this is an aggressive standard for Class II engines. The transition to OHV technology should be eased by the phase-in of the standard and the certification averaging, banking, and trading provisions proposed today for nonhandheld engines.

2. Handheld Engine HC+$NO_X$ Emission Standards

The standards proposed today for handheld engines represent an approximate 35 percent reduction from Phase 1 levels, to be phased-in on a

[8–10] Copies of these MOUs are in EPA Air Docket A–96–55, Items II–B–03 and II–B–04.

percentage of production basis between the 2002 and 2005 model year, as indicated in Table 3. These standards are expected to be achieved in a cost-effective manner by use of improved 2-stroke technology engines (as discussed in more detail in Section IV.A).

TABLE 3.—HC+$NO_X$ EMISSION STANDARDS FOR HANDHELD ENGINES

[In g/kW-hr]

| Engine class | HC+$NO_X$ emission standard (g/kW-hr) | Model year 2002 (percent) | Model year 2003 (percent) | Model year 2004 (percent) | Model year 2005 (percent) |
|---|---|---|---|---|---|
| Class III | 210 | | | | |
| Class IV | 172 | 20 | 40 | 70 | 100 [1] |
| Class V | 116 | | | | |

[1] The standards would be phased-in on the basis of percentage of total eligible sales. In this proposed rule, ''eligible sales'' or ''U.S. sales'' is defined as Phase 2 engines sold for purposes of being used in the United States, and includes any engine exported and subsequently imported in a new piece of equipment, but excludes any engine introduced into commerce, by itself or in a piece of equipment, for use in a state that has established its own emission requirements applicable to such engines pursuant to a waiver granted by EPA under section 209(e) of the Clean Air Act.

Two-stroke technology engines have traditionally been the dominant engine design used for handheld equipment applications. These engines have been well suited to meet the weight, multipositional use, and power requirements of these applications. However, 2-stroke technology engines also have very high engine emissions, compared with 4-stroke technologies, due in large part to fuel scavenging losses.

With the advent of emission control requirements federally and in California, research into other technologies to further control emissions from engines used in handheld applications has occurred. Promising technologies include light weight 4-stroke technology engines, and 2-stroke technology engines with aftertreatment. However, little is known about the in-use performance, in-use emissions characteristics and cost of these technologies, or how appropriate it is to consider these technologies across the full range of handheld equipment applications. Because of these uncertainties, today's standards would not require conversion to 4-stroke engine technology or the use of aftertreatment for handheld engines. However, EPA wants to encourage introduction of technologies into today's market which are cleaner than required by the proposed standards. For example, EPA recognizes that some engine manufacturers have recently developed and marketed cleaner, lightweight 4-stroke engines for use in handheld equipment. The Agency believes potentially cleaner 4-stroke engines, 2-stroke engines with aftertreatment and other advanced two-stroke technologies may enter the market to a limited extent on a national level during the time frame of the Phase 2 program. EPA's goal is to encourage development of such technology, and EPA believes that the proposed ''green labeling'' program, (discussed in Section IV.F.1) should provide important incentives to manufacturers to introduce cleaner technologies on a national basis. In addition, the Agency intends to conduct a technology review and a possible Phase 3 rulemaking to address the possibility that technological advances and/or cost reductions may occur after promulgation of the Phase 2 rule that could make greater, but still cost-effective reductions feasible in handheld engine emission levels.

3. Useful Life Categories

Today's proposal would require that engines meet the proposed emission standards throughout their useful lives. EPA is today proposing multiple useful life categories, indicated in Tables 4 and 5, given the numerous applications in which these engines are used, and wide variation in expected engine useful life in these different applications. In addition, the use of these engines in applications which experience primarily commercial rather than primarily consumer or residential usage can also impact the useful life of the engine.

TABLE 4.—USEFUL LIFE CATEGORIES FOR NONHANDHELD ENGINES

[Hours]

| | Category C | Category B | Category A |
|---|---|---|---|
| Class I | 66 | 250 | 500 |
| Class II | 250 | 500 | 1000 |

TABLE 5.—USEFUL LIFE CATEGORIES FOR HANDHELD ENGINES

[Hours]

| | Residential | Commercial |
|---|---|---|
| Class III, IV and V | 50 | 300 |

EPA is proposing that at the time of certification, engine manufacturers would have the responsibility to select the useful life period which most typically represents the in-use operating periods for the majority of engines in the engine family, based on information about that engine family including design and durability information, as well as information about the equipment in which the engine is expected to be used. Manufacturers would label the engine according to the useful life selection. See Section IV.A.4 for further discussion of the proposed useful life provisions for nonhandheld and handheld engines.

*B. Assuring Emission Reductions are Achieved In-use*

The goal of the in-use component of the proposed Phase 2 program is to provide assurance that the emission reduction benefits anticipated by the program are achieved in actual use. This section describes how EPA's traditional compliance programs for mobile sources achieve this goal, outlines various challenges in designing a compliance program for the small SI industry, provides an overview of the compliance program proposed today for nonhandheld and handheld engines, and discusses alternative compliance program options.

1. Traditional Compliance Programs for Mobile Sources

EPA has traditionally used three-step compliance programs to implement and enforce mobile source emission standards. For a given engine family, the first of the three steps is certification, where, based on emission data from test engines, which are often prototype engines, EPA issues a license to the engine manufacturer known as a certificate of conformity. This license enables the manufacturer to introduce engines covered under the certificate into commerce in the United States. This step typically includes some means of projecting the emissions characteristics of the engine family over its useful life. If the manufacturer demonstrates according to the regulatory provisions that the engine family meets the emission standards for the useful life of the engines, EPA issues a certificate of conformity.

The second step is production line testing where the engine manufacturer demonstrates that actual production line engines meet emission standards. Production line testing provides an opportunity for EPA and the manufacturer to verify that designs approved based on certification testing are translated into mass production engines that meet standards and to catch production problems before they become in-use problems.

The last step involves the testing of in-use engines to ascertain whether the engines continue to meet standards during their useful lives in the hands of typical customers. EPA has the authority under Section 207(c) of the Clean Air Act to require a mandatory recall of vehicles or engines that have been shown not to comply with standards for their useful life. Such recalls are instigated based on evidence of nonconformities discovered through a variety of means, the most common of which are cases in which nonconformities are found either through production line testing or through in-use testing programs. In EPA's on-highway emission control programs, EPA's recall authority and recall practices have provided clear incentives to manufacturers to produce emissions durable engines and vehicles.

2. Compliance Programs for the Small SI Engine Industry

The Phase 1 emission control program for small SI engines does not follow this typical three-step compliance program. This is because, unlike other programs, the Phase 1 program includes ''new engine'' standards only, that is, standards that the engines must meet when new, without the requirement that they continue to meet those standards in-use throughout their useful lives. As such, while the Phase 1 program contains programs for certification and production line testing (in the form of EPA initiated Selective Enforcement Audits), the program does not contain a requirement for manufacturers to project the emissions characteristics of the engine family over its useful life at the time of certification (e.g., to determine a deterioration factor, or ''df'', for the engine family), nor does it contain mandatory in-use testing provisions. EPA promulgated such a program for Phase 1 for several reasons, including the belief that for a first phase of emission controls, significant emission reductions would occur in this sector even with the ''new engine'' standards. Equally important was the lack of data available to the Agency at the time of the rulemaking on which to base an in-use program (e.g., information supporting appropriate regulatory useful life periods and engine deterioration rates). In addition, EPA made clear its intention to address in-use issues in a second Phase of regulation.

In addition to determining appropriate useful life periods and engine emission deterioration characteristics for this proposed Phase 2 program, the Agency has also faced a key challenge of how to conduct an effective in-use testing program for these engines, and whether or not a recall program modeled on the traditional on-highway recall program could be an effective compliance tool for this sector of the nonroad engine industry. As EPA has begun to regulate a wide range of nonroad engines pursuant to Section 213 of the Clean Air Act, it has become evident that a mandatory recall program, as has been traditionally conducted for the on-highway industry, may not be the most effective program for some sectors of the nonroad engine industry, as compared with other means of assuring compliance in-use. This is especially true for the small SI engine industry, in which many of the engines are installed in consumer products which are not registered and thus would be difficult to track in the event of a recall, and in which the cost of conducting a potential recall could be large relative to the cost of the actual engines being recalled.

For certain nonroad engine industry sectors, such as the spark-ignition marine engine sector and the small SI engine sector, EPA has sought to develop alternative programs designed to provide reasonable means to address emissions exceedances identified through production line testing and in-use testing programs. For example, the spark-ignition marine engine program includes a voluntary in-use credit program that EPA expects will be an effective way to address exceedances identified through in-use testing, and the program also includes provisions for the use of certification credits to address exceedances identified through production line testing (see 40 CFR Part 91).

EPA believes that these alternative programs, designed to provide a means to address emission exceedances, should meet several criteria in order to be considered as effective as EPA's traditional mandatory recall programs. First, they should provide an incentive to manufacturers to build emission-durable engines. Second, they should be practical to implement. Third, they should provide an incentive to perform accurate testing. Fourth, such programs should offset additional emissions that occur as a result of the exceedence of the standards. Finally, such programs should not be unduly burdensome to manufacturers.

The compliance programs proposed today for small SI nonhandheld and handheld engines are intended to meet these criteria. While EPA retains the authority to order a recall if a substantial number of engines are found to be in nonconformity, and while this Phase 2 proposal does include regulatory language governing EPA's action in ordering recalls (see proposed Subparts I and M), EPA anticipates considering programs which would be effective alternatives to ordering a mandatory recall of Phase 2 certified engines. Instead, EPA would expect these alternatives to recall would address the exceedances of the emission standards in ways that meet the five criteria identified above. For nonhandheld engines, in some cases, the use of certification credits would be allowed to offset exceedances of the family emission limit [11, 12] in the event of PLT exceedances. For handheld engines, the use of in-use credits would be allowed as one means of addressing potential exceedances of standards in the event of exceedances determined through production line testing or in-use testing programs. For both nonhandheld and handheld engines, other possible alternatives for addressing exceedances of emissions standards would include voluntary recall and other possible alternative projects (these issues are discussed

[11, 12] For nonhandheld engines participating in the averaging, banking, and trading program described in more detail in Section IV.A.5, compliance would be demonstrated with the family emission limit, or FEL, rather than the standard.

further in Section IV.D of this preamble).

3. The Proposed Phase 2 Compliance Program

Today's program proposes ''in-use'' standards for the first time for this industry.[13] New elements of the Phase 2 compliance program include processes for determining deterioration factors (''dfs'') at the time of certification, a manufacturer-run Production Line Testing program, and in-use testing components.

*i. Certification and In-Use Testing.* Today's proposal includes three different approaches to certification df determination and in-use testing, based on engine class and engine technology, which are discussed briefly below. These approaches comprise the basic program proposed today. EPA is also proposing additional procedures for some engine classes and engine technologies to increase the flexibility of the rule.[14] All the approaches are discussed in more detail in Section IV.D.

First, for nonhandheld OHV technology engines, manufacturers would be allowed to apply an assigned deterioration factor or ''assigned df'' to new engine test values at the time of certification to determine a useful life certification value. Compared to an alternative of testing an engine over its full useful life to determine deterioration, these engines would be allowed to undergo this lower burden certification effort, in return for participation in an industry-wide OHV field durability and in-use emission performance demonstration program (as described in Sections IV.D.1 and IV.D.3). Second, for nonhandheld side-valve technology engines and engines with aftertreatment, manufacturers would certify their engines based on accumulating hours on the engines to the engines' full useful lives at the time of certification. This relatively heavier burden at the time of certification is balanced by a decreased in-use testing burden. Following full useful life certification, these engines would not be subject to further in-use testing requirements. Third, for all handheld engines, manufacturers would certify their engines to full useful life standards at the time of certification using new engine test values and dfs determined based on ''good engineering judgment.'' Handheld engine manufacturers would then conduct an in-use testing program, by which each manufacturer would age and emissions test engines to ensure compliance in-use. A handheld engine manufacturer would in-use test up to 25 percent of its engine families each year.

Other than the addition of the requirements to demonstrate that engines meet the emission standards throughout their useful lives, and to determine a deterioration factor at the time of certification, the certification procedures proposed today for the Phase 2 program are essentially the same as those for Phase 1. In particular, EPA is proposing to retain a streamlined certification application form and process, with simple procedures for electronic submittal of information, as discussed further in Section IV.D.1.

*ii. Production Line Compliance.* Today's proposal would add a manufacturer-run Production Line Testing program known as CumSum to replace a Selective Enforcement Audit (SEA) program as the primary method of determining the compliance of new production engines. SEA would remain an optional or backstop program depending upon the class of engine, as described in Section IV.D.2.

*iii. Aging Engines To Their Useful Lives.* EPA believes that aging engines in field usage in typical representative applications would be the most accurate possible program for verifying in-use emissions. As such, the proposed OHV field durability and in-use emissions performance program (''Field Durability Program'') is designed to produce significant quantities of reliable test data from OHV engines aged in typical field usage, and to verify that the conclusions used in the certification process with respect to the durability of OHV engines are accurate.

While aging engines in typical field usage would be the optimal program for assuring the emission reductions are being achieved in use, EPA recognizes that costs associated with aging engines in the field and administering a field aging program could be higher than, for example, costs of a bench aging program. It is for this reason that EPA is proposing that for full useful life certification for nonhandheld side-valve technology engines or engines with aftertreatment, and for in-use testing for handheld engines, manufacturers may age engines on bench cycles, in lieu of field aging, provided that a field/bench adjustment factor has previously been established, as discussed in Section IV.C. EPA requests comment on the proposal to allow manufacturers in some cases to age engines on bench cycles in lieu of field aging.

In addition, for nonhandheld engine manufacturers, who could be field aging engines for the OHV Field Durability Program and also for the field/bench adjustment program, EPA is proposing a cap on the number of field engine tests required in a given year. EPA requests comments on all aspects of the compliance program proposed today for Phase 2 small SI engine regulation.

4. Alternative Compliance Program Options

The program proposed today for Phase 2 regulation of small SI engines is essentially the same as the program described in the ANPRM for this rulemaking. EPA received comments on the ANPRM relating to the differences between the nonhandheld and handheld sides of the industry, and the merits of applying concepts and programs outlined for one side of the industry to the other. One commenter stressed that the nonhandheld and handheld engine industries are very different in composition, in marketing, in technology, as well as in application. This commenter suggested that the program for nonhandheld engines described in the ANPRM is an integrated whole, with each provision linked to other provisions, and that it would be a mistake to graft parts of the handheld program on to the nonhandheld program. Another commenter suggested that the Agency should take a comprehensive and balanced view of the program for the two sides of the industry, and that elements of the two proposals should be used to create a simpler and more effective regulation.

EPA is concerned that any changes to the programs being proposed today should be considered carefully as to their impact on the program as a whole, given linkages between the various elements of the programs proposed today. For example, the compliance program proposed for nonhandheld OHV technology engines is designed as an integrated whole. The proposal to allow manufacturers to use the assigned dfs for certification is reasonable because it is linked to the proposal for an industry-wide OHV Field Durability Program designed to verify the assumptions with respect to stable and low dfs. In addition, EPA believes this

[13] The fact that the proposed Phase 2 emissions standards are ''in-use'' standards, compared with the Phase 1 standards which are ''new engine'' standards, together with the fact that these engines do experience emissions deterioration over time, is why, when compared numerically with the Phase 1 levels, Phase 2 levels in fact are higher in the case of Class I. Despite this apparent numerical discrepancy, EPA still anticipates important reductions from all engine classes as a result of the proposed Phase 2 standards. Since Phase 2 designs will account for in-use deterioration, in-use emission levels will be lower under the proposed Phase 2 regulations compared to Phase 1 engines.

[14] For example, for nonhandheld OHV technology engines, manufacturers would have an option to use a ''calculated df'' rather than the ''assigned df'' described below.

conversion of engines to OHV or comparably clean and durable technology, together with the OHV Field Durability Program, is one of the strongest elements of today's proposal, an element which links stringent standards forcing clean technology with a field testing program to verify that those emission reductions are being achieved in use.

However, EPA believes that there are multiple ways to design effective programs for reducing emissions from small SI engines, and for ensuring that those reductions are achieved in use. EPA requests comment on alternative compliance options. For example, EPA requests comment on an option which would allow nonhandheld manufacturers to establish certification dfs for SV engines and engines with aftertreatment through good engineering judgment (instead of the proposed program for full useful life aging for certification), linked to a program for field aging SV engines and engines with aftertreatment to verify the dfs established through good engineering judgment. EPA also requests comment on applying the in-use testing program proposed today for handheld engines to the nonhandheld side of the industry. EPA requests comments on these or other ways in which programs for the two sides of the industry could be designed to achieve the goals of providing assurance of environmental benefits in-use, easing the implementation burden for EPA and the industry, and achieving greater commonality in the programs for the two sides of the industry, where appropriate.

## IV. Description of Proposed Program

Section IV of today's document contains a description of the programs proposed for nonhandheld and handheld small SI engines for Phase 2 regulations, including discussion of standards and related provisions, test procedures, a field/bench adjustment program, compliance programs, flexibilities, nonregulatory programs, and other general provisions.

### *A. Standards and Related Provisions*

This section provides a detailed discussion of the standards being proposed for the Phase 2 program, as well as related provisions including useful life categories, certification averaging, banking, and trading provisions, and certification fuel.

The Agency is aware of the levels which the California Air Resources Board (CARB) is considering for their Tier 2 standards for their Utility, Lawn, and Garden Engine regulation. The CARB Tier 2 levels are more stringent and occur in a shorter time frame than the levels being proposed by the Agency for a Federal Phase 2 program. Although EPA's approach is not structured identically with CARB regulations, EPA believes there are two valid reasons for the distinction. First, Congress has recognized the need for California to maintain its own mobile source emission control program (*see* section 209 of the CAA) because it faces difficult and distinct air pollution problems and, as a result, may need to adopt measures more stringent than those that apply in the nation as a whole (*see,* e.g., *Motor & Equipment Manufacturers Association* v. *EPA*, 627 F.2d 1095, 1110–11 (D.C. Cir. 1979)). Second, EPA's nonroad emission standards are not allowed to be more stringent than is achievable for this nationwide program after consideration of cost and lead time according to section 213(a)(3) of the CAA. Although California is constrained by similar criteria per the authorization criteria of section 209(e), consideration of such criteria is limited to the State of California. The Agency must consider cost and lead time when nonroad emission regulations affect the nation as a whole. As discussed in the remainder of this section, the Agency believes the standards contained in today's proposal meet the section 213(a)(3) requirements to consider cost and lead time in setting Federal standards.

#### 1. $HC+NO_X$ Emission Standards

The Agency believes the level of the standards contained in today's proposal would achieve the greatest degree of emission reduction achievable through application of technology which will be available and considering lead time under the proposed schedule of compliance, noise, energy, safety, and cost factors associated with applying such technology to a nationwide program. The sections below discuss how EPA addressed and weighed these factors in developing the proposed standards.

EPA is proposing in-use $HC+NO_X$ standards of 25 g/kW-hr effective in model year 2001 for Class I engines, and 12.1 g/kW-hr to be phased-in between model years 2001 and 2005 for Class II engines, as presented in Table 6. EPA expects that the Class II levels would result in a complete shift in engine technology from side-valve (SV) to cleaner overhead valve (OHV) or comparably clean and durable technology by 2005.

TABLE 6. $HC+NO_X$ EMISSION STANDARDS FOR NONHANDHELD ENGINES

[In g/kW-hr]

| Engine class | Model year 2001 | Model year 2002 | Model year 2003 | Model year 2004 | Model year 2005 |
|---|---|---|---|---|---|
| Class I | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| Class II | 18.0 | 16.6 | 15.0 | 13.6 | 12.1 |

EPA is proposing in-use $HC+NO_X$ emissions levels for Class III, IV and V engines to be phased-in between model years 2002 and 2005 based on a percentage of U.S. sales as presented in Table 7.

TABLE 7.—$HC+NO_X$ EMISSION STANDARDS FOR HANDHELD ENGINES

[In g/kW-hr]

| Engine class | $HC+NO_X$ emission standard (g/kW-hr) | Model year 2002 (percent) | Model year 2003 (percent) | Model year 2004 (percent) | Model year 2005 (percent) |
|---|---|---|---|---|---|
| Class III | 210 | | | | |
| Class IV | 172 | 20 | 40 | 70 | 100 |

TABLE 7.—$HC+NO_X$ EMISSION STANDARDS FOR HANDHELD ENGINES—Continued

[In g/kW-hr]

| Engine class | $HC+NO_X$ emission standard (g/kW-hr) | Model year 2002 (percent) | Model year 2003 (percent) | Model year 2004 (percent) | Model year 2005 (percent) |
|---|---|---|---|---|---|
| Class V | 116 | | | | |

Unlike the nonhandheld Phase 2 program, for handheld engines, the phase-in process of mandatory percentages would result in Phase 1 and Phase 2 handheld engines being produced in the same model year, i.e., at least 20 percent of the engines produced in model year 2002 would be Phase 2 engines subject to the Phase 2 program, and up to 80 percent of the handheld engines produced in model year 2002 would be Phase 1 engines subject to the Phase 1 program, followed by a 40/60 split in model year 2003, and a 70/30 split between Phase 2/Phase 1 engines in model year 2004.

The remainder of this section describes the analysis and supporting data for the proposed $HC+NO_X$ standards for Class I nonhandheld engines, Class II nonhandheld engines, and Class III, IV, and V handheld engines. Each of these subsections is organized into the following topics: *(i) Historical Sales Trends by Engine Technology*—Historical trends are important to consider when assessing the range of field proven technologies. Historical trends assist in understanding what technologies have been demonstrated in actual use, what manufacturers' current production capabilities are, and the availability of new and in-use emission performance data; *(ii) In-use HC and $NO_X$ Emission Performance of Uncontrolled Engines*—The Agency presents this information to highlight the in-use performance characteristics associated with small engine technologies and the need for careful consideration of the in-use performance of various control technologies. Phase 1 new engine emission performance data is available from Federal certification data. However, in-use emission performance on engines pulled from the field is limited; therefore, a discussion of the in-use performance of uncontrolled engines is warranted; *(iii) New Engine and In-use HC and $NO_X$ Performance of Phase 1 Technology Engines*—A summary of the information available on the new and in-use emission performance of Phase 1 engines is presented. This information is used to assess the current status of the small engine industry, which is critical for the Agency's analysis when trying to predict the impact of technology changes on the industry; *(iv) Technologies Considered for Phase 2 $HC+NO_X$ Standards*—Discussion of the technologies the Agency considered when determining the level of the proposed standards is presented. This includes a discussion of new and in-use emission performance of each technology, and the per engine cost associated with each technology, and; *(v) Proposed Phase 2 $HC+NO_X$ Standard*—A discussion of the Phase 2 standards the Agency is proposing, including information on why the proposed standards are achievable, the proposed lead time, and a discussion and request for comment on more stringent standards (such as the CARB Tier 2 levels).

*a. $HC+NO_X$ Emission Standard for Class I Nonhandheld Engines.* This section presents information used by the Agency to determine the appropriate level for the proposed $HC+NO_X$ exhaust emission standards for nonhandheld Class I engines. A more detailed explanation of the engine technologies and costs described in this section is contained in the Draft Regulatory Support Document (RSD) for this proposal, a copy of which is available in the public docket for this rule.

i. Class I Historical Sales Trends by Engine Technology

Class I engine (<225 cc nonhandheld engines) sales have historically been dominated by low cost four-stroke side-valve engines. Two-stroke gasoline Class I engines are currently less than 10 percent of annual sales and will continue to decline as a result of the Phase 1 emission standards, which effectively calls for their phase-out by 2003 due to their high HC emissions. Prior to 1986, OHV engines represented less than one percent of annual Class I engine sales. In the past decade OHV engines have begun to penetrate the Class I marketplace, but they have hovered between 10 and 15 percent of total U.S. sales for the past eight years.

ii. In-use HC and $NO_X$ Emission Performance of Uncontrolled Class I Engines

Unregulated Class I engines have demonstrated high new engine emission rates for HC and CO, and low levels of $NO_X$, as well as poor in-use performance (large deterioration factors) for HC and CO, with little deterioration of new engine $NO_X$ values.[15] HC deterioration has been shown to be greater than two times the new engine value in as little as four years of engine use.

iii. New Engine and In-use HC and $NO_X$ Performance of Phase 1 Class I Technology Engines

Phase 1 engines have improved new engine emission performance over uncontrolled engines, and may have improved in-use performance. The Draft RSD for this proposal contains publicly available information on engine families from all engine classes certified to the Phase 1 program. This information shows both SV and OHV technology can meet the Phase 1 Class I new engine standard.

The Agency has recently examined information presented by several engine manufacturers concerning emissions deterioration from Phase 1 technology Class I side-valve and over-head valve engines.[16] A more detailed discussion of this data is presented in the Draft RSD. This information covers over 50 Class I engines field aged by manufacturers, with usage varying from 20 to 300 hours. Table 8 contains a summary of the $HC+NO_X$ deterioration factors resulting from an analysis of this data.

[15] See ''Emission Tests of In-use Small Utility Engines'' Southwest Research Institute, Sept. 1991, EPA Air Docket A–91–24, Item #II–A–8, and ''Nonroad Engine and Vehicle Emission Study'' U.S. EPA Report #21A–2001, Nov. 1991, EPA Air Docket A–91–24, Item #II–A–10.

[16] See ''Tier 1 Deterioration Factors for Small Nonroad Engines'', Sept. 1996, a report by Air Improvement Resources, available in EPA Air Docket A–96–55, Item #II–D–11.

TABLE 8.—SUMMARY OF IN-USE DETERIORATION OF PHASE 1 TECHNOLOGY CLASS I ENGINES

| | Class I OHV | Class I SV |
|---|---|---|
| Estimated $HC+NO_X$ df at 66 Hours ..... | 1.35 | 1.87 |

Analysis of this information indicates Class I SV $HC+NO_X$ deterioration is higher than Class I OHV engines. The lower new engine emission levels of Class I OHV over SVs combined with lower in-use deterioration results in better in-use emission performance for Class I OHV engines compared to Class I SV engines.

iv. Technologies Considered for Phase 2 Class I $HC+NO_X$ Standards

The Agency analyzed the emission performance and cost of several technologies which could be applied to Class I engines, including improvements to existing SV engines, conversion of existing SV engines to OHV technology, and the application of catalytic converters to existing SV and OHV engines. Four-stroke SV technology utilizes an engine configuration in which the intake and exhaust valves are located to one side of the combustion chamber (also called an L-head design), as compared to four-stroke OHV technology in which the intake and exhaust valves are located directly above the combustion chamber. Catalytic converters are add-on after treatment devices which operate by chemically reducing or oxidizing exhaust gases. The Draft RSD for this proposal contains additional information regarding these three technologies.

As discussed previously, the majority of Class I engines utilize SV technology. Table 8 shows that Class I SV technology have $HC+NO_X$ deteriorations on the order of 1.87 times new engine levels at 66 hours of use. Combining this with the Phase 1 certification level of 16.1 g/kW-hr $HC+NO_X$ indicates an in-use level of approximately 30 g/kW-hr $HC+NO_X$. The Agency believes additional reductions can be achieved with improvements to existing Phase 1 SV engines. A more detailed discussion of these improvements is contained in the Draft RSD. A summary of the improvements are: lowering of new engine emission levels achieved through enleanment of intake air-fuel ratio; improvements to valve seat material which will lower in-use distortion, resulting in decreased valve leakage and deposit formation; improvements in cylinder ring design, which will result in better combustion chamber sealing and lower oil consumption and lower combustion chamber deposits; continued structural improvements to cylinder design to lower cylinder distortion inherent in side-valve configurations; and addition of valve stem seals to limit the creepage of oil into the combustion chamber. As presented in the Draft RSD, the Agency estimates the improvements to Class I SV engines would cost the manufacturer as much as $4 to $7 per engine, depending on the engine family volume. The Agency estimates changes would result in improvements to both new and in-use emission performance, combining for a 10 to 20 percent improvement in the in-use $HC+NO_X$ performance beyond Phase 1 designs.

As indicated by Table 8, Phase 1 OHV engines have better in-use performance compared to Phase 1 SV engines. A new engine level equal to the Phase 1 standard of 16.1 g/kW-hr combined with a $HC+NO_X$ df of 1.35 at 66 hours results in an in-use emission rate of 21.7 g/kW-hr. This level is well below the performance of Class I SV engines, therefore the Agency has considered the conversion of existing Class I SV to OHV engines in developing the proposed Phase 2 levels. Based on the Federal Phase 1 new engine certification data analyzed for this proposal, the average Class I OHV engine emits around 10.5 g/kW-hr. Based on the deterioration information presented in Table 8 and design improvements discussed elsewhere, the Agency estimates a well designed nonhandheld OHV engine could have an $HC+NO_X$ deterioration factor of 1.3. Assuming a 10 percent compliance margin, these specific Class I OHV engines could achieve an average in-use emission level of around 15 g/kW-hr. However, it should be noted that only about 10 percent of current Class I engines are OHV designs. The performance of these specific engines may not be representative of what would occur if all Class I engines were converted to OHV technology.

Federal certification data indicates a small number of Class I engines have certified to the Federal Phase 1 standards using catalyst technology. Though it is technologically feasible to apply catalysts to both SV and OHV engines, the Agency has little information regarding in-use durability and emission performance of engines equipped with catalysts. As discussed previously, the in-use emission performance of small engines is a critical component of the analysis EPA has undertaken in the development of the Phase 2 proposal. The Agency's experience with on-highway catalyst technology has shown considerable in-use deterioration of catalysts can occur. In recent years several technical papers have been published regarding catalyst durability on small engines, however, these papers have relied on laboratory durability programs, such as aging catalysts on dynamometers [17]. The Agency is not aware of any actual field-aged in-use catalyst durability information. The Agency requests comment on the relationship between laboratory durability data and in-use field data, any information on typical in-use aged catalyst performance, and all available data on individual catalysts aged under typical in-use conditions experienced by equipment using Class I engines. The Agency requests additional information regarding new engine emission performance, in-use emission performance, and cost of catalyst technology for Class I SV and OHV engines.

v. Proposed Phase 2 Class I $HC+NO_X$ Standard

The Agency is proposing a corporate average exhaust emission level of 25 g/kW-hr $HC+NO_X$ for Class I engines beginning in model year 2001 (for discussion of the averaging, banking, and trading program, see Section IV.A.5). The Agency believes this level is technologically achievable, and, as discussed previously, can be met by improvements to existing Class I SV engines. The Agency has performed an analysis using the existing Phase 1 certification data (which contains confidential sales projections) combined with reasonable assumptions for in-use deterioration. This analysis indicates an averaging standard of 25 g/kW-hr is achievable with improvements to existing SV engines and considering the emission performance of existing Phase 1 OHV engines. A standard of 25 g/kW-hr would not require an increase in the penetration of Class I OHV sales. Manufacturers would need to make improvements to existing SV engine families which would require improvements to several engine components. However, major retooling of engine production lines would not be required. In addition, the use of ABT provides manufacturers with considerable flexibility for determining the most appropriate expenditure of resources when deciding which engine families will need specific improvements to meet the proposed levels. The lead time between the

[17] See Society of Automotive Engineers Technical Papers 930076, 932445, 941807, and 961735 for bench aged catalyst information.

finalization of this rule and model year 2001 would be sufficient for manufacturers to meet the proposed $HC+NO_X$ level.

The Agency has considered emission standard levels more stringent than the proposed 25 g/kW-hr $HC+NO_X$. As discussed above, a level more stringent than 25 g/kW-hr could be met by the conversion of existing SV technology engines to OHV technology. The Agency's analysis of existing Phase 1 certification data combined with confidential sales information indicates an in-use level of around 15 g/kW-hr could be met by current Phase 1 Class I OHV engines with some design improvements to assure in-use emissions durability. However, these Class I OHV engines represent only about 10 percent of Class I sales; it is uncertain what level of emission could be achieved by complete conversion to OHV technology. As discussed previously, the percentage of Class I OHV engine sales has remained fairly constant for the past eight years, despite superior durability, performance, and fuel economy. Several Class I engine manufacturers, including the two largest which represent the majority of the market in terms of sales, have discussed with the Agency their past attempts to sell low cost OHV engines, likely in competition with less expensive SV engines. Manufacturers have indicated they have seen little success in drawing consumers away from the even lower cost Class I SV engines. Engine manufacturers have indicated that the principle reason for the failure of OHVs to penetrate further into the Class I market is the cost difference between the two engine technologies, and consumers' unwillingness to pay this premium. Several engine manufacturers have indicated that low cost Phase 1 Class I SV engines have manufacturing costs on the order of $60 to $70 per engine. Engine manufacturers contend that for these low cost engines, the cost increase to purchase an OHV engine is large enough to prevent a larger market penetration by OHV engine, at least when they would have to compete in the market with SV engines (see 62 FR 14752, ''Class I OHV Demonstration Program''). The Agency estimates the manufacturer's cost for conversion to OHV to be between $5 and $14 per engine. Engine manufacturers have indicated concern over what they perceive to be the potentially dramatic impacts on the Class I engine sales which would result from a standard which requires conversion to OHV technology. As discussed in the Overview Section III.A, above, EPA is also concerned that possible adverse impact on sales and the potential need for additional lead time could result in reduction in at least the near term emission benefits anticipated by this proposal. The Agency requests comment on the market concerns expressed by engine manufacturers, on the potential impact on lead time associated with more stringent Class I standards and on the potential for delay in at least the near term emission reduction benefits available from Class I engines if more stringent standards were adopted.

The Agency is aware of the emission standards being considered by CARB for the CARB Tier 2 Utility, Lawn, and Garden Engine (ULGE) regulation. The Agency's current understanding is that CARB is considering Class I engine in-use standards of 16.1g/kW-hr $NMHC+NO_X$ to be met by model year 2000, followed by a standard of 12.0g/kW-hr in model year 2004. In their comments to the ANPRM, California recommended a nationwide level of control equivalent to that being considered by CARB. Further, CARB suggested these standards could be met with the use of available technology, specifically, total conversion to OHV technology to achieve compliance with a 16.1 g/kW-hr $NMHC+NO_X$ standard and the addition of catalyst control to meet a 12.0 g/kW-hr $NMHC+NO_X$ standard. EPA understands that CARB is still evaluating its Tier 2 ULGE program and may adopt regulations which differ from these specific levels or implementation dates or both. As discussed under Section IV.A of this proposal, section 209 of the CAA allows California to set its own standards, considering criteria as they apply to the State of California. However, as discussed later in this section, the Agency requests comment on whether application of these emission control technologies as being considered by CARB are appropriate for a Federal program at this time, the level of emission control expected from such application of these technologies and what adjustments to the proposed Federal program might be necessary to accommodate standards which would require such widespread application of OHV and catalyst technology.

The Agency has considered the potential impacts associated with the conversion of Class I SVs to OHV technology. Due to uncertainties as to consumer acceptance of OHV engines in typical Class I equipment applications and as to how a more stringent Class I standard might effect lead time for the program as a whole and the resulting uncertainty of emissions benefits, the Agency has chosen not to propose Class I standards which would mandate the conversion of Class I engines to OHV or comparably clean technology. However, the Agency requests comment on such an option. EPA specifically requests additional supporting information regarding this issue to be made available to the Agency through the public comment process on this proposed rule to supplement that which informed EPA's analysis of CARB's proposed Tier 2 levels and EPA's cost estimates of converting Class I engines to OHV. The Agency requests comment on all aspects of the proposed Class I standards.

b. $HC+NO_X$ Emission Standard for Class II Nonhandheld Engines.This section presents information used by the Agency to determine the appropriate level for the proposed $HC+NO_X$ exhaust emission standards for nonhandheld Class II engines. A more detailed explanation of the engine technologies and costs described in this section is contained in the Draft RSD for this proposal, a copy of which is available in the public docket.

i. Class II Historical Sales Trends by Engine Technology

Class II engine sales have been dominated by 4-stroke SV engines in the past. As described in the Draft RSD, Class II engines were predominantly SV technology in the 1970's and early 1980's. Beginning in about 1985, OHV engines have steadily increased their annual sales penetration into the Class II market, averaging about a 3 percent increase per year; by 1995 OHV engine sales represented approximately 35 percent of the Class II market, with the remaining 65 percent being SV engines.

ii. In-use HC and $NO_X$ Emission Performance of Uncontrolled Class II Engines

Information regarding new engine and in-use emission performance of uncontrolled Class II engines is limited. While some new engine data is available, the Agency does not have in-use emission information on uncontrolled Class II engines. The limited new engine information from uncontrolled engines comes from the CARB Technical Support Document for the CARB ULGE program.[18] The Agency used this information to estimate the new engine emission factors for the 1991 Nonroad Engine and Vehicle Emission Report. Those estimates were between 15.2 and 15.4 g/kW-hr for

[18] California Air Resources Board Mail Out #92–06, Technical Support Document for California Exhaust Emission Standards and Test Procedure for 1994 and Subsequent Model Year Utility and Lawn and Garden Equipment Engines, January 1992.

typical new engine Class II HC+$NO_X$ emission factors.

iii. New Engine and In-use HC and $NO_X$ Performance of Phase 1 Class II Technology Engines

Table 9 is a summary of the new engine emission values for gasoline fueled SV and OHV engine families certified to the Federal Phase 1 regulations as of September 1997.

TABLE 9.—SUMMARY OF FEDERAL PHASE 1 CLASS II GASOLINE FUELED ENGINE FAMILIES

| Technology | Number of families | Average new HC+$NO_X$ (g/kW-hr) | Minimum new HC+$NO_X$ (g/kW-hr) | Maximum new HC+$NO_X$ (g/kW-hr) |
|---|---|---|---|---|
| Federal Phase 1 OHV | 64 | 9.0 | 5.3 | 12.9 |
| Federal Phase 1 SV | 14 | 11.3 | 9.4 | 12.9 |

The values in Table 9 are an average of the certified new engine rates. EPA has access to manufacturers' confidential sales estimates for model year 1997. Using these projections the sales weighted new engine HC+$NO_X$ emission rate is 11.7g/kW-hr for Class II SV engines, and 8.3g/kW-hr for Class II OHV. This certification data shows that OHV new engine HC+$NO_X$ emissions tend to be lower than SV emissions.

In 1996 the Agency received a report from several engine manufacturers regarding the deterioration of Phase 1 technology Class II SV and OHV engines.[19] A more detailed discussion of this information is contained in the Draft RSD for this proposal. Table 10 contains a summary of this information.

TABLE 10.—SUMMARY OF IN-USE DETERIORATION FACTORS FOR PHASE 1 CLASS II ENGINES

| | Class II OHV | Class II SV |
|---|---|---|
| Estimated HC+$NO_X$ df 250 hours | 1.4 | 1.6 |

iv. Technologies Considered for Phase 2 Class II HC+$NO_X$ Standards

The Agency analyzed the emission performance and cost of several technologies which could be applied to Class II engines, including improvements to existing SV engines, conversion of existing SV engines to OHV technology, improvements to existing OHV engines, and the application of catalytic converters to existing SV and OHV engines. The Draft RSD for this proposal contains additional information regarding these technologies.

The Agency considered the costs and emission performance potential which would result from manufacturers making improvements to Phase 1 Class II SV engines. As discussed in the Draft RSD, several areas for improvement potentially exist, including: improvements to carburetors to lower variability and maintain more precise air/fuel control; enhancements to the cylinder structural integrity; improvements to valve stems and valve seats; and changes in piston ring design. These improvements would lower production variability and improve both new engine and in-use emission performance. The Agency estimates these changes would cost the manufacturer as much as $7 to $20 per engine depending on engine family volume and the improvements required. However, the Agency believes the improvement in the in-use emission performance from Phase 1 levels would be small. All spark-ignited engines have a lean performance limit, i.e., an air/fuel ratio beyond which additional enleanment will result in unstable combustion and poor engine performance. The basic design of the SV combustion chamber results in a lean performance limit which is reached relatively soon (compared to OHV technology). Improvements in the in-use performance can be made, but the Agency believes these improvements will also be relatively small. The Agency estimates that the improvements to SV technology considered would result in an overall 10 to 20 percent reduction in the in-use emissions from Phase 1 SV levels. With the Phase 1 Class II new engine standard equal to 13.4 g/kW-hr HC+$NO_X$, and a Phase 1 Class II SV df of 1.6, the Phase 1 in-use emission rate is 20.1g/kW-hr at 250 hours. A 10 to 20 percent reduction translates to an in-use emission rate between 16.8 and 18.9 g/kW-hr.

As described above in Section IV.A.1.a, the principal difference between SV and OHV engines is the location of the intake and exhaust valves with respect to the combustion chamber; in SV engines the valves are located to one side of the combustion chamber, while in OHV the valves are located at the top of the combustion chamber directly above the piston. The OHV location offers many performance advantages over the SV engine, including lower valve seat distortion, lower combustion chamber surface-to-volume ratio, and the ability to run stably at leaner air-fuel ratios. These differences are described in more detail in the Draft RSD. These differences can result in better new engine and in-use HC+$NO_X$ emission performance for OHV over SV technology. Based on confidential Phase 1 Class II OHV Federally certified engine families sales projections, the Agency believes an average new engine emission rate of 9.3 g/kW-hr, which includes a 10 percent compliance margin, is achievable from OHV technology engines. This would result in an in-use emission level of 12.1 g/kW-hr (1.3 * 9.3 g/kW-hr), which is a 42 percent reduction from Phase 1 SV levels (Phase 1 SV = 13.4 g/kW-hr * 1.6 = 20.1 g/kW-hr). As presented in the Draft RSD, the Agency estimates the conversion of Class II SV to OHV technology would cost the manufacturer between $10 and $17 per engine, depending on the engine family volume. Engine manufacturers have indicated the higher cost associated with conversion of Class II SV to Class II OHV technology is reasonable because the equipment using Class II engines is typically more expensive than the equipment targeted toward the residential market, and the increased cost resulting from conversion to OHV design would not have a significant adverse impact on Class II engine sales. While EPA has no independent information on consumer price sensitivity for equipment using Class I engines, it is understandable that the higher price of this equipment and the typical commercial use of such equipment could allow the performance, fuel efficiency, and durability benefits of Class II OHV engines to outweigh the incremental impact on equipment price.

[19] "Tier 1 Deterioration Factors for Small Nonroad Engines" September 1996, a report by Air Improvement Resources, available in EPA Air Docket A–96–55, Item #II–D–11.

The Agency also considered improvements to existing Phase 1 OHV engines in determining the appropriate level of the Class II standard. In many cases, engine manufacturers have already optimized new engine emission performance and have incorporated improvements to engine designs to optimize in-use emission performance. However, as discussed in the Draft RSD, the Agency believes that for some Class II OHV engine families internal engine improvements can still be made which would result in lower new engine and/or better in-use performance. These changes include leaner carburetor calibrations to lower new engine $HC+NO_X$, optimization of combustion chamber design, and improvements to oil control. As discussed previously, the sales weighted new engine Phase 1 Class II OHV $HC+NO_X$ level is 8.3g/kW-hr, and as shown in Table 10, the Class II $HC+NO_X$ df is estimated to be 1.4 at 250 hours. The Agency believes changes to existing Class II OHV engines will primarily improve in-use emission performance. As presented in the Draft RSD, the Agency estimates these changes would cost the manufacturer as much as $3 to $8 per engine, depending on the engine family production volume and the improvements required. However, the Agency believes many engine families have already incorporated these design improvements. Based on existing Federal certification data and the deterioration information contained in Table 10, the Agency estimates these improvements will result in an in-use $HC+NO_X$ deterioration rate of 1.3 at 250 hours, and average new engine emission rates (including a ten percent compliance margin) of 9.3 g/kW-hr, for an average in-use emission rate of 12.1 g/kW-hr.

Federal certification data indicates a small number of Class II SV and OHV engines families have certified to the Federal Phase 1 standards using catalyst technology. However, the majority of these engines are intended for indoor use on applications such as generators or floor buffers, where lowering CO emissions appears to be the primary focus. The majority of these catalyst equipped Class II engine families operate on propane fuel. No catalyst equipped Class II engine families have certified to the Phase 1 rule for use in lawn and garden equipment. Though it is technologically feasible to apply catalysts to both SV and OHV engines, the Agency has little information regarding in-use emission performance of engines equipped with catalysts. The Agency's experience with on-highway catalyst technology has shown that considerable in-use deterioration can occur. As previously discussed in the Class I standard section, information on laboratory aged small engine catalysts has appeared in recent years in the technical journals. The Agency requests comment on the relationship between laboratory and field aged catalyst durability data, any information on typical in-use aged catalyst performance and all available data on individual catalysts aged under typical in-use conditions experienced by equipment using Class II engines. The Agency requests additional information regarding the new engine emission performance, in-use emission performance, and cost of catalyst technology for Class II engines, particularly Class II engines designed for lawn and garden type applications.

v. Proposed Phase 2 Class II $HC+NO_X$ Standard

The Agency is proposing a corporate average $HC+NO_X$ emission standard of 12.1 g/kW-hr which will be phased in over five years, beginning in model year 2001. Based on the information presented in this section, the Agency believes an in-use level of 12.1g/kW-hr can be met by the conversion of Phase 1 SV engines to OHV technology, and by internal improvements to some existing Phase 1 OHV engines.

The proposed standards would require significant production line changes for many Class II engine manufacturers to convert existing SV models to OHV designs, as well as modifications to some Phase 1 OHV models which may need internal improvements to meet the 12.1 g/kW-hr level. To accommodate a smooth transition of existing SV engine family production lines to the new OHV technology or other comparably clean technology, the Agency is proposing a five year phase-in period, starting with a level of 18 g/kW-hr in 2001 and ramping down to the final year level of 12.1 in model year 2005. The Agency expects the proposed standards for Class II engines would result in increased penetration of and virtual total conversion to clean OHV technology by 2005. However, the proposal does not preclude other technologies from meeting the proposed standard.

The Agency recognizes that there are large differences in technology mixes currently being produced by Class II engine manufacturers. Some Class II engine manufacturers have already made significant investments in OHV technology prior to and during the Phase 1 program. For some of these manufacturers the standards in the early years of the Phase 2 phase-in (i.e., the 2001 standard of 18g/kW-hr and the 2002 standard is 16.6 g/kW-hr) may not require additional reductions in Class II engine emissions. At the same time, the Phase 1 standards do not require a shift to clean, durable OHV technology or comparably clean technology, and several Class II engine manufacturers currently produce a significant number of SV engines. For manufacturers who are relying on SV technology the proposed phase-in period will allow them to shift their production to new, cleaner technology which is capable of meeting the 2005 standard of 12.1g/kW-hr. The Agency believes the phase-in standards will address the inequities among manufacturers' current technology mixes but will also require manufacturers to produce the clean, durable 12.1g/kW-hr engines in 2005. Manufacturers have indicated the early banking provision will pull ahead clean technology and ease the transition to the 12.1 standard. However, due to the wide discrepancy between manufacturers' current technology mixes, some manufacturers may generate significant credits during the phase-in period. The Agency has recently performed an analysis, based on Federal Phase 1 certification data, which indicates under some conditions, early banking would result in significant credits being generated during the phase-in period which may in fact undermine the Agency's assumptions that the 12.1 standard in model year 2005 would require a virtual 100 percent shift to OHV or comparably clear technology for Class II engines. To insure the EPA's goals are met, the Agency is proposing a declining set of caps on how high the sales-weighed average level of $HC+NO_X$ family emission limits (FELs) could be for Class II engine families beginning in 2005. A discussion of this proposal is contained in Section IV.A.5.

Engine manufacturers have commented that, while 12.1 g/kW-hr $HC+NO_X$ can be met with engines designed for a typical 250-hour useful life, engines designed for the longer proposed useful life categories of 500 and 1000 hours need a higher standard due to their higher expected df as measured over these longer hour periods.[20] Specifically, they recommend a 500-hour engine standard of 13.0 g/kW-hr and a 1000-hour standard of 14.0 g/kW-hr $HC+NO_X$. In arriving at these recommendations, the manufacturers

[20] See the discussion in the March 27, 1997, ANPRM, 62 FR 14740, and the Memo to the Docket regarding the October 3, 1997 meeting between U.S. EPA and the Engine manufacturers Association, EPA Air Docket A–96–55, Item #II–E–11.

assumed the new engine emission levels would be the same regardless of useful life category; this is also assumed by the Agency in developing its proposal. However, while the manufacturers also predict improvements in in-use emission durability, they do not expect these improvements would allow a constant deterioration factor (full useful life emission level divided by new engine emission level) regardless of useful life category. Rather, the manufacturers expect improved durability would allow typical deterioration factors of around 1.4 for 500-hour engines and 1.5 for 1000-hour engines. In making these recommendations, the manufacturers acknowledge that they have not provided any data or analyses to validate their recommendations, but also argue that the Agency has no full useful life data for these higher hour categories which substantiate the feasibility of the Agency's proposed standards. EPA requests any additional data and other pertinent information which would help the Agency reassess the appropriate level of standards for the 500-hour and 1000-hour engines.

Based on the May, 1997 CARB Workshop on their Tier 2 standards, the Agency believes CARB may propose a Tier 2 in-use standard of 12.0 g/kW-hr NMHC+$NO_X$ in model year 2000, followed by a level of 9.4 g/kW-hr NMHC+$NO_X$ in model year 2004. CARB's 12.0 level may be achievable with OHV technology and is very similar to the Agency's proposed Phase 2 level. CARB's 9.4 g/kW-hr level is more stringent than the Agency's 12.1 g/kW-hr proposal. CARB suggests an in-use 9.4g/kW-hr standard would require technology beyond conversion to OHV, such as an OHV engine equipped with a catalyst. The Agency believes the costs and lead time which could be necessary to achieve a 9.4 g/kW-hr level for a national program would be considerably greater than the program contained in today's proposal. However, as discussed under Section IV.A of this proposal, section 209 of the CAA allows California to set their own standards, considering criteria as they apply to the State of California. However, as discussed below, the Agency requests comment on whether the application of the technology anticipated by the standards being considered by CARB would be appropriate for a Federal program at this time.

The Agency requests comment on all aspects of the proposed Class II standards, and especially requests data, analyses and other information on the expected emission performance capability of Class II engines designed for in-use operating lives of 500 hours and 1000 hours.

*c. HC+$NO_X$ Emission Standards for Class III, IV and V Handheld Engines.* This section presents information used by the Agency to determine the appropriate level for the proposed HC+$NO_X$ exhaust emission standards for handheld engines (engine Class III, IV and V). A more detailed explanation of the engine technologies and costs described in this section is contained in the Draft RSD for this proposal, a copy of which is available in the public docket for this rule.

i. Class III, IV and V Historical Sales Trends by Engine Technology

Handheld engine sales have historically been dominated by crankcase charge scavenged two-stroke engines (''traditional 2-strokes''). Historical sales data indicate that until the recent introduction by one manufacturer, Ryobi, of a 4-stroke trimmer, 100 percent of gasoline engine powered handheld equipment used traditional 2-stroke engines.

ii. In-use HC and $NO_X$ Emission Performance of Uncontrolled Class III, IV and V Engines

Information on uncontrolled 2-stroke engines is limited. However, what information is available indicates 2-stroke technology has the potential to experience high rates of in-use deterioration of HC, on the order of two times the new engine value.[21]

This same information indicated that little in-use deterioration of $NO_X$ emissions occur from traditional 2-stroke engines.

iii. New Engine and In-use HC and $NO_X$ Performance of Class III, IV and V Phase 1 Technology Engines

Federal Phase 1 certification data shows that over 150 two-stroke engine families have been certified for the 1997 and 1998 model years. A summary of the emission performance of these Phase 1 technology engine families is shown in Table 11.

TABLE 11.—SUMMARY OF FEDERAL PHASE 1 HANDHELD 2-STROKE ENGINE FAMILIES

| Engine class | Number of families | Average new HC+$NO_X$ (g/kW-hr) | Minimum New HC+$NO_X$ (g/kW-hr) | Maximum New HC+$NO_X$ (g/kW-hr) |
|---|---|---|---|---|
| Class III | 4 | 216 | 177 | 258 |
| Class IV | 131 | 189 | 97 | 236 |
| Class V | 19 | 136 | 90 | 161 |

The average emission rates for the Phase 1 Class III, IV and V traditional 2-stroke engines are 28 percent, 23 percent and 18 percent below the combined Phase 1 HC and $NO_X$ standards. Federal certification data also show three Class IV four-stroke technology engine families and three Class IV two-stroke with catalysts engine families have been certified to the Federal rule. The average HC+$NO_X$ certification levels for these engine families are 27 and 165 g/kW-hr respectively.

Information on in-use emission performance of Phase 1 technology 2-strokes is also limited. In preparation for the Phase 1 regulation, several members of the Portable Power Equipment Manufacturers Association (PPEMA) ran a test program which included manufacturer controlled field testing of seven Phase 1 technology 2-stroke engines, six aged to 50 hours, and one to 225 hours.[22] This data shows relatively low deterioration in HC+$NO_X$ emissions, with dfs ranging from slightly less than 1.0 to approximately 1.2 at 50 hours, and slightly less than 1.0 for the 225 hour engine.

[21] See ''Emission Tests of In-use Small Utility Engines'' Southwest Research Institute, September 1991, EPA Air Docket A–91–24, Item #II–A–8, ''Nonroad Engine and Vehicle Emission Study'' U.S. EPA Report #21A–2001, November 1991, EPA Air Docket A–91–24, Item #II–A–10, ''Emission Testing of In-use Handheld Engines'' Southwest Research Institute, March 1994, EPA Air Docket A–93–25, Item #II–A–06, and ''Regulatory Impact Analysis and Regulatory Support Document, Control of Air Pollution, Emission Standards for New Nonroad Spark-Ignition Engines at or Below 19 kilowatts'' U.S. EPA, May 1995, EPA Air Docket A–93–25, Item #V–B–01.

[22] See Appendix C of ''Regulatory Support Document, Control of Air Pollution, Emission Standards for New Nonroad Spark-Ignition Engines at or Below 19 kilowatts'' U.S. EPA, May 1995, EPA Air Docket A–93–25, Item #V–B–01.

The Agency has little information on the in-use performance of 4-stroke handheld technology or on handheld catalyst technology.

iv. Technologies Considered for Phase 2 Class III, IV and V HC+$NO_X$ Standards

The Agency analyzed the emission performance and cost of several technologies which could be applied to handheld engines. These include improvements to existing 2-stroke engines, conversion of existing 2-stroke engines to 4-stroke technology, and the application of catalytic converters to existing 2-stroke engines. The Draft RSD for this proposal contains additional information regarding these technologies.

For Phase 1 2-stroke technology engines, fuel lost during the scavenging process represents the largest fraction of exhaust HC emissions, and HC emissions represent greater than 95 percent of the exhaust HC+$NO_X$ emissions. The Agency believes several types of improvements can be made to Phase 1 technology 2-stroke engines. The following is a summary of potential areas for lowering HC+$NO_X$ emissions: (1) improvements in carburetors to reduce production variability and tighter air/fuel ratio control; (2) redesign of the combustion chamber to promote more complete combustion; (3) optimizing port shapes and timing to reduce scavenging losses; (4) leaner carburetor calibrations to reduce HC emissions; and (5) tighter manufacturing tolerances for engine components to reduce component variation. These improvements are discussed in more detail in the Draft RSD. As described in the Draft RSD, the Agency estimates the cost of these improvements would cost the manufacturer as much as $2 to $6 per engine, depending on the production volume of the engine family and the improvements required. The Agency would expect these changes to lower the new and in-use emission rates of Phase 1 two-stroke technology engines. PPEMA members have indicated they believe a well designed, properly maintained 2-stroke engine is capable of performing with no in-use deterioration of HC+$NO_X$ emissions. Based on the small amount of in-use data from Phase 1 technology engines, the Agency estimates the in-use performance of an improved Phase 1 technology 2-stroke engine would deteriorate approximately 10 percent during its useful life. The Agency estimates that for the majority of handheld engines, improvements to Phase 1 2-stroke designs would result in a 30 percent reduction in the in-use emission rates from Phase 1 designs.

The Agency also analyzed the benefits and associated costs which would occur from the conversion of existing 2-stroke handheld engines to 4-stroke designs. Two engine manufacturers, Ryobi and Honda, have successfully demonstrated that 4-stroke designs are viable in at least some handheld equipment applications, notably a string trimmer application. However, the Agency is uncertain that 4-stroke technology would be viable in all handheld applications, particularly those applications which require high power and low weight, such as large, commercial chainsaw applications, where the lower power-to-weight ratio of 4-stroke engines may impede equipment performance. Four-stroke technology does not have the scavenging loss problem associated with traditional 2-strokes. Therefore 4-stroke exhaust HC emissions are substantially below those of a 2-stroke design. Federal Phase 1 certification data for Class IV engines indicates a 4-stroke string trimmer produces new engine HC+$NO_X$ emission rates of about 27 g/kW-hr, which is approximately 80 percent below the Phase 1 standard. Deterioration information on small displacement 4-stroke engines is limited, and the Agency has no deterioration information on handheld 4-stroke engines. The Agency has heard from one small engine manufacturer that the smaller 4-stroke engines would likely have higher deterioration than Class I OHV 4-stroke engines, which is on the order of 1.4 at 66 hours.[23] The Agency requests comment and additional information on the deterioration of smaller 4-stroke engines. As described in the Draft RSD, the Agency estimates the cost of converting an existing handheld 2-stroke to a 4-stroke engine would cost the manufacturer between $7 and $10 per engine, depending on the production volume of the engine family.

The Agency also considered the application of catalytic convertors to Phase 1 2-stroke technology. One handheld engine manufacturer, Husquvarna, has certified three engine families to the Phase 1 rule which utilize a 2-stroke engine with catalyst. This engine has been designed for lower scavenging losses to reduce engine out emissions, has improved fuel metering, and also uses a catalyst to further reduce exhaust emissions. EPA's testing of this engine showed new engine emission results for HC+$NO_X$ at the nominal carburetor setting on the order of 90 g/kW-hr, which is 63 percent below the combined Phase 1 Class IV HC+$NO_X$ new engine standard. The Agency does not have information regarding the actual in-use performance of this or other catalyst equipped 2-stroke engines. The Agency estimates the cost of adding a catalytic convertor to an improved 2-stroke handheld engine would cost the manufacturer between $6 and $12 per engine, depending on the production volume of the family. This cost estimate does not include any of the additional improvements to the Phase 1 technology 2-stroke mentioned previously, such as combustion chamber improvements or scavenging design improvements. As previously discussed, such improvements to existing 2-stroke designs would cost the manufacturer an additional $2 to $6 per engine. Therefore, the Agency estimates an improved 2-stroke design with a catalytic convertor would cost the manufacturer from $8 to $18 per engine. Comments are requested on these cost estimates.

v. Class III, IV and V Proposed Phase 2 HC+$NO_X$ Standard

The Agency is proposing an in-use HC+$NO_X$ standard of 210, 172 and 116 g/kW-hr for Class III, IV and V engines, respectively. As presented in Table 7, the proposed standards would begin in model year 2002, with a requirement that 20 percent of a manufacturer's U.S. sales meet the standards, followed by an increased percentage each year until model year 2005, when 100 percent of a manufacturer's U.S. sales would be required to meet the proposed standards.

The Agency expects the proposed in-use standards can be met primarily through improvements to existing Phase 1 technology 2-stroke engines. As presented previously, the Agency believes improvements to Phase 1 technology 2-stroke engines should result in approximately a 30 percent reduction in the in-use emissions of Phase 1 engines, which would be required to meet the proposed standards.

PPEMA members have indicated the proposed standards would require significant research and development time as well as a large capital investment to change existing production capabilities. The proposed phase-in period plus the lead time anticipated after this rule is finalized will allow manufacturers at least 6 years to make the necessary changes to existing product lines in order to meet the proposed standards, which should accommodate the manufacturers' concerns regarding lead time.

[23] See Item # II–E–08 in EPA Air Docket A–96–55 referencing a meeting between EPA and Honda.

The Agency has not proposed a handheld standard which would require catalyst or 4-stroke technology. The Agency's experience with on-highway technology indicates catalysts and engine technology evolved together to prevent significant in-use deterioration. As previously discussed in the section on the Class I engine standard, publicly available information on bench aged catalysts used on 4-stroke engines has become available in recent years. The Agency requests comment on the relationship between bench aged and typical in-use aged catalyst performance, and all available data on individual catalysts aged under typical in-use conditions experienced by handheld equipment. The Agency requests additional information on the new and in-use emission performance of catalyst-equipped handheld engines. Two engine manufacturers have introduced 4-stroke engines into string trimmer applications. There are likely some applications, such as high power chainsaws, where 4-stroke technology may not be feasible as a power unit because of weight concerns. As previously discussed, the Agency estimates that conversion to 4-stroke designs would cost the manufacturer between $7 and $10 per engine. PPEMA has reported that in 1993 and 1994 the average retail price of a 2-stroke gasoline powered string trimmer or leaf blower was approximately $100, and the average retail price of a chainsaw was approximately $200. PPEMA members, who do not currently manufacture 4-stroke handheld products, have expressed concern regarding what they perceive to be the potential negative impacts on sales which would result from a large increase in engine costs, such as the cost of conversion to 4-stroke technology for handheld engines. While EPA has no independent information on consumer price sensitivity, it is concerned that the higher cost of equipment which would likely result if catalyst or 4-stroke technology were necessitated by a more stringent standard could result in significant financial burden if the industry were to absorb the cost impact or adverse impact on sales if the increase in cost were passed along to the consumer. EPA is also concerned that mandating near term conversion to 4-stroke technology could significantly increase the lead time necessary before implementing the standards and delay the emission benefits of the standards. The Agency requests comment on the market concerns expressed by these engine manufacturers as well as the potential impact on lead time of a more stringent standard and information on the cost to the consumer and in-use emissions performance if 2-stroke engines were required to be equipped with a catalyst.

The Agency believes that during the next several years additional information regarding the in-use performance of new technologies, such as handheld 4-strokes, or traditional 2-strokes equipped with catalysts, may become available, perhaps in response to the CARB Tier 2 program. In addition, EPA recognizes that technological advances and/or cost reductions may occur after promulgation of the Phase 2 rule that could make greater, but still cost-effective reductions feasible in handheld emission levels. The Agency proposes to conduct a technology review to address this possibility. In this review, EPA expects to examine issues including the potential for further reductions from existing 2-stroke engines, stratified charge 2-stroke technology, direct injection 2-stroke injection, the use of catalysts on handheld engines, and the conversion to 4-stroke technology. Following a technical review, the Agency intends to publish a Notice of Proposed Rulemaking in 2001 announcing any possible amendments to the standard levels or other program elements, or EPA's intention to maintain the existing handheld standards or program. The Agency expects that the final rulemaking would be completed by 2002 and, if adopted, Phase 3 standards would be phased in on a percentage basis and over of a period of time similar to Phase 2, beginning no earlier than model year 2007. This schedule is intended to provide a minimum five year period before the implementation of any Phase 3 standards in order to allow manufacturers to recoup their investments in Phase 2 technology and ensure the cost-effectiveness of the Phase 2 program.

The Agency is aware that CARB is considering a Tier 2 standard for all handheld engines of 72 g/kW-hr $HC+NO_X$, which is more stringent than the levels being proposed for the Federal program. CARB has stated this level could be met by the complete conversion of existing 2-stroke technology to 4-stroke technology. The Agency believes the costs and lead time which would be necessary to achieve a 72 g/kW-hr level for a national program could be considerably higher than the program contained in today's proposal. However, as discussed under Section IV.A of this proposal, section 209 of the CAA allows California to set its own standards, considering criteria as they apply to the State of California. However, as discussed below, the Agency requests comment on whether 4-stroke technology for all handheld applications would be appropriate for a Federal program at this time. The Agency requests comment on all aspects of the proposed handheld standards, and on what adjustments to the proposed Federal program might be necessary to accommodate such standards.

*d. Proposed California Standards.* As mentioned previously, the State of California has proposed standards for both handheld and nonhandheld small SI engines which are considerably more stringent than the standards which the Agency is proposing today. In this proposal, the Agency has noted several reasons why the level of control being considered by California is not being proposed today, including uncertainties regarding cost, the possible impact of potential price increases on consumer sales, and the lead time necessary for the industry should they be required to adopt the required changes in technology nationwide. However, EPA requests comment on the feasibility in the Federal program of requiring such technology as anticipated by the standards being considered by California, the level of emission control which would result, the costs of such technology for a nationwide program, and any impact on lead time necessary to allow the adoption of such levels of control nationwide.

2. $NMHC+NO_X$ Emission Standards for Class I and II Natural Gas Fueled Nonhandheld Engines

EPA is proposing optional separate standards for Class I and Class II natural gas fueled engines only, due to the fact that for these engines methane has very low ozone forming potential, i.e., low reactivity. The total hydrocarbon (THC or HC) emissions from Phase 1 technology 4-stroke gasoline engines is between 5 and 10 percent methane by mass. For natural gas engines, methane is on the order of 70 percent of total HC mass emissions. For natural gas fueled nonhandheld engines, the Agency is proposing an optional $NMHC+NO_X$ standard, as presented in Table 12.

TABLE 12.—NMHC + $NO_X$ EMISSION STANDARDS FOR NATURAL GAS FUELED NONHANDHELD ENGINES

[g/kW-hr]

| Engine class | Model year 2001 | Model year 2002 | Model year 2003 | Model year 2004 | Model year 2005 |
|---|---|---|---|---|---|
| Class I | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| Class II | 16.7 | 15.3 | 14.0 | 12.7 | 11.3 |

These proposed NMHC+$NO_X$ standards have been adjusted so that these standards are of equivalent stringency to the HC+$NO_X$ standards for gasoline fueled engines, i.e., 11.3 g/kW-hr NMHC+$NO_X$ is a deteriorated new engine NMHC+$NO_X$ level, assuming a new engine THC+$NO_X$ level of 9.3 g/kW-hr, a NMHC+$NO_X$ deterioration factor of 1.3, and a new engine split of 54 percent NMHC, 6 percent methane and 40 percent $NO_X$.

The Agency is proposing that for natural gas fueled engines, the standard be based on the level of NMHC+$NO_X$ reduction which a Phase 2 technology gasoline fueled nonhandheld engine could be expected to meet, not on the performance of a Phase 2 technology natural gas fueled engine. Natural gas fueled engines represent less than 1 percent of annual small engine sales and EPA recognizes that this is a technology that as a matter of environmental policy it may be desirable to encourage. The Agency believes very little environmental benefit would occur from basing this optional NMHC+$NO_X$ standard on the performance of Phase 2 technology natural gas engines. In consideration of the energy and safety factors associated with using natural gas technology rather than gasoline technology, EPA is proposing the NMHC+$NO_X$ standard at a level that gives manufacturers a greater incentive, as a result of the ABT program, to use natural gas technology. The Agency requests comment on this approach, and on whether it poses a meaningful risk of allowing over generation of positive credits in the ABT program.

The NMHC+$NO_X$ standard would require an additional testing burden for natural gas engine manufacturers, because these manufacturers would need an additional emission analyzer to measure the methane content of the exhaust gas. However, because natural gas engine manufacturers have requested this optional NMHC standard, and the Agency does not see any adverse effects for the formation of ozone, the Agency believes it is appropriate for this proposal. EPA is not proposing NMHC + $NO_X$ standards for handheld engines. EPA is not aware of any natural gas fueled handheld applications. Therefore, no NMHC+$NO_X$ standard is needed.

The Agency is aware that CARB may use a NMHC+$NO_X$ standard for all handheld and nonhandheld engine manufacturers. At this time, EPA does not believe an emissions benefit would occur by replicating this action for the Federal program. The Agency would need to adjust all standards downward to maintain equivalent stringency and require all manufacturers to begin testing for methane. If manufacturers of small SI engines were able to selectively target reductions in NMHC as compared to THC, an NMHC standard may be of some value to manufacturers. However, the Agency is not aware of small engine technologies which have this potential, other than natural gas fueled engines, which represent less than 1 percent of annual sales. Therefore, because a national NMHC standard would result in increased testing cost for little or no benefit, the Agency is not proposing NMHC standards for all small engines at this time.

3. CO Emission Standards

In addition to HC and $NO_X$ standards, the Phase 1 final rulemaking (60 FR 34582) put in place a cap on the level of CO emissions from small SI engines. That cap was subsequently modified for Class I and II engines (61 FR 58296). In today's action EPA is proposing that the Phase 1 CO standards be adjusted to reflect in-use standards and to maintain the same level of stringency as afforded by the Phase 1 standards. Specifically, EPA proposes to take the Phase 1 standards and multiply them by the projected CO dfs over the useful lives of the engines to arrive at the Phase 2 in-use CO standards. For Class I and II engines, available data indicates that the df ranges considerably between less than 1.0 and something in excess of 2.0 depending on the engine. For Class III, IV and V engines, available data indicates that the df for CO ranges more narrowly and typically falls between 1.0 and 1.1. Consequently, EPA proposes that the following in-use CO standards in Table 13 apply for the Phase 2 program:

TABLE 13.—IN-USE CO EMISSION STANDARDS FOR SMALL SI ENGINES

[In g/kW-hr]

| | Engine Class | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| CO Standard (g/kW-hr) | 610 | 610 | 805 | 805 | 603 |

These CO standards would not be subject to the averaging, banking, and trading provisions of the rule available for nonhandheld engines. Rather, these standards would serve as caps on the CO emissions allowed from all engine families.

EPA is proposing that for Class I and Class II engines, the proposed CO levels would be effective in the 2001 model year for a manufacturer's entire product line. For Class III, IV and V engines, those engine families complying with Phase 2 HC+$NO_X$ levels under the proposed phase-in for HC+$NO_X$ standards for handheld engines would be required to also comply with CO levels on the same phase-in schedule. This seemingly disparate treatment for handheld and nonhandheld is consistent with the other provisions of the program (e.g., phase-in from Phase 1 to Phase 2 for handheld but not for nonhandheld engines) and protects manufacturers from having to have engine families comply with Phase 2 CO requirements prior to those same engine

families being subject to the other Phase 2 requirements.

EPA believes it is appropriate not to go beyond the Phase 1 stringency for CO emissions for two main reasons. First, in most parts of the country CO is primarily a wintertime problem (November through February), while the vast majority of engines covered by this rulemaking are used almost exclusively during the summer months. As a result, most additional CO emission reductions resulting from any increase in the stringency of the standard would not occur at a time when they would provide nonattainment areas with measurable benefit toward meeting the National Ambient Air Quality Standard (NAAQS) for CO.

Second, CO is a diminishing ambient air quality problem.[24] There has been approximately an 80 percent reduction in the number of nationwide exceedances of the NAAQS for CO since the Clean Air Act Amendments of 1990, and this trend is expected to continue without further tightening of CO requirements for small SI engines. Many of the CO nonattainment areas in 1990 have already been redesignated as being in attainment, many more are in the process of requesting redesignation, and many of those not currently requesting redesignation are expected to before the time the Phase 2 standards would go into effect.

Taken together, these two reasons indicate that it does not make sense to pursue more stringent CO standards at the national level for small SI engines at this time. Should this situation change, EPA can take appropriate action at that time.

While EPA does not believe it is appropriate at this point in time to pursue more stringent CO standards for small engines, we nevertheless do believe it is important to maintain the current level of stringency for CO. As discussed in the Phase 1 rulemaking, uncontrolled small SI engines do contribute approximately 1 percent of the emissions toward the national winter CO inventory.[25] As a result, while emissions from small SI engines represent a small piece of the inventory, they are significant. Furthermore, many small SI engines are used outside in close proximity to the equipment users, raising possible concerns over user health effects. A recent National Institute of Occupational Safety and Health Alert[26] raised serious health concerns regarding the operation of gasoline powered engines inside buildings or other partially enclosed spaces due to potential CO poisoning. The NIOSH Alert contains a list of suggested practices for the proper use of equipment powered by small gasoline engines which should be followed. The NIOSH alert does not recommend a more stringent CO standard for gasoline powered small SI engines.

Even without a more stringent CO standard for Phase 2, CO emissions from small engines will likely continue to decrease as manufacturers improve production quality (reduce tolerances and variability) and improve durability to meet the more stringent $HC+NO_X$ standards proposed for Phase 2. To the extent that this does occur, and Phase 2 engines are shown to clearly achieve the Phase 2 CO emission standards, the proposal would allow EPA the flexibility to waive the reporting of CO emissions in the future, thereby decreasing the compliance costs associated with the program as it transitions to one more focussed on $HC+NO_X$ emissions. EPA requests comment on this aspect of the proposed rule. To the extent that engines do exceed the Phase 2 CO emission standard, EPA could also consider in the future setting a more stringent CO standard, taking into account cost, lead time, energy and safety factors as required by the Clean Air Act.

4. Useful Life Categories.

Section 213(a)(3) of the Clean Air Act provides that regulations promulgated for nonroad engines shall apply to the useful lives of the engines. EPA is proposing that engine families meet the proposed Phase 2 emission standards throughout their useful lives, a requirement new to this Phase 2 program for small SI engines. Small SI engines can experience a wide range of useful lives, depending upon the applications and usage patterns, even within a single engine class. EPA believes that the three useful life categories each for Class I and Class II engines, and the two useful life categories each for Class III, IV and V engines proposed today would provide a means of sorting engines for regulatory purposes to reflect expected usage, without establishing an overly complex system of useful life categories. So that consumers have the best information available as to the emission durability of the engine being purchased, EPA is proposing that an indication of the useful life hours be included on the engine's certification label. Finally, in order to ensure that the air quality benefits anticipated by the proposed rule will in fact accrue, EPA is proposing that manufacturers select the useful life category most appropriate for the engine family. This section discusses the useful life categories proposed today for nonhandheld and handheld engines, proposed provisions for inclusion of the useful life hours on the engines' label, and proposed provisions relating to manufacturer selection of the appropriate useful life category.

*a. Useful Life Hours.* EPA is proposing three useful life categories each for Class I and Class II nonhandheld engines, and two useful life categories each for Class III, IV and V handheld engines, as shown in Tables 14 and 15. These categories are based on information of the ranges of useful lives experienced by the engines in these Classes.

TABLE 14.—NONHANDHELD ENGINE USEFUL LIFE CATEGORIES

[Hours]

| | Category C | Category B | Category A |
|---|---|---|---|
| Class I ... | 66 | 250 | 500 |
| Class II .. | 250 | 500 | 1000 |

TABLE 15.—HANDHELD ENGINE USEFUL LIFE CATEGORIES

[Hours]

| | "Residential" | "Commercial" |
|---|---|---|
| Class III .... | 50 | 300 |
| Class IV ... | 50 | 300 |
| Class V .... | 50 | 300 |

EPA is aware that the small SI engine and equipment industry is comprised of a wide variety of equipment with a wide range of usage patterns. Handheld and nonhandheld engines are designed for many different types of applications, with each application having specific design criteria, resulting in different expected lifetimes. The most obvious example of these differences is the distinction between commercial (or professional) operators and residential (or home) operators. In general, commercial operators, such as commercial lawn-care companies or rental companies, expect to accumulate high numbers of hours on equipment on

[24] See "National Air Pollution Emission Trends, 1900–1995," EPA–454/R–96–007, October 1997.

[25] Nonroad Engine and Vehicle Emission Study—Report, U.S. EPA, November 1991, EPA Air Docket A–91–24, Item #II–A–10.

[26] "Preventing Carbon Monoxide Poisoning from Small Gasoline-Powered Engines and Tools," Department of Health and Human Services Publication #96–118. Information on how to obtain this publication is contained in EPA Air Docket A–96–55, Item #II–B–1.

an annual basis, while a residential operator, such as a residential chain saw owner, expects to accumulate a relatively low number of hours on an annual basis. Several organizations have investigated the issues related to average life and annual use of equipment powered by small SI engines, including industry organizations, the California Air Resources Board, and EPA (see Chapter 3 of the Draft RSD for a summary of several of these reports).

On the nonhandheld engine side, a 1992 phone survey of over 6,000 households collected information on usage rates for consumer-owned walk-behind and ride-on mowers, showing that on average consumers accumulated 100 hours of use on walk-behind mowers (typical of Class I ''residential'' engines) over a five year period of time, and 207 hours of use on ride-on mowers over a six year (five and six years being the estimates of when one-half of the mowers are no longer in service, or ''B–50'' life,[27] for walk-behind and ride-on mowers, respectively).[28] On the handheld side, a 1990 study demonstrated the large disparity between consumer and professional use, with consumer equipment expected life time estimates ranging from 53 to 80 hours, and professional equipment expected life time estimates ranging from 225 to 536 hours.[29] A 1990 study of both nonhandheld and handheld equipment in residential and commercial applications showed a large disparity in average lifespan between equipment used by residential and commercial applications, with residential equipment implied average lifespan estimates ranging from 35 to 394 hours, and commercial equipment implied average lifespan estimates ranging from 274 to 3024 hours.[30]

Based on these sources of information, EPA is proposing for regulatory purposes three useful life categories for nonhandheld engines, and two useful life categories for handheld engines. The determination of which useful life category is appropriate for a specific engine is largely dependent on its intended application. For example, Class II engines going into a consumer ride-on mower application may most appropriately have a regulatory useful life of ''250 hours.'' The longer useful life categories would be appropriate for engines placed into ''commercial'' types of usage. For example, a Class II engine going into a ''commercial'' generator set application, may most appropriately have a regulatory useful life of 1000 hours. EPA believes that a number of features of engine and/or equipment design are reflective of the intended or expected usage of the engines. As discussed below, manufacturers would be expected to have information on the intended application of their engines which support their useful life category selections.

EPA received comments on the ANPRM arguing that the Class I shortest useful life (66 hours) is too short, and that the minimum lifetime compliance period for Class I engines should be set at 120 or 125 hours to reflect an average six year life with an average use of 20 hours a year for mower engines. While the Agency agrees that 120 or 125 hours may be more representative of the ''B–50'' life of residential Class I engines, EPA selected 66 hours as sufficient to determine the emission durability performance characteristic of engines in this Class I design category. EPA did so under the assumptions that certifying Class I engines to 66 hours rather than 120 or 125 hours would still provide adequate assurance of in-use emission performance over the life of the engines without the added burden which would be incurred with testing to the higher hours. If this proves not to be the case, EPA would likely have to adjust the useful life, deterioration factors and standards accordingly to provide such assurance. EPA requests comment on the tradeoff between compliance demonstration and in-use compliance assurance associated with the 66 hour useful life proposal.

For handheld engines, the 50 hours category reflects ''residential'' usage, and the 300 hour category reflects ''commercial'' usage. For example, a trimmer in residential use may most appropriately be certified to a regulatory useful life of 50 hours, while a chainsaw in commercial use may more appropriately be certified to a useful life of 300 hours. Again, EPA believes that a number of features of engine and/or equipment design are reflective of the intended or expected usage of the engines. As discussed below, manufacturers would be expected to have information in support of their useful life category selections for handheld engines.

EPA received comments on the ANPRM arguing that an intermediate useful life category for some handheld products might be appropriate, for example, in the case of products with intended useful lives of 150 hours. EPA believes that the 50 and 300 hour useful life hour categories are sufficient to distinguish residential and commercial usage, respectively. EPA has not received additional data in support of an intermediate useful life, and believes that it is desirable to avoid a proliferation of useful life categories. Thus, EPA is not proposing an intermediate useful life category for handheld engines. However, EPA requests comment and data on the issue of whether an intermediate category is appropriate, what would be the appropriate hours for an intermediate category, and what features of an engine with an intermediate useful life might distinguish it from engines more appropriately certified to a 50 or a 300 hour useful life.

EPA also received comments on the ANPRM regarding the use of ''residential'' and ''commercial'' to indicate the useful life for handheld engines. Several commenters suggested that the terms ''residential'' and ''commercial'' are potentially misleading to consumers of handheld engines. One commenter was concerned that dealers would have the responsibility to ''qualify'' a buyer of equipment, and in the event of injury, the dealer would be at risk for having sold the wrong buyer the wrong equipment. This commenter suggested instead that EPA categorize engines in terms of power, size, weight, or other factors that clearly would not risk making dealers think they have a responsibility to classify the expertise of the buyer. A second commenter suggested EPA could base the useful life on technical properties of engines such as ''half crank'' and ''full crank'' rather than ''commercial'' and ''residential.'' A third industry commenter suggested that it is unnecessary and unwise for manufacturers to differentiate handheld engine families by the terms ''residential'' and ''commercial,'' since these terms are not airtight, and in fact have substantial overlap for some models. This commenter suggested using useful life categories ''A'' and ''B'' instead, where a Category A engine (or

[27] The ''B–50'' is the point at which one-half of the equipment are no longer in service. For regulatory purposes, EPA anticipates that engines would be certified to a ''useful life'' which most accurately reflects this ''B–50'' value. Thus, for a Class II engine family certified to the 250 hour useful life category, half of those engines would be expected to no longer be in service after 250 hours.

[28] ''Useful Life, Annual Usage, and In-Use Emissions of Consumer Utility Engines,'' memo from the OPEI CAAC In-Use Working Group to Ms. Gay MacGregor, U.S. EPA, EPA Air Docket A–96–55, Item # II–D–13.

[29] ''A 1989 California Baseline Emissions Inventory for Total Hydrocarbon and Carbon Monoxide Emissions from Portable Two-Stroke Power Equipment,'' prepared by Heiden Associates, Inc., for the Portable Power Equipment Manufacturers Association, July 24, 1990, available in EPA Air Docket A–96–55, Item #II–D–14.

[30] ''Utility Engine Emission report,'' prepared by Booz, Allen and Hamilton Inc., for the California Air Resources Board, November 20, 1990, available in EPA Air Docket A–93–25, Item #II–I–02. These implied average lifespan estimates were calculated from average annual use and estimated ''B–50'' values.

engine family) would be ''a handheld engine model or family designated by the manufacturer, at the time of certification, as an engine intended primarily for commercial use. Such an engine or family would be subject to testing requirements and warranty obligations for its regulatory useful life. The regulatory useful life of a Category A engine shall be 300 hours.'' A Category B engine (or engine family) would be ''an engine model or family designated by the manufacturer, at the time of certification, as an engine intended primarily for residential use. Such an engine or engine family would be subject to testing requirements and warranty obligations for its regulatory useful life. The regulatory useful life of a Category B engine shall be 50 hours.''

EPA agrees that commercial and residential are not airtight terms. However, EPA is proposing the following definitions for these terms and requests comments on these definitions. A ''residential engine'' would mean a handheld engine for which the engine manufacturer makes the statement to EPA that such engine and the equipment it is installed in by the engine manufacturer, where applicable, is not produced, advertised, marketed or intended for commercial or professional usage. A ''commercial engine'' would mean a handheld engine that is not a residential engine.

In response to the commenter's concerns about dealer responsibilities, EPA believes that inclusion of the terms ''residential'' and ''commercial'' should not pose a risk to dealers, and that the proposed duty of engine manufacturers to certify and label their engines for purposes of emissions durability would not transfer into a duty on the dealer's part to restrict sale of ''commercial'' products to ''residential'' purchasers. EPA requests comment on all aspects of the proposal for handheld useful life categories and the proposed definitions of ''commercial'' and ''residential'', or other alternative designations for the 50 and 300 hour useful life categories. In particular, EPA requests comment on eliminating the use of residential and commercial as regulatory terms, and simply retaining the ''50'' and ''300'' hour useful life categories.

In summary, the Agency's analysis indicates there is a large disparity in the useful life of engines within all five engine classes. The Agency is interested in striking a compromise between the need for representative useful lives, and the reality that different engines within a single class are designed for vastly different usage patterns. For this reason the Agency believes it is appropriate to have multiple useful life categories, but the Agency believes there should be a limit on the number of categories, to prevent an overly complex categorization system. Based on the information presented in this section, the Agency believes the proposed useful life categories presented in Tables 14 and 15 are appropriate. The Agency requests comment on these proposed useful life categories.

*b. Useful Life on the Engine's Label.* EPA is proposing that manufacturers would indicate their selection of useful life category by adding information concerning the engine's ''emissions compliance period'' to the engine's label. This information would be an important tool for consumers and purchasers of engines. EPA anticipates that manufacturers will use the useful life hours of the engine as a marketing tool. For example, a manufacturer might advertise that an engine family is emissions durable to 1000 hours, or is certified by EPA as a ''commercial'' engine. Thus, the requirement that manufacturers indicate the emissions compliance period on the engine's label would also have potential as a marketplace mechanism to help encourage manufacturers to select longer useful life categories.

For nonhandheld engines, EPA is proposing that the manufacturer would add to the compliance statement on the engine's label, ''EMISSIONS COMPLIANCE PERIOD: [useful life] HOURS.'' In addition, consistent with the ANPRM, EPA is proposing as an option for nonhandheld manufacturers, rather than indicating the useful life in hours, the manufacturer may add to the compliance statement on the engine's label ''EMISSIONS COMPLIANCE PERIOD: CATEGORY [A, B, OR C]. REFER TO OWNER'S MANUAL FOR FURTHER INFORMATION.'' In this case, the owner's manual would be required to contain the statement: ''This engine has been shown to meet emission standards for a period of [useful life] hours.'' EPA is proposing this option in light of concerns voiced by manufacturers that putting the useful life of the engine, in hours, on the engines' label, could be misleading to consumers in that the emissions compliance period may or may not represent the expected lifetime of the engine. Nevertheless, EPA believes that putting the engine's useful life in hours on the engine's label could serve as an important mechanism to educate and inform consumers as to the emissions durability of the product they are considering. EPA requests comment on whether the option to allow a manufacturer to instead designate the useful life by using Category [A, B or C] on the engine's label, with information on the emissions compliance period in hours in the owners manual, is an effective substitute to achieve this goal of educating consumers.

In the case of handheld engines, the manufacturer would add to the compliance statement on the engine's label, for residential engines, ''EMISSIONS COMPLIANCE PERIOD: 50 HOURS,'' and for commercial engines, ''EMISSIONS COMPLIANCE PERIOD: 300 HOURS.'' Again, EPA believes that including the useful life, in hours, on the engine's label, is an important mechanism for educating consumers as to the emissions durability of the engine. EPA requests comment on whether requiring the designation ''EMISSIONS COMPLIANCE PERIOD: 50 RESIDENTIAL HOURS,'' or ''EMISSIONS COMPLIANCE PERIOD: 300 COMMERCIAL HOURS'' would be more effective as the proposed requirement to only include the emissions compliance period, by hours, on the label. Similar to the option for nonhandheld engines, EPA is requesting comment on an option which would allow handheld engine manufacturers to use label statements which include a useful life category code (such as A, B, or C) and referencing the owner's manual to determine what the code means.

*c. Manufacturer selection of useful life category.* One of EPA's goals in the proposed Phase 2 program is to assure that engines are emissions durable for their useful lives, so that the air quality benefits anticipated for the rule are in fact achieved. EPA believes that the selection of the appropriate useful life category for an engine family is essential to achieving this goal. An appropriate useful life selection is important from an emissions compliance durability perspective, in terms of assuring that engines meet the appropriate emissions standards for the period of time that they are expected to be in service. However, EPA is concerned that since the useful life of engines, in hours, would be included in certification credit calculations for nonhandheld engines, and in-use credit calculations for handheld engines, and since these credits have real value, a manufacturer may have an important incentive to choose a useful life category for a particular family to maximize the manufacturer's credit balance, rather than to reflect the most accurate useful life selection for that family.

For example, in the case of a nonhandheld engine family whose FEL is significantly below the standard and is therefore generating substantial

credits, a manufacturer could generate four times as many certification credits if that family were certified to 1000 hours rather than 250 hours. Similarly, for a handheld engine family whose in-use test results are well below the standard, that family could generate six times as many in-use credits if certified to 300 hours rather than 50 hours. However, in cases where the credit generating engine is not expected to be used for 1000 hours (or 300 hours, in the handheld example), those clean air benefits may never be realized if the typical engine for that family is scrapped substantially before reaching 1000 hours of use. The ''surplus'' credits might be used to make up for higher emissions of other engine families even though the credits were generated based on an overestimation of the useful life. On the other hand, for engines which are emitting above the standard, the manufacturer might have an incentive to certify to the shortest useful life period, to minimize the credits needed to offset that engine's higher emissions. This could become an even greater concern if that engine is in fact expected to be placed into an application which experiences longer hours of use than indicated by the selected useful life category.

From an air quality perspective, a consumer education perspective, as well as from a marketing or competitive perspective, EPA believes that selection of an appropriate useful life is important, and certifying an engine to an inappropriate or inaccurate useful life presents serious problems. However, no one technical feature of an engine model would necessarily dictate that it be placed in one or another useful life category, and the distinctions between the useful life categories proposed today are not based on objective technical differences between engines (e.g., half crank, full crank).

EPA also recognizes that historically engine manufacturers have not always tracked the sale of engines, and may not have been able to ascertain the type of application in which an engine is used. On the other hand, EPA is also aware that in many cases manufacturers are able to determine the end application for a particular engine, and that in many cases an engine is designed for a specific end use.

Manufacturers, stressing that the nonhandheld SOP, as reflected in the March 1997 ANPRM, discussed useful life selection as being solely at the manufacturer's discretion, have maintained that marketing and competitive concerns would ensure that manufacturers select the most accurate and appropriate useful life category, and that additional requirements that manufacturers support their useful life selections are not needed. EPA understands that manufacturers have strong views regarding the nonhandheld SOP's discussion of useful life selection. However, the SOP indicates that it would be appropriate to certify engines to longer useful life categories when they are intended for longer hours of operations in-use. The signatories of the SOP further recognized that the greater use of an engine during the ozone season directly relates to its impact on air quality. In addition, since the signing of the SOP, EPA has become concerned that a number of various incentives are at play for the manufacturer when it comes to selection of a useful life category for an engine, including the requirement to demonstrate the engines' emissions durability, testing requirements and warranty obligations, generation or use of emissions credits, consumer education, and marketing and competitive issues. EPA is concerned that a manufacturer might inappropriately select useful life categories for certification so as to put itself in a position of competitive advantage compared to other manufacturers that fairly and accurately select useful life categories, and that the risk of this could cause other manufacturers to follow suit in order to remain competitive.

Therefore, to assure that no individual manufacturer is unfairly biasing its useful life selections in order to take advantage of the credits programs, EPA is proposing that all manufacturers would declare the applicable useful life category for each engine family at the time of certification, and would be required to retain at their facilities data appropriate to support their selections of useful life categories, to be furnished to the Administrator upon request. The manufacturer would be required to select the category which most closely approximates the actual useful lives of the equipment into which the engines are expected to be installed. The rule would also require manufacturers to have data supporting their selections sufficient to show that the majority of engines or a sales weighted average of engines of that family are used in applications having a useful life best represented by the chosen category. EPA would not expect to request such data unless there is evidence of problems with a manufacturer's useful life selections. Such problems might be indicated, for example, if all or the major portion of a manufacturer's credit-generating engine families were certified to the longest useful life categories, or if all or the major portion of a manufacturer's credit-using engine families were certified to the shortest useful life categories.

EPA is proposing that data in support of a useful life category selection could include: surveys of the life spans of the equipment in which the engines are installed; engineering evaluations of field aged engines to ascertain when engine performance deteriorates to the point where usefulness and/or reliability is impacted to a degree sufficient to necessitate overhaul or replacement; warranty statements and warranty periods; marketing materials regarding engine life; failure reports from engine customers; and engineering evaluations of the durability, in hours, of specific engine technologies, engine materials, or engine designs. EPA expects that retaining these types of data at their facilities would not be unduly burdensome to manufacturers, and that in most cases these types of data would be information that the manufacturer already has on hand. EPA requests comment on these types of data and their usefulness in helping to distinguish the most accurate and appropriate useful life category for a particular engine family.

Finally, EPA proposes that in the event that EPA reviewed data provided by the manufacturer in support of the useful life selection, and upon review of that and such other information available and discussion with the manufacturer EPA believed that a different useful life category would be more appropriate, the Agency would work with that manufacturer to determine a more appropriate selection of useful life categories. EPA requests comment on all aspects of this proposal.

5. Certification Averaging, Banking and Trading Program

With today's notice, EPA is proposing a certification averaging, banking and trading (ABT) program for nonhandheld small SI engines. The proposed program would be the first ABT program for nonhandheld small SI engines. The Phase 1 rule did not include an ABT program due to uncertainties regarding the in-use emission levels of engines certified to the Phase 1 standards. (The Phase 1 standards apply to ''new'' engines and do not require any determination of in-use deterioration as the proposed Phase 2 standards do.)

The Agency is not proposing a certification ABT program for handheld engines at this time. Based on the levels of the proposed standards and discussion with engine manufacturers, EPA does not believe a certification ABT program is warranted or desired for

handheld engines. The Agency specifically requests comment on this issue. As discussed later, EPA is proposing an in-use credit program for handheld small SI engines that would be used to address potential in-use emission exceedances. The reader is directed to Section IV.D.3 of today's notice for further details of the proposed in-use credit program for handheld engines.

The nonhandheld small SI engine ABT program proposed today is a market-based incentive program designed to provide an incentive for early introduction of clean technologies, and provides engine manufacturers with additional flexibility for meeting the proposed $HC+NO_X$ standards, while protecting the environmental benefits of the program. Implementation of the program should also reduce the cost of controlling $HC+NO_X$ emissions from nonhandheld engines.

EPA believes that the proposed ABT program is consistent with the statutory requirements of section 213 of the Clean Air Act. Although the language of section 213 is silent on the issue of averaging, it allows EPA considerable discretion in determining what regulations are most appropriate for implementing section 213. The statute does not specify that a specific standard or technology must be implemented, and it requires EPA to consider costs, lead time, and other factors in making its determination of ''the greatest degree of emissions reduction achievable through the application of technology which the Administrator determines will be available.'' As noted in the proposal for Tier I nonroad compression-ignition engine standards, which also contained a certification ABT program, section 213(a)(3) also indicates that EPA's regulations may apply to nonroad engine classes in the aggregate, and need not apply to each nonroad engine individually (see 58 FR 28809, May 17, 1993).

At the same time, EPA believes that any ABT program must be consistent with the statutory requirement that standards reflect the greatest degree of emission reduction achievable through the application of available technology. EPA believes the proposed ABT program is fully consistent with such a requirement. The proposed $HC+NO_X$ emission standard of 25.0 g/kW-hr for Class I engines and the series of declining $HC+NO_X$ standards for Class II engines were developed under the assumption that an ABT program would take effect at the same time as proposed standards, once adopted. In fact, as discussed earlier in Section IV.A.1, the conclusion that the proposed standards for Class I and Class II engines are feasible for all affected nonhandheld engines within the time available to manufacturers, is based in part on the availability of the proposed ABT program. In addition, the flexibilities provided to engine manufacturers via an ABT program should allow compliance with the proposed standard at a lower cost than may otherwise be the case. It is also possible that ABT allows the standard to be implemented sooner since, for example, not every family may need to be redesigned to meet the lower standard. If each engine family had to comply with the standards, the standards might be higher and/or the standards might need to be implemented later.

As noted above, the three aspects of the proposed ABT program are averaging, banking, and trading. Averaging means the exchange of emission credits among engine families within a given engine manufacturer's product line. Averaging allows a manufacturer to certify one or more engine families at levels above the applicable emission standard. However, the increased emissions would have to be offset by one or more engine families within that manufacturer's product line certified below the same emission standard, such that the average emissions in a given model year from all the manufacturer's families (weighted for engine power, useful life, load factor, and sales) are at or below the level of the emission standard. Averaging results would be calculated for each specific model year and, as proposed today, would be calculated for each engine class. The mechanism by which this is accomplished would be certification of the engine family to a ''family emission limit'' (FEL) set by the manufacturer, which may be above or below the standard. An FEL that is established above the standard could not exceed an upper limit specified in the ABT regulations. Once an engine family is certified to an FEL, that FEL would become the enforceable emissions limit used for compliance purposes and each engine in the engine family would be subject to compliance with the FEL.

Banking means the retention of emission credits by the engine manufacturer generating the credits for use in future model year averaging or trading. EPA believes that banking, including today's proposed provision which would allow early banking under certain conditions during the two years prior to implementation of the standards, would improve the feasibility of meeting standards by encouraging the development and early introduction of advanced emission control technology, allowing certain engine families to act as trailblazers for new technology. This can help provide valuable information to manufacturers on the technology prior to manufacturers needing to apply the technology throughout their product lines. An incentive for early introduction arises because the banked credits could subsequently be used by the manufacturer to ease the compliance burden of new, more stringent standards.

Trading means the exchange of emission credits between engine manufacturers which then can be used for averaging purposes, banked for future use, or traded to another engine manufacturer. Trading can be advantageous to smaller manufacturers who might have limited opportunity to optimize their costs through the use of averaging. Trading can also be advantageous to larger manufacturers because extending the effective averaging set through trading can allow for overall optimization of costs across manufacturers.

EPA is proposing that participation in the proposed ABT program for Phase 2 nonhandheld small SI engines would be voluntary. For those manufacturers who choose to utilize the program, compliance of individual engine families with their FELs would be determined and enforced in the same manner as compliance with the emission standards in the absence of an ABT program. In addition, except where specifically permitted in the case of production line testing failure (see section IV.D.2. of today's notice), the final number of credits available to the manufacturer in each engine class at the end of a model year after considering the manufacturer's use of credits from ABT would have to be greater than or equal to zero. Specific elements of the proposed ABT program for nonhandheld small SI engines are discussed below.

*a. Calculation of Credits.* Credits would be calculated as a function of the difference between the applicable Phase 2 emission standard and the FEL, the power, the useful life, the load factor, and the number of eligible engines sold of the engine family participating in the program. (Since the standards are expressed in terms of grams/kW-hour, the ''power'' and ''load factor'' variables are included to allow averaging across engines designed to different power.) EPA would expect manufacturers to follow the regulations for establishing its engine families and not disaggregate their families into multiple families or combine their existing families into fewer families to maximize credit generation or minimize credit usage.

EPA is proposing the following equation for calculating the emission credits from a given engine family, whether generating positive or negative credits.

Credits=(Standard − FEL)×(Power)× (Useful Life)×(Load Factor)× (Sales)

''Standard'' represents the applicable Phase 2 emission standard as proposed by EPA. ''FEL'' is the family emission limit for the engine family as established by the manufacturer. ''Power'' represents the engine's maximum modal power produced during the certification test cycle. For those engine families that contain more than one configuration with different power ratings, EPA is proposing that the ''Power'' term be the sales-weighted maximum modal power determined across all configurations within the engine family. EPA assumes manufacturers know the general power characteristics of each of their engine configurations they are producing, and therefore, determining the power information necessary for the ABT calculations will not place any additional testing burden on manufacturers. EPA requests comment on this assumption.

''Useful Life'' is the useful life category to which the engine family is certified, and represents the period of time for which the manufacturer is responsible for compliance with the emissions standards. ''Load Factor'' refers to the fraction of rated power at which the engine operates in use, on average. For the two main certification test cycles, referred to as cycle ''A'' and cycle ''B'', which EPA believes represent typical in-use operation, a load factor of 0.47 is proposed. For alternative test cycles, as approved by EPA, the load factor would need to be calculated based on the characteristics of the test procedure as described in the proposed regulations.

''Sales'' represents the eligible number of Phase 2 engines sold in the United States in the applicable model year, excluding those engines subject to California regulations. Manufacturers would be allowed to use sales projections for initial certification. However, actual sales based on the location of the point of first retail sale (for example, retail customer or dealer) would have to be submitted at the end of the model year to verify end-of-year compliance. The Agency is proposing that manufacturers exclude engines subject to California's emission standards from the estimates of eligible engine sales because California will likely require all engines sold in California to meet its own tighter $HC+NO_X$ standards. If California engines were included, then the credits generated by California sales would allow more engines with higher emission rates to be sold in states outside of California. This would detract from the goals of the Phase 2 program, and possibly undermine the emissions reductions expected to be achieved by the program throughout the country. Engines sold outside of the United States, including Canada and Mexico, would also be excluded from the manufacturer's estimates of sales unless those engines are subsequently imported back into the United States in a new piece of nonhandheld equipment.

Because only those engines sold in the United States, excluding engines subject to California's standards, would be included in the ABT program, manufacturers would need to determine the number of such engines sold each year to yield accurate estimates of credit generation and usage. Due to the difficulty in tracking point of first retail sales in the nonhandheld market compared to other markets (e.g., the on-highway segment where a more direct engine and vehicle distribution system exists), EPA is requesting comments on alternative methods manufacturers could use to determine their eligible sales for credit calculations. One possible option would be to allow engine manufacturers to query their customers, on an annual basis, to ascertain the percentage of Phase 2 engines of each family that constitute eligible sales. Based on the results of the query, the Agency could allow manufacturers to extrapolate those results, assuming they received responses sufficient to cover some high percentage of their sales, say 90 percent or more, to its total sales of engines in the United States. The Agency is open to considering other alternative methods for tracking engines for credit calculation purposes that provide high levels of confidence that eligible sales are accurately counted. EPA specifically requests comments on such alternatives and other information that would further address the Agency's concerns that eligible sales estimates be as accurate as possible. In addition, the Agency requests comments on appropriate methods for estimating the export of engines and the sales of engines subject to California's standards, since one method for estimating eligible sales for ABT purposes could be to deduct these two groups from total sales.

As discussed in Section IV.E of today's notice, EPA is proposing several compliance flexibility provisions for engine manufacturers and equipment manufacturers that would allow the limited use of Phase 1 engines in the Phase 2 time frame. To avoid penalizing manufacturers that produce engines to be used under the proposed flexibility provisions, EPA is proposing that manufacturers exclude such engines from the ABT program calculations. In other words, engine manufacturers would not be required to use credits to certify these Phase 1 engines used for the proposed flexibility provisions even though they would likely exceed the proposed Phase 2 standards.

Another proposed flexibility provision described in Section IV.E of today's notice would allow engine manufacturers to certify beyond the 2005 model year Class II side-valve engine families with annual sales of less than 1,000 units to an $HC+NO_X$ cap of 24.0 g/kW-hr. For such engine families, EPA is proposing that manufacturers do not need to include such families in the ABT program calculations for 2005 and later model years. For the interim years, 2001 through 2004, a manufacturer could also exclude Class II side-valve engine families with annual sales of less than 1,000 units from the ABT program calculations as long as the deteriorated $HC+NO_X$ emission level of the engine is less than 24.0 g/kW-hr. Class II side-valve engine families with annual sales of less than 1,000 units that are certified above the 24.0 g/kW-hr $HC+NO_X$ level must be included in the manufacturers' ABT calculations during the interim years.

EPA is proposing an upper limit on the level of emissions allowed from those engine families a manufacturer wishes to include in the ABT program. Under the proposal, manufacturers would not be allowed to certify engines that have FELs above the upper limits described below. Typically, when EPA adopts an ABT program, the upper limit is set at the level of the previous standard. However, because the Phase 1 standards did not require manufacturers to take into account deterioration over the useful life of the engine as the proposed Phase 2 standards do, EPA believes it is appropriate to use the Phase 1 standards as the basis for calculating the upper limits and apply a deterioration factor to determine the equivalent deteriorated level of the Phase 1 emission standards. Based on the predominant side-valve engine technology certified under the Phase 1 program, EPA estimates that a typical Phase 1 engine would have emissions at the end of the useful life period about twice its new engine emission level.[31]

[31] See ''Summary of EPA Analysis Regarding Upper Limits for Phase 2 Averaging, Banking & Continued

Therefore a deterioration factor of 2.0 is appropriate for estimating the equivalent useful life level of engines designed to meet the Phase 1 standards. Based on the Phase 1 $HC+NO_X$ standards and a deterioration factor of 2.0, EPA is proposing $HC+NO_X$ upper limits of 32.2 g/kW-hr for Class I engines and 26.8 g/kW-hr for Class II engines. Therefore, a manufacturer would be allowed to certify an engine family only if the $HC+NO_X$ FEL were at or below these proposed levels (and only if they had the appropriate number of credits to offset the family's credit needs). For families not participating in the ABT program, each family must comply with the standard which in effect is an analogous upper limit. EPA requests comment on the appropriateness of the proposed upper limits for engine families included in the ABT program.

Due to concerns over the amount of credits manufacturers could accumulate, as described below, EPA is proposing a declining set of caps on how high the sales-weighted average level of $HC+NO_X$ FELs could be for Class II engine families beginning in 2005. Based on the certification information of Phase 1 nonhandheld engines submitted by manufacturers to EPA and assumptions about typical deterioration factors and compliance margins, it appears that some engine manufacturers have the potential to earn significant credits from their Class II engines prior to the 2005 model year. (Because the proposed emission standard for Class I engines assumes side-valve technology and because most Class I engines are expected to remain side-valve technology, it does not appear that there would be the same potential for significant credit generation by Class I engine manufacturers.) Manufacturers who adopt OHV technology earlier than anticipated by the proposed Class II phase-in standards appear best positioned to accumulate significant credits. The ability to generate credits during the transition years would occur primarily because the typically lower-emitting OHV engines could earn credits up to the proposed applicable model year standards (which, as noted earlier, would decline for each model year between 2001 and 2005 and assume an industry changeover to the cleaner OHV engines from the higher-emitting side-valve engines).

The environment benefits when a manufacturer produces engines which, on average, are cleaner than required during the transition years. However, EPA is concerned that some manufacturers, because their current product line is predominantly made up of OHV technology, would be able to accumulate significant credits during the phase-in years without any additional effort to improve emission performance. These credits could be, in turn, used by such manufacturers beginning in 2005 to, in effect, delay the need for that manufacturer to produce engines meeting the proposed 2005 model year standard. This action could put such manufacturers in a competitively advantageous position compared to manufacturers who did not have substantial credits and therefore needed to produce a product line which, on average, met the 2005 model year standard. Such action could similarly undermine the goal of this rule (and the SOP) to have 100 percent OHV technology (or similar technology meeting the 2005 model year standards) in place across the industry for Class II by 2005.

In order to ensure that this transition to cleaner technology occurs by the 2005 model year and to minimize the risk of credit ''build-up'' resulting in a delay of conversion to OHV or OHV-comparable technology, EPA is proposing that a manufacturer's sales-weighted average of Class II $HC+NO_X$ FELs may not exceed 13.6 g/kW-hr in 2005, 13.1 g/kW-hr in 2006, and 12.6 g/kW-hr in 2007 or later. EPA believes this approach would ensure that Class II engines are converted to OHV or OHV-comparable technology by roughly 2005 while still encouraging the early introduction of cleaner, more durable technology and ensuring that manufacturers have the flexibility they need to comply with the proposed standards. EPA requests comment on the proposed caps and alternative approaches that would ensure the introduction of OHV or OHV-comparable technology by approximately 2005 while maintaining the flexibility offered to manufacturers by ABT and the encouragement to pull ahead cleaner, more durable technology.

As described earlier, EPA is proposing separate $NMHC+NO_X$ standards for natural gas-fueled engines which are intended to be as stringent as the proposed $HC+NO_X$ standards for the remaining nonhandheld small SI engines. All credit calculations for natural gas-fueled engines would be calculated against those standards. In addition, because the proposed standards are equivalent in stringency, and the market for nonhandheld natural gas-fueled small SI engines is extremely small (i.e., less than 0.1 percent of current nonhandheld sales), EPA is proposing to allow manufacturers to freely exchange $NMHC+NO_X$ credits from nonhandheld engines fueled by natural gas with $HC+NO_X$ credits from nonhandheld engines fueled by fuels other than natural gas in the ABT program.

*b. Life of Credits.* For all credits generated by Class I and Class II engines under the certification ABT program, EPA is proposing an unlimited credit life. EPA believes that unlimited life for these credits will promote the feasibility of the proposed Phase 2 Class I and Class II standards because it increases the value of these credits to the manufacturer by providing greater flexibility for the use of the credits. It is consistent with the general emission reduction goal of ABT programs, not only because of the increased manufacturer incentive but also because it reduces the incentive for manufacturers to use their credits as quickly as possible. As a result, unused credits, which are extra emission reductions beyond what the EPA regulations require, may remain off the market longer. It should be noted that EPA would expect to reconsider the appropriate life of Phase 2 emission credits in connection with any post-Phase 2 rulemaking for nonhandheld engines.

*c. Early Use of the ABT Program.* EPA is proposing that manufacturers be allowed to use the ABT program prior to implementation of the Phase 2 standards to provide an incentive to accelerate introduction of cleaner technologies into the market. The Agency believes that making bankable credits available prior to 2001 would reward those manufacturers who take on the responsibility of complying with the proposed standards sooner than required and would result in early environmental benefits. Under the proposed provisions, manufacturers would be allowed to begin using portions of the ABT program starting two model years before the proposed standards take effect provided the manufacturer certifies and complies with the proposed 2001 model year standards of 25.0 g/kW-hr for Class I engines and 18.0 g/kW-hr for Class II engines for their entire product line in a given nonhandheld engine class. The manufacturer could show it is in compliance with the proposed standards for each individual engine family or on average using the averaging provisions of the proposed ABT program. If a manufacturer meets this condition, the manufacturer could generate early credits to be banked for use in the 2001 or later model years

Trading Program for Nonhandheld Engines'', Item #II–B–05 in EPA Air Docket A–96–55.

from only those engines certified below 16.0 g/kW-hr $HC+NO_X$ for Class I engines and below 12.1 g/kW-hr for Class II engines (or 15.0 g/kW-hr $NMHC+NO_X$ for Class I natural-gas fueled engines and 11.3 g/kW-hr for Class II natural-gas fueled engines). However, all early credits would be calculated against the initial Phase 2 standards of 25.0 g/kW-hr $HC+NO_X$ for Class I engines and 18.0 g/kW-hr $HC+NO_X$ for Class II engines (or the corresponding $NMHC+NO_X$ standards of 23.0 g/kW-hr and 16.7 g/kW-hr, respectively, for natural-gas fueled engines). If the manufacturer certifies its product line to the proposed Phase 2 standards early through the use of averaging, the manufacturer could bank credits for use in 2001 and later, but could only bank credits from those engines which were not needed to show early compliance with the proposed Phase 2 standards. In other words, manufacturers would not be allowed to bank credits from engines whose credits were already used to offset other engines with FELs above the proposed Phase 2 standards. This would prevent manufacturers from ''double counting'' credits needed to show early compliance with the proposed standards. Manufacturers would not be allowed to trade their early credits to other manufacturers until the 2001 model year or later.

In establishing the proposed set of declining standards for Class II engines, EPA assumed a certain phase-in of OHV or comparably clean and durable technology. As described in the March 1997 ANPRM, the proposed series of Class II $HC+NO_X$ standards were based on the assumption that 50 percent of Class II engines would employ OHV or comparably clean and durable technology in 2001 (i.e., could meet a 12.1 g/kW-hr $HC+NO_X$ standard without the use of credits). For the remaining years, the phase-in schedule assumed for ''OHV emission performance'' (''OEP'') technology was 62.5 percent in 2002, 75 percent in 2003, 87.5 percent in 2004, and 100 percent in 2005. EPA believes this phase-in of OHV or comparably clean and durable technology is important due to the inherent emission benefits anticipated from this technology in use. Related to the concerns discussed above regarding credit life for pre-2005 credits, the Agency is concerned that manufacturers of Class II engines could bank early credits and use such credits to continue certifying a line of engine families that do not meet the OEP production phase-in schedule assumed by EPA in establishing the proposed standards. Therefore, EPA is proposing that manufacturers only be allowed to use early banked credits beginning in 2001 or later if they are meeting the OEP production phase-in schedule estimates for that model year. EPA believes prohibiting the use of early banked credits unless manufacturers meet such conditions will encourage the manufacturers to meet the OEP production phase-in schedule assumed in developing the proposed Phase 2 standards.

*d. Cross-Class Exchange of Credits for Certification Purposes.* Today's proposal contains limitations on the cross-class exchange of credits during certification. The limitations are meant to assure the ABT program fulfills its intended function of encouraging a transition to cleaner, more durable technology for both classes of nonhandheld engines and achieves the expected environmental benefits of the program. The proposed limitations are also intended to assure that the proposed ABT program does not affect competition between engine manufacturers.

With regard to encouraging cleaner, more durable technology, the proposed schedule of standards for Class II engines was established with the assumption that engine manufacturers will phase-in OHV technology over roughly the five year period from 2001 to 2005 based on the schedule noted earlier. In order to encourage manufacturers to follow the assumed OEP production phase-in schedule, EPA is proposing that limited cross-class exchange of credits for certification purposes, as noted below, would be allowed only if a manufacturer's Class II engine production meets or exceeds the assumed OEP production phase-in schedule for Class II engines presented earlier.

With regard to competition in the nonhandheld market, about two-thirds of nonhandheld engine manufacturers currently produce both Class I and Class II engines. The remaining one-third of the nonhandheld engine manufacturers produce only Class II engines. At this time, EPA is not aware of any nonhandheld engine manufacturers that only produce Class I engines. Allowing manufacturers to exchange credits across engine classes could cause a competitive disadvantage for those manufacturers who only produce Class II engines because they would not have the advantage of being able to use positive credits from Class I engines. Therefore, with regard to the cross-class exchange of credits, EPA is proposing that manufacturers would be allowed to exchange credits from credit generating Class II engines to credit using Class I engines for certification purposes. However, due to the competitive concerns noted above, EPA is not proposing to allow the exchange of credits from credit generating Class I engines to credit using Class II engines for certification purposes.

*e. Use of Credits to Address Nonconformity Determined After Certification.* As noted elsewhere in today's notice, EPA is proposing a number of provisions that address post-certification compliance aspects of the proposed standards. In two specific cases, EPA is proposing to allow manufacturers to use credits from the certification ABT program to address noncompliance determined after the time of certification. As noted in the discussion on compliance, EPA does not believe that the typical type of enforcement action that could be taken when a substantial nonconformity is identified (i.e., an engine family recall order) would generally be workable for nonhandheld small SI engines given the nature of the nonhandheld market. Whereas handheld engine nonconformities after certification would be addressed through the use of in-use credits, EPA is not proposing an in-use credit program for nonhandheld engines, as discussed in Section IV.D.

Instead, EPA is proposing to allow manufacturers to use certification ABT credit to address two different types of nonconformance. First, manufacturers would be allowed to use ABT credits to offset limited emission shortfalls for past production of engines determined through the Production Line Testing (PLT) program as described in Section IV.D.2. of today's notice. Second, manufacturers would be allowed to use ABT credits to offset emission shortfalls from Class II OHV engines that arise as a result of an adjustment to deterioration factors originally determined through good engineering judgement, as described in Section IV.E of today's notice. Under the proposed provisions, manufacturers would be allowed to use all credits available to them to offset such emission shortfalls. EPA does not believe it is necessary to limit the use of cross-class credits for these situations. Allowing manufacturers to exchange credits from one class to another should not raise the same concerns with regard to new engine competition as noted earlier because the manufacturer is addressing a nonconformance problem for engines that have already been sold and used in the field for a significant period of time. EPA requests comment on the proposed provisions for using certification ABT credits to address nonconformance with

the Phase 2 emission standards determined after certification.

EPA is not proposing to allow manufacturers to use ABT credits to remedy a past production nonconformance situation in the Selective Enforcement Audit (SEA) program. As described in today's notice, EPA is planning to primarily rely on the PLT program to monitor the emissions performance of production engines. However, in the case of nonhandheld engines only, manufacturers would in some cases have the option of traditional SEA in lieu of PLT as a production line compliance program. In addition, SEAs could be conducted in cases where EPA has evidence of improper testing procedures or nonconformities not being addressed through PLT. As discussed in section IV.D.3, if EPA determines that an engine family is not complying with the standards as the result of an SEA, EPA plans to work with the manufacturer on a case-by-case basis to determine an appropriate method for dealing with the nonconformity. The option(s) agreed upon by EPA and the engine manufacturer may, or may not, include the use of ABT credits to make up for any ''lost'' emission benefits uncovered by the SEA.

As noted earlier, EPA solicits comments on all aspects of the proposed ABT program, including comments on the benefit of the program to manufacturers in meeting the proposed emission standards and any potential air quality impacts which might be associated with them.

6. Certification Fuel

The program for nonhandheld engines discussed in the March 1997 ANPRM specified that the proposed range for eligible certification fuels for Phase 2 would be the same as under Phase 1. The program for handheld engines in the ANPRM was silent on this issue. EPA received comment on the ANPRM that the continued use of Phase 1 certification fuels for Phase 2 testing is appropriate so long as the same fuel may be used to certify handheld engines under both EPA and CARB regulations.

EPA is proposing today that certification test fuel requirements for the Phase 2 program would remain the same as in the Phase 1 program, as specified at 40 CFR 90.308(b). While California ''Phase 2'' reformulated gasoline is not a proposed certification test fuel, EPA believes that continuation of the Phase 1 program for Phase 2 would continue to provide a means of harmonizing the Federal and California programs. As described in the February 1997 Draft U.S. EPA Small Engine Certification Guidance, Section X ''Certification Fuel'', manufacturers have four options for choice of certification fuel for Phase 1 [32]; EPA is proposing that these options would continue for this rule.

The first option is to use average in-use gasoline specified at 40 CFR Part 90, Subpart D, Appendix A, Table 3. The second option is federal certification fuel (e.g., Indolene), specified at 40 FR 86.1313–94(a), Table N94–1. Third, manufacturers may use other fuels, such as natural gas, propane, methanol, or others, under conditions described at 40 CFR 90.308(b)(2) and (3). Fourth, manufacturers may request EPA approval for certification testing on fuels such as California ''Phase 2'' reformulated gasoline, which do not meet the requirements for ''other fuels'' under 40 CFR 90.308(b)(2) or (3). For this option, manufacturers would request EPA approval of an alternate test procedure (e.g., alternate test fuel) under 40 CFR 90.120(b)(1). Manufacturers may elect to use an alternative test procedure provided it yields results equal to the results from the specified test procedures (e.g., test fuels described at 40 CFR 90.308(b)), its use is approved by EPA, and the basis for equivalent results is fully described in the manufacturer's certification application (see 40 CFR 90.120(b)(1)). EPA would work with manufacturers to assist them in making the required technical demonstrations to show equivalency of the emission results. The continuation of these Phase 1 certification fuel requirements would continue to provide mechanisms for manufacturers to use the same fuel for certification to both EPA and California Air Resources Board regulations, as specified above.

*B. Test Procedures*

Test procedures are contained in today's proposal which would be used by engine manufacturers for the purpose of measuring emissions and determining emission rates for regulated emissions for certified engines. The test procedures being proposed today are in most respects identical to the procedures required for the certification of Phase 1 engines. Test procedures were discussed during the Regulatory Negotiation process, with the key issue being the appropriateness of the Phase 1 test cycles for Phase 2 engines. The draft Regulatory Support Document for this proposal contains a summary of the test procedure issues addressed during the Regulatory Negotiation process.

In general, the Agency believes the Phase 1 test procedures are appropriate for measuring engine emissions from Phase 2 engines.[33] In today's action, EPA is proposing the Phase 1 test procedures with the following minor changes. First, nonhandheld engines sold with an engine rotational speed governor would have to use the governor for speed control while running the appropriate test cycle. Second, the mode weightings for the handheld test cycle, Cycle C, would be adjusted to 0.85 for Mode 1 and 0.15 for Mode 2. Finally, appropriate changes to the test procedure and emission calculations have been proposed for the measurement of methane from natural gas fueled engines in order to determine non-methane hydrocarbon emissions for natural gas fueled nonhandheld engines. These proposed changes are discussed below. EPA requests comment on these issues.

1. Test Cycle: Requirement for the Use of a Speed Governor Operation for Testing of Nonhandheld Engines

Many small engines manufactured today make use of a speed control governor (''governor'') to regulate engine rotational speed. In general, the governor is a mechanically or electronically controlled device that attempts to maintain engine rotational speed in a particular range as the engine experiences different loads. A typical example is the walk-behind mower, where the governor is designed to control engine throttle position in response to various loads to maintain the engine's rotational speed, and thus, mower blade rotating speed, to provide an adequate grass cut. For the Phase 1 test procedure, manufacturers are allowed to over-ride or disconnect the speed governing device and use an external piece of equipment, i.e., a throttle controller, for the purpose of replicating the speed and load conditions required by the test cycle (see 40 CFR 90.409(a)(3)). After the finalization of the Phase 1 rule during the regulatory negotiation process, the Test Procedure Task Group formed by the Regulatory Negotiation committee recognized that the use of the engine's designed governor, not an external throttle controller, may be a more accurate prediction of an engine's in-use performance. The Test Procedure Task Group members generally agreed that a

[32] See ''U.S. EPA Small Engine Certification Guidance, Draft, February 19, 1997,'' available in EPA Air Docket A–96–55, Item #II–C–03.

[33] For a discussion on the adequacy of the Phase 1 test procedure, see Chapter 1.1 in ''Regulatory Support Document, Control of Air Pollution, Emission Standards for New Nonroad Spark-Ignition Engines At or Below 19 kilowatts'' U.S. EPA, May 1995, EPA Air Docket A–93–25, Item #V–B–01.

Phase 2 test procedure should require the use of the engine's speed governor for speed control during the Federal Test Procedure (FTP) for those engines which are equipped by the manufacturer with a speed governor. However, there was not general agreement or detailed discussion of the specific requirements of how the speed governor should be used during the FTP. At this time the Agency believes the most appropriate method to operate engines on the speed governor for an emissions test would be to use fixed throttle operation for the 100 percent load mode, and then to use the engine governor for all subsequent power modes (75 percent, 50 percent, 25 percent and 10 percent). For each power mode, the engine speed governor set-point would be adjusted to the nominal test cycle set-point, 85 percent of rated speed for Cycle A, and 100 percent rated speed for Cycle B. This test method allows for a consistent and repeatable method of determining the 100 percent load condition, yet would allow the engine's governor to regulate speed for the remaining load conditions. This method is also straightforward and would be relatively simple to implement in a laboratory. The Agency requests comment on this test method and on other test methods which may be more appropriate.

2. Test Cycle: Adjustments for Weightings for 2-Mode Cycle for Handheld Engines

The Agency is proposing a change in the weighting factors for the handheld test procedure. For the Phase 1 rule, a weighting factor of 90 percent is applied to the 100 percent power mode, and a factor of 10 percent is applied to the idle mode, in order to combine the modal results for the final weighted emission value. The Agency is proposing for Phase 2 that a weighting factor of 85 percent is used for the 100 percent power mode, and 15 percent be used for the idle mode. This proposal is based on a study performed by members of PPEMA during the regulatory negotiation process.[34] PPEMA members collected real-time speed and throttle position data on several types of handheld equipment used during actual in-use operation. This data was analyzed and combined with estimates of annual use, load factors, and annual sales to weight the results of the field testing. EPA's summary of this report is contained in the Draft RSD. The Agency agrees with the report's conclusion that a more appropriate set of weighting factors for handheld engines is 85 percent for the 100 percent power mode and 15 percent for the idle mode. Therefore this change is being proposed for Phase 2.

3. Measurement of NMHC Emissions From Natural Gas Fueled Nonhandheld Engines

In order to accommodate the proposed optional non-methane hydrocarbon (NMHC) standard for natural gas fueled nonhandheld engines, the Agency is proposing to incorporate by reference the appropriate sections from 40 CFR Part 86 which relate to the measurement of methane emissions from spark-ignited engines. These appropriate sections were published as part of a final rulemaking titled ''Standards for Emissions From Natural Gas-Fueled, and Liquefied Petroleum Gas-Fueled Motor Vehicles and Motor Vehicle Engines, and Certification Procedures for Aftermarket Conversions'' see 59 FR 48472, published on September 21, 1994. The specific sections being incorporated can be found in the proposed regulatory language contained in this proposal at § 90.301(d) and § 90.401(d).

*C. Field/Bench Adjustment Program*

The ANPRM contemplates a so-called ''bench field correlation program'' for both handheld and nonhandheld small spark ignited engines.[35] For handheld engines, it is part of the in-use testing program (ANPRM, Appendix A, Section J(2)); for nonhandheld engines, it is part of the certification program (ANPRM, Appendix B, Sections 4(a) and (b)). In either case, the basic premise for these programs is the same: to allow manufacturers to age engines on the bench to demonstrate expected compliance in-use, it is necessary to demonstrate the ''correlation'' between field aging and bench aging.

The ANPRM sets out slightly different requirements for the proposed handheld and nonhandheld programs. Specifically, the ANPRM stipulates that the handheld correlation program would be conducted under EPA guidance; a portion of the engines would be aged in situations in which the manufacturer does not exercise control over the engines' maintenance, or limit their usage such that the engines are no longer used in a way that is representative of typical in-use engines; the full federal test procedure would be used; all pollutants would be measured; residential engines would be aged to their full regulatory life but commercial engines could be aged to 75 percent of their full regulatory life; samples sizes would be determined in the NPRM process; and there would be periodic spot checks of the correlation (ANPRM, Annex A, Section J(2)).

The ANPRM provisions for the nonhandheld engines are less comprehensive. For this category, the correlation program was specifically discussed for engines using side-valve or aftertreatment technologies. In addition, the ANPRM describes a simple ''correlation'' method (ratio of mean emission rates); would require periodic re-calculation (every other year for the first five years of the program and then every five years thereafter, e.g., 2001, 2003, 2005, 2010, 2015, etc.); and calls for changes in the correlation to apply prospectively only.

In today's NPRM, EPA is proposing a unified program, to be called the ''field/bench adjustment program,'' [36] that would apply to both nonhandheld engines that use side-valve or aftertreatment technologies and to handheld engines. EPA believes it is appropriate to design one program to apply to both categories of engines both because it is less complicated for manufacturers that produce both kinds of engines and because it simplifies the compliance program for administrative purposes. EPA seeks comment on the application of the same program and methodology to both categories of engines. The remainder of this section will set out the background for field/bench adjustment and the principles of such a program, a proposed methodology, and various practical requirements for the application of the program. It will end with a brief discussion of an alternative methodology.

1. Background and Principles

There are at least three ways to demonstrate compliance with in-use standards such as those proposed in today's rule. In general, the most representative way is to demonstrate compliance on engines that have been aged to their full regulatory lives by actual end-users. This ensures that the emissions reflect actual in-use conditions, including the presence of dirt and other matter such as clippings, operation at several degrees of orientation, operation in very hot ambient temperatures, etc. At the same time, consumer-based field aging is

[34] See ''Hand Held Composite Duty Cycle Report'', February 1995, prepared by members of the Portable Power Equipment Manufacturers Association, available in EPA Air Docket A–96–55, Item # II–D–18.

[35] The use of the term ''correlation'' was meant to describe an adjustment factor that can be applied to bench-aged engines to approximate field-aged conditions, and not a true statistical correlation.

[36] This nomenclature more accurately reflects the purpose of the program.

difficult, not the least because it is cumbersome to organize a program with a sufficient number of end-users. In addition, it may take some end-use consumers years to put an appropriate number of hours on the engine through normal use.

The second method is to demonstrate compliance on engines that have been aged to their full regulatory lives on the bench. While this method can be more practical for the manufacturer, it also abstracts away many operational or environmental conditions that can affect deterioration.

The third way, and the way being proposed in today's notice, is a consolidation of some elements of the other two methods. Under it, manufacturers could bench age engines and then adjust the emission test results to reflect actual in-use conditions as represented by field aging. This would be accomplished by developing a field/bench adjustment factor that would be applied to emissions from bench-aged emissions to simulate field aging.

Thus, the objective of this field/bench adjustment program is to develop an adjustment factor based on the mathematical relationship between emissions from field-aged and bench-aged engines. For obvious reasons, it is very important to design a field/bench adjustment program that will yield an adjustment factor that is as closely related as possible to the true relationship between field and bench aging. Any deviation will result in an adjustment factor that either under-corrects or over-corrects the bench results, the ultimate result being an impact on the stringency of the emission limits. In addition, this field/bench adjustment program should take advantage of statistical techniques, both to take into account the inherent uncertainty in sampling[37] and to allow EPA to impose some restrictions on the use of this simplified compliance method. In today's notice, EPA is proposing to allow manufacturers to use the simple ratio of the field and bench mean emission results as an adjustment factor if the width of a confidence interval around the bench-aged and field-aged mean emission rates does not exceed a certain percentage of the standard. This restriction would limit the emission results for each sample, permitting a closer fix on the true population relationship.

2. General Methodology

Drawing on the elements of the ''bench field correlation program'' set out in the ANPRM and the criteria discussed above, EPA is proposing the following methodology to calculate the adjustment factor that would be applied to bench-aged emissions to approximate field aging. EPA seeks comments on all aspects of this program.

Two samples of engines would be aged, one in the field and one on the bench. The aging procedures for all engines in the field sample would be the same, and the aging procedures for all engines in the bench sample would be the same. The manufacturer would develop a test plan which would specify the conditions under which the engines would be aged on the bench and in the field. EPA would reserve the right to review any test plan, for handheld or nonhandheld engines, and to require the manufacturer to revise it if it does not reflect appropriate testing conditions. This review would enable EPA to exercise some oversight of the program without requiring the entire program to be performed under EPA guidance, as anticipated in the handheld program described in the ANPRM. With regard to sample size, today's proposed program contains only two constraints: the bench-aged and field-aged samples must initially be of equal size and must contain at least three engines. This minimum number is necessary to perform the statistical tests described below.

Next, each engine would be tested on the full federal test procedure after it has been run for its useful life. Then, for each sample, the mean $HC+NO_X$ emission rate would be calculated and two independent confidence intervals would be constructed, one around the mean of the field-aged engines, and one around the mean of the bench-aged engines, using the student's T distribution and a 90% confidence level.

The formula for the confidence interval would be:

$$\bar{x} \pm t_{(1-\alpha/2;\, n-1)} * S/\sqrt{n}$$

where

$\bar{x}$ is the sample mean,
$t(1-\alpha/2; n-1)$ is the appropriate parameter from Student's t table, depending on the level of confidence chosen by EPA,
s is the sample standard deviation, and
n is the number of engines in the sample.

The width of each confidence interval would then be compared to the ''maximum allowable interval width'' proposed today. EPA is proposing +/−20% of the standard as the maximum allowable interval width. If the confidence intervals around each of the field-aged and bench-aged means each are no wider than the maximum allowable interval width (e.g, +/−20% of the standard), then the adjustment factor that would be applied in the future to bench-aged engines to simulate field aging would be the ratio of the means ($\bar{x}_F/\bar{x}_B$), *provided* this ratio is greater than or equal to one.

EPA is proposing that these constraints be applied to both handheld and nonhandheld engines, but seeks comment as to whether the confidence levels and maximum allowable interval widths should be different among them. EPA chose 90% confidence levels for constructing the confidence intervals for the field-aged and bench-aged engines, and +/−20% of the standard maximum allowable interval widths, based on computer simulations[38, 39]; however, manufacturers or others commenting on this proposal may have information that suggest other levels.

Under the proposed program, if either or both of the confidence intervals do not pass the above-described statistical test, the manufacturer would have the choice of three remedies. First, the manufacturer could increase the size of the failing sample and repeat the statistical tests with the increased number of engines. Often, increasing the size of the sample will lead to a smaller sample variance, although this is not always the case with small samples. A manufacturer could repeat this remedy as many times as desired. Note that it would not be necessary to increase the size of both samples; only the sample that failed the statistical test would need to be increased. Alternatively, if the statistical tests are failed, the manufacturer could adjust the test plan and rerun the program, subject to EPA approval. In the third alternative, the manufacturer could choose to age all engines in the field for the purposes of the compliance program.

3. Practical Requirements of the Program

This section describes several practical elements of this proposed field/bench adjustment program and how it would work if adopted as proposed.

[37] To take full advantage of the field/bench adjustment program, engine manufacturers will presumably prefer to bench and field age only a relatively small number of engines. Thus, the results of the program will heavily depend on the characteristics of the sample (it is generally the case that a different sample would have different emission results and a different adjustment factor).

[38, 39] See ''Simulation to Determine Confidence Level and Maximum Allowable Interval Width for Field/Bench Adjustment Factor Program,'' EPA Air Docket A–93–29, Item #II–B–01.

*a. Initial Field/Bench Adjustment Factor Calculation.* The ANPRM does not discuss an initial date by which the first correlation would have to be performed, and thus the first adjustment factor calculated. EPA is today proposing that a manufacturer may propose a field/bench adjustment program test plan up to 48 months prior to certification for Phase 2, and if EPA did not reject the proposed test plan within 90 days of submission of a complete test plan, the proposed test plan would automatically be accepted. EPA is also proposing that, at least 90 days before beginning bench aging for certification or in-use testing purposes, the manufacturer would provide a report to EPA for approval describing the aging and testing conducted for the field/bench adjustment program. This timing would ensure that adjustment factors have been established in time for demonstrating compliance with Phase 2 standards. EPA is also proposing that the initial field/bench adjustment program be performed on engines representative of Phase 2 engines.

*b. Periodic Rechecks.* The ANPRM contemplates that both the handheld and the nonhandheld correlation programs would require the correlation to be periodically rechecked, although only for the nonhandheld engines was a specific recheck schedule provided (every other year for the first five years of the program and every five years thereafter, e.g., 2001, 2003, 2005, 2010, 2015, etc.). In today's notice, EPA is proposing that the recheck period be the same for both handheld and nonhandheld engines. However, EPA suspects that the recheck period described in the ANPRM's nonhandheld program may be more comprehensive than is necessary. Specifically, it may be the case that the field/bench adjustment factor will not need to be checked so often, especially if technologies, production tolerances, and emission results do not change that much from year to year. As a result, EPA is proposing that the field/bench adjustment factor be re-estimated as often as every five years as determined by EPA on a case-by-case basis, except that EPA may require more frequent rechecks in model years prior to the 2006 model year. EPA seeks comment on this proposed recheck schedule. EPA also proposes that any new adjustment factor subsequent to a recheck be applied regardless of how similar it is to the adjustment factor from the previous correlation effort. However, the new adjustment factor would apply only prospectively, beginning with the next model year. EPA seeks comment on whether a longer lead time should be specified, for example, requiring the new adjustment factor to be applied with the engine model being certified at least six months after the new adjustment factor is determined. This would allow more time for engine manufacturers to adjust their designs, if necessary. Finally, EPA is not proposing any restrictions on the direction of modification of the field/bench adjustment factor that may results from future rechecks: it could be revised up or down, but not below 1.0.

*c. Hours to Age.* EPA is proposing that all bench-aged engines be aged to their full regulatory lives. Field-aged nonhandheld engines and field-aged residential handheld engines would also be aged to their full regulatory lives. However, following the program described in the ANPRM, under the proposed program field-aged commercial handheld engines could be field-aged to a minimum of 75 percent of their full regulatory lives. This flexibility is proposed today to reflect concerns that it may be hard to age these engines in the field due to equipment problems not related to emissions and engine durability which might be experienced at the end of the useful life. At the same time, as described below, field aging need not be done by actual end users but, instead, could be done by the manufacturer using a test plan that mimics as closely as possible actual field use. Under these conditions, the equipment may be less likely to break. Field aging to a minimum of 75 percent of regulatory useful life is being proposed as a cost savings measure for commercial engines which have the longest regulatory useful lives. Furthermore, EPA believes that test results on commercial engines aged to at least 75 percent of their regulatory useful lives can be appropriately extrapolated to the full regulatory useful life of the engine due to the generally more durable design of commercial engines which would tend to result in more predictable emission determination performance. Therefore, EPA seeks comment on the costs and benefits associated with field aging handheld commercial engines to their full regulatory lives. Finally, EPA is proposing that all engines in the same sample (bench or field) be aged to the same number of hours.

*d. Test Plan.* EPA is proposing that the manufacturer develop a test plan for both field and bench aging. All such test plans would be required to use the federal test procedure. The handheld program described in the ANPRM specified that ''a portion of the field engines will be aged in individual usage or fleets where the manufacturer does not carry out or exercise control over the engines' maintenance, or limit their usage such that engines are no longer used in a way that is representative of typical in-use conditions.'' Manufacturers would have three ways to field-age engines: in individual usage, in an independent fleet, or in a fleet that may be controlled by the manufacturer but over which the manufacturer does not control the maintenance process or inappropriately limit use. EPA proposes to extend this choice to both handheld and nonhandheld engines. However, EPA proposes that, if the manufacturer chooses to field-age the engines in a non-independent fleet, the applicable test plan must explain how the engines will be used to approximate, as closely as possible, actual in-use conditions, and also the kind of maintenance program to be followed, which should approximate expected in-use maintenance by end-users. The key is to ensure that the engines will experience similar load demands and environmental factors. For example, in the case of lawn mowers, the test plan for a non-independent fleet would have to specify how the engine would be exercised in a way to be representative of typical in-use conditions, which likely include cutting both high and low grass, under wet and dry conditions, etc. Alternatively, if the manufacturer chooses to age the engines in an independent fleet, the test plan would have to detail how the use of the engine will be documented and how the user will ensure that it is used in a variety of different conditions. Finally, EPA could review this test plan and could require changes if the plan does not adequately approximate in-use conditions.

*e. Technology Subgroups.* For both individual-manufacturer and industry-wide programs (see f., below), the analysis could be done on engine technology subgroups which could be expected to have similar emission deterioration characteristics, that is, groups of engine families from one or more manufacturers having similar size, application, useful life and emission control equipment. It would not be appropriate for engines with significant differences in in-use emissions performance characteristics to be included in the same technology subgroup. Manufacturers would be required to provide a justification satisfactory to EPA that the engines families would be expected to have similar emission deterioration characteristics, and would thus be

appropriately grouped in the same technology subgroup.

*f. Individual-Manufacturer or Industry-Wide Estimation.* EPA is proposing that the above-described field/bench adjustment program and estimation of the field/bench adjustment factor can be performed on either an individual-manufacturer basis or on an industry-wide basis. Any manufacturer who wants to use a field/bench adjustment factor instead of field aging engines would have to either conduct its own program, or participate in an industry-wide program. In other words, the engines that will benefit from the application of an adjustment factor would have to be included in the sample used to estimate that adjustment factor. This requirement would ensure that a manufacturer could not simply apply a field/bench adjustment factor estimated by another manufacturer that may not reflect the performance of the engines to which it is applied.

An industry-wide analysis would be subject to several additional constraints. First, EPA is proposing that all manufacturers participating in the same sample use the same test plan, except that maintenance schedules could vary across manufacturers to reflect differences in manufacturer-specified maintenance guidance to end-users. This is to reflect the fact that although manufacturers may pool their emissions results in the industry-wide program, they may want to test their engines separately. This uniformity is important to avoid biased aggregation of results. Second, the sample of engines used to estimate the field/bench adjustment factor would have to include at least one bench engine and one field engine from the same engine family from each participating manufacturer, but no fewer than three bench-aged engines three field-aged engines per technology subgroup. EPA seeks comment on whether the emissions should be sales weighted, to give a better picture of emissions across the category. EPA requests comment on how such a sales weighting procedure could be accomplished and still protect the confidentiality of sales information that might be covered by the confidential business information provisions of 90 CFR part 2. Third, EPA proposes to limit entries into and exits from the industry-wide program: a manufacturer could enter or drop out only before the adjustment factor goes into use for the first time. This will prevent constant revision of the adjustment factor. If a manufacturer drops out of the industry-wide adjustment program, the field/bench adjustment factor would have to be recalculated, both for that manufacturer and the industry. This is necessary to ensure that the field/bench adjustment factor reflects only the experience of the engines to which it will be applied. Presumably, a manufacturer will drop out only if its individual adjustment factor is more favorable than the industry-wide adjustment factor. Thus, if the industry-wide adjustment factor is not recalculated, then it will understate the experiences of the engines to which it will be applied. EPA seeks comment on whether such restrictions are necessary.

*g. Restriction on Using Test Results for Other Purposes.* One comment on the ANPRM requested that engine manufacturers be allowed to combine certification, correlation, and in-use testing for a family, such that bench results from the bench aged engines from the field/bench adjustment program can be used to satisfy in-use testing requirements. EPA proposes to allow test results from engines used for the field/bench adjustment program to be considered for purposes of determining handheld deterioration factors based on good engineering judgment. EPA believes this is appropriate because in the handheld certification program compliance is determined by applying a deterioration factor to new engines. Thus, the actual engines that are used for certification are not the field-aged engines. However, the test results from the field/bench adjustment program would not be acceptable to satisfy the in-use testing requirements for handheld engines, since this would create a situation in which engines that were used to estimate a parameter for the compliance program are also used to demonstrate compliance. Similarly, EPA would not allow the test results from the field/bench adjustment program to be used for demonstrating certification for the nonhandheld program. The nonhandheld engine compliance program relies on emission results from engines aged to their full regulatory lives. As in the handheld engine in-use testing example above, if the engines used in the field/bench adjustment program were also allowed to be used to demonstrate compliance, this would create a situation in which engines that were used to estimate a parameter for the compliance program are also used to demonstrate compliance. Finally, EPA proposes to prohibit emission results from engines tested to determine compliance with other parts of today's program from being used for purposes of calculating the field/bench adjustment factor. This restriction is necessary because otherwise manufacturers could choose among all of their test results and submit only the best emission results from a fairly large pool of engines, thus biasing the field/bench adjustment calculation. EPA does not believe this restriction will be burdensome, since manufacturers will be able to estimate a field/bench adjustment factor with as few as two engines (one bench-aged, one field-aged) if they participate in an industry-wide program, or six engines (three bench-aged and three field-aged) if they decide to establish their own adjustment factor.

*h. Other Pollutants.* The handheld program described in the ANPRM contemplated that all pollutants be measured. EPA is proposing that CO emissions be measured and adjustment factors for CO be determined for both the nonhandheld and handheld programs. However, EPA believes that the data set upon which statistical tests used to establish appropriate adjustment factors for $HC+NO_X$ are determined are sufficient to establish the relationship between CO emissions in the field and on the bench. Therefore, EPA proposes to allow manufacturers to use the same set of data to calculate a CO adjustment factor as would be used to establish the $HC+NO_X$ field/bench adjustment factor. EPA requests comment on this proposal.

4. Alternative Methodology Considered

EPA believes that the methodology described above is most appropriate because it balances the desires of industry for a simple program with the desire of EPA to put reasonable statistical constraints on the program without making it too difficult to perform or apply. However, there are other methods that can be used. Notably, EPA considered a statistical methodology in which a confidence interval would be constructed around the ratio of the means, and the adjustment factor would be the upper bound of that confidence interval.[40]

While both techniques attempt to apply statistical concepts, this alternative methodology could be considered in some ways more statistically sound than the one proposed above. However, it may be practically more difficult to use. Most importantly, the adjustment factor derived from this alternative methodology would be sensitive to the number of engines tested: a larger

[40] See ''Simulation to Determine Confidence Level and Maximum Allowable Interval Width for Field/Bench Adjustment Factor Program,'' EPA Air Docket A–93–29, Item #II–B–01. For a description of this alternative approach, see ''A Procedure for Adjustment of Emissions Results for Bench Aged Small Engines,'' located in EPA Air Docket A–96–55, Item #II–D–40.

number of engines will most often result in a smaller adjustment factor, although this need not always be the case. Thus, manufacturers will be faced with either testing a large number of engines to ensure the smallest adjustment factor (closest to the straight ratio of the sample means) or using a larger adjustment factor with concomitant effects on the adjusted emission rate. EPA is concerned that this dynamic could lead manufacturers to test a large number of both bench-aged and field-aged engines. In addition, the adjustment factor derived from this alternative methodology will always be a conservative estimate of the relationship between bench and field-aged results, because it is the upper bound of the confidence interval, and it will always be greater than the simple ratio of the means. Yet, it is not clear why choosing a conservative adjustment factor is preferable to a simple ratio of the sample means. Nevertheless, EPA seeks comment on the use of this methodology and other alternative approaches as opposed to the proposed methodology.

*D. Compliance Program*

This section discusses the three step compliance program proposed today for the Phase 2 regulation of small SI engines, consisting of certification, production line testing, and in-use emission testing. As discussed above in Section III, today's proposal contains three basic elements new to the Phase 2 program. First, manufacturers would be required at the time of certification to account for emissions deterioration throughout the useful life of the engines. Second, EPA is today proposing a manufacturer-run production line testing program to replace the existing Selective Enforcement Audit (SEA) program as the primary method of determining the compliance of new production engines. Finally, EPA is proposing in-use emission testing programs for nonhandheld and handheld engines. EPA is also proposing appropriate remedies to address noncompliance with emission standards. Such remedies include mandatory recall but would also consider alternatives to mandatory recall, in the event of nonconformities found through production line testing or in-use testing programs. The basic proposed program for nonhandheld and handheld engine compliance is described in this section; Section IV.E outlines certain compliance flexibilities which may be made available to certain manufacturers depending on a manufacturer's size, the class of engines, or other factors.

1. Certification

The certification process as required in the Act is an annual process. The Act prohibits the sale, importation or introduction into commerce of regulated engines when not covered by a certificate. The certification process proposed in this notice differs from that required in Phase 1 in that it would require the manufacturer to demonstrate that the engines will meet standards throughout their useful lives. To account for emission deterioration over time, manufacturers would be required to either age engines out to their full useful lives to obtain certification, or to adjust their certification test results by assigned or calculated deterioration factors (dfs), as is currently done under other EPA mobile source rules. Where appropriate and with suitable justification, dfs would be allowed to be carried over from one model year to another and from one engine family to another. This section describes nonhandheld and handheld engine certification provisions, provisions for certification to CO standards, and EPA efforts to streamline the certification process.

*a. Nonhandheld Certification.* This notice proposes that certification for Class I and Class II nonhandheld engines continue as in Phase 1 except for the inclusion of an estimation of in-use deterioration. This deterioration estimate would be used to predict full useful life emission performance which would then be the basis for certification compliance decisions. The method for estimating in-use deterioration for certification purposes would depend on the type of engine technology.

*i. Side-Valve Engines and Engines with Aftertreatment.* For all side-valve engines and engines with aftertreatment, this notice proposes that one engine from each engine family would either be field aged in a representative application to its full useful life, or bench aged to its full useful life to demonstrate compliance with the standards.[41] If a manufacturer chose the bench aging option, it would be required to use a bench cycle approved in advance by the Administrator, adjusting the results using the field/bench adjustment factor established through the process described above at Section IV.C. In either case, the manufacturer would be required to run the full test procedure described in this rule when the engine is stabilized, accumulate hours on the engine, and then run a full test procedure at full useful life hours to determine a test value for certification.

The final field-aged results or the final adjusted results of the fully bench-aged engines would be compared against the applicable standard to determine compliance at the time of certification. In addition, a df would be calculated from the final test results compared against low hour stabilized test results. While not directly used in the certification program, this df would be used to adjust the results of engines tested in Production Line Testing program described below in Section IV.D.2.

For Class II SV engines and Class II engines with aftertreatment certified to the 250 hour useful life category, the manufacturer would have the option to bench age the engine to less than the full useful life and calculate a df at the engine's full useful life using a method of data extrapolation acceptable to the Administrator, as described below in Section IV.E.

*ii. Overhead Valve Engines.* As discussed elsewhere in this notice, EPA expects the Phase 2 rule to result in a virtually complete technological shift for Class II nonhandheld engines from SV to OHV or comparably clean and durable technology engines. In addition, EPA believes that OHV technology engines have the potential to show low and stable emissions deterioration characteristics as compared with SV technology engines.

EPA is today proposing that manufacturers of OHV technology engines be allowed to use an industry-wide assigned df for certification purposes. This program should allow manufacturers to focus more of their efforts on transitioning to a cleaner technology, by reducing the certification test burden on the engine manufacturers at the beginning of the Phase 2 program. EPA believes that offering manufacturers the opportunity to use an industry-wide assigned df rather than calculated dfs is reasonable for OHVs. A key element of the proposal for an assigned df is the proposed requirement that all manufacturers of OHV technology engines would participate in an industry-wide OHV Field Durability and In-use Performance Demonstration Program (''Field Durability Program'') described in Section IV.D.3, below. This program would be designed to demonstrate the validity of the assigned df by producing significant amounts of data from real field-aged engines. If the OHV Field Durability Program data indicate that the assigned df is inappropriate, EPA would conduct a

[41] For nonhandheld engines participating in the averaging, banking and trading program described in more detail above in Section IV.A.5, compliance would be demonstrated with the family emission limit (FEL) rather than the standard.

rulemaking to modify these proposed provisions to correct the assigned df program. This section describes the assigned df program for OHV engines, as well as an option for manufacturers to calculate dfs through field testing engines at the time of certification.

**Assigned dfs For OHV Nonhandheld Engines**

EPA is proposing that manufacturers of OHV technology engines would be allowed to use a multiplicative assigned df of 1.3 for OHV engines in all useful life categories for projecting emissions deterioration for compliance purposes. In the ANPRM, EPA discussed a value of 1.3 as the assigned df value for Class I and Class II OHV technology engines in the shortest useful life categories (i.e., 66 and 250 hours, respectively). In addition, EPA indicated that it would consider during the rulemaking process whether or not to propose an assigned df for all useful life categories, and if so, what the appropriate assigned df values would be. EPA indicated that the assigned df for Class II OHVs in the 500 and 1000 hour useful life categories would likely fall between 1.3 and 1.5. In addition, if an assigned df of 1.5 at 1000 hours, for example, appeared to be the appropriate value, EPA would propose a standard for the 1000 hour category adjusted by ratio to the proposed 12.1 g/kW-hr standard proposed for the 250 hour category.

EPA received comment on the ANPRM that the assigned df should be higher than 1.3 for the higher useful life categories, with a corresponding higher emission standard for the higher useful life categories. This commenter suggested that the application of a 1.3 df to longer useful life periods could reduce product offerings and impose unjustified costs on small equipment manufacturers. EPA received a similar recommendation for higher dfs for the 500 and 1000-hour useful life categories.[42] Specifically, an assigned df of 1.4 and a $HC+NO_X$ compliance standard of 13.0 g/kW–hr were recommended for 500-hour engines and an assigned df of 1.5 and a $HC+NO_X$ compliance standard of 14.0 were recommended for 1000-hour engines. In making these recommendations, the represented manufacturers argued that EPA had no full life emission performance information for these categories of engines. Although acknowledging they were providing no data to substantiate their recommendation, these manufacturers believe these higher dfs and emission standards provide a better assessment of equivalent stringency for these categories of engines compared to 250-hour engines certified with a 1.3 df to a 12.1 g/kW–hr standard.

EPA also received comment that use of assigned dfs should be limited to small volume manufacturers as a cost savings measure, and that the use of experimentally-derived dfs is preferable to the use of assigned dfs. This commenter argues that if the assigned df level is set too high, it could penalize those manufacturers who develop extremely durable engines, but if an assigned df were set too low, the result could be an underestimation of the emissions impact associated with an engine family or even the entire category. A final commenter asserted that assigned dfs are a bad idea; that the program described in the ANPRM results in a program in which future standards are uncertain due to the possibility of another rulemaking to adjust dfs; and that in the interval, engines may exceed the in-use standards because there is little incentive for manufacturers to reduce the deterioration rates of their engines.

EPA believes an industry-wide assigned df combined with the OHV Field Durability Program to validate assumptions as to the durability of OHV technology engines is a sound program. The Agency fully expects the assigned df to accurately reflect the industry-wide average df of OHV engines certified to the proposed standards at least in the near term. As manufacturers gain improved capabilities to produce OHV engines (as would be expected as an increasing proportion of small engines become OHVs), the industry-wide df could shift to a lower value. There is no expectation, however, for a shift to a higher average df. The OHV Field Durability Program is expected to yield significant quantities of in-use data designed to verify the assumptions as to the emissions durability characteristics of OHV technology engines underlying today's proposal. The future standards are not uncertain if the industry average assigned dfs prove to be low and stable, as anticipated by this proposed rule.

EPA is today proposing a 1.3 assigned df for all useful life categories for Class I and Class II engines, based on EPA analysis of available test data on engines aged in the field, provided by engine manufacturers.[43] While the data are limited, the data on Class II engines designed for longer useful life periods do not point to any value other than 1.3 for an assigned df for longer useful life hours. While no data were available on Class I engines designed for longer useful lives, EPA believes that a 1.3 assigned df at longer useful lives is a reasonable value. Longer useful life engines are designed for enhanced durability, and this is reflected in the emissions deterioration of the engines as well, with longer useful life engines experiencing the same emissions deterioration at longer hours as do short useful engines at short hours. Additional information on the derivation of the proposed assigned df of 1.3 is contained in the docket to this rulemaking.[44] Commenters who suggested a value other than 1.3 for assigned dfs at longer useful life hours did not supply data in support of their recommendations. However, EPA recognizes that the data upon which this proposal is based are very limited. EPA requests additional data on which to base the analysis for determining values for assigned dfs for OHV engines at longer useful lives. In particular, EPA requests comment on and any data supporting the assigned df and level of standards recommended by engine manufacturers (that is, 1.4 df and 13.0 g/kW–hr for 500-hour engines, and 1.5 df and 14.0 g/kW–hr for 1000-hr engines).

Finally, EPA is concerned that an industry-wide assigned df could reduce the incentive for a manufacturer to improve the durability of its engines. If manufacturers would be able to rely on an assigned df for certification performance regardless of in-use emission performance, manufacturers could design and produce engines which actually had much higher in-use deterioration than the assigned df. Manufacturers would be motivated to do so if they receive cost or other advantages from such a strategy. This is a real possibility since, in general, less expensive designs such as those with larger production tolerances or no oil control rings would also be expected to have higher emission deterioration. To protect against this, EPA is proposing limits on the use of assigned dfs. Specifically, EPA is proposing that if it determines the manufacturer's actual in-use sales weighted average df for a

[42] See Memo to the Docket regarding the October 3, 1997 meeting between U.S. EPA and the Engine Manufacturers Association, EPA Air Docket A–96–55, Item #II–E–11.

[43] See ''Tier 1 Deterioration Factors for Small Nonroad Engines'', September 1996, a report by Air Improvement Resources, available in EPA Air Docket A–96–55, Item #II–D–11.

[44] See ''Summary of EPA Analysis of Nonhandheld Engine HC and $NO_X$ Exhaust Emission Deterioration Data for 500 Hour Useful Life Class II OHV Engines,'' EPA Memorandum, August 4, 1997, available in EPA Air Docket A–96–55, Item #II–B–02.

useful life category (e.g., all OHV families certified to a 500-hour useful life) exceeds the assigned df by more than 15 percent (i.e., actual in-use df is 1.5 or greater), then EPA may require the manufacturer to generate engine family-specific dfs for one or more engine families in that useful life category. Similarly, if EPA determines that a family has an actual in-use df greater than 1.8, then EPA may require the manufacturer to generate an engine-specific df for that family. In either case, if EPA requires such engine-specific dfs, they would be determined on the basis of data from three field-aged engines per engine family. This level of testing is the same as that for the program being proposed for a manufacturer which opts to not use the assigned dfs for certification (see discussion in the following section, ''Calculated dfs for OHV Nonhandheld Engines''). EPA requests comment on the proposed thresholds for limits on the use of the 1.3 assigned df.

EPA recognizes that a requirement to generate an engine-family specific df for certification could be especially burdensome or perhaps practically impossible without disrupting production if the requirement was placed on the manufacturer close to the anticipated start of production for that family. EPA would take such issues into consideration when making any determination to require an engine-family-specific df to be generated.

EPA requests comment on all aspects of today's proposal for assigned dfs and calculated dfs for OHV technology engines, including the proposals for incentives for improving deterioration characteristics of OHV technology engines, and protections against misuse of the assigned dfs. EPA also requests additional data on which to determine the assigned dfs for OHV engines.

**Calculated dfs for OHV Nonhandheld Engines**

EPA views assigned dfs for OHV technology engines as the program engine manufacturers would most often select due to lower costs for certification. However, it is desirable to allow manufacturers of engines having improved durability characteristics to demonstrate and take credit for these lower dfs. Therefore, EPA is proposing as an option a procedure whereby a manufacturer could generate its own dfs for all engine families within a useful life category, in lieu of applying the assigned df for those families.

The assigned df is based on industry average data with some actual dfs above 1.3 and others below 1.3. EPA anticipates that manufacturers would choose the option of calculating their own dfs, over the option of selecting the 1.3 assigned df, in cases in which their engines exhibit superior deterioration characteristics. EPA is concerned that, if only these engines with superior deterioration characteristics are removed from the evaluation of the industry-wide assigned df values, then the industry average would be influenced upwards.

Therefore, to partially mitigate this concern, EPA is proposing that if a manufacturer chooses to establish its own df for one engine family in a useful life category, then it would be required to do so for all of its engine families within that useful life category. Thus the manufacturer would determine specific dfs for all of its families in that useful life category. In considering the types of data that would be required for manufacturer-determined dfs, EPA balanced the need for the program to be reasonable and practicable, yet rigorous enough to provide confidence in the dfs.

EPA is today proposing that calculated dfs for the full product line of OHV engines in a particular useful life category could be generated by field aging a minimum of three engines per engine family in a representative application to their regulatory useful lives. Each engine would be emission tested at least twice for all regulated pollutants using the full test procedure described in this rule. The first test point would occur after the engine had been stabilized by bench or field aging. The second test point would occur after the engine had been field aged to its useful life. The df for that engine family would be determined based on test data by dividing the average emissions at the full useful life by the average stabilized emissions for that family. If the manufacturer elects to conduct more than one test at either test point then the average of the data would be used. All test data would have to be at or below the standard (FEL, if applicable). EPA is also proposing that calculated dfs may cover families and model years in addition to the one upon which they were generated if the manufacturer submits a justification acceptable to EPA at the time of certification that the affected engine families can be reasonably expected to have similar emission deterioration characteristics.

The Agency is proposing for manufacturers who choose to develop their own OHV dfs by field aging three engines per engine family that these engines must be actual field-aged engines and not bench-aged even if adjusted by a field/bench adjustment factor. The proposed assigned dfs with df verification through the OHV Field Durability Program is the primary program for Class I and II OHV engines. The Agency believes that any alternative to the primary program for nonhandheld OHV engines must generate emission data of similar accuracy as that on which the assigned df and OHV Field Durability Program is based. Without this requirement, the primary program would be undermined. The Agency has proposed a field/bench adjustment program for handheld engines and for non-OHV technology Class I and II engines. In both of those programs the Agency has proposed a level of confidence which would have to be met before a field/bench adjustment factor would be allowed, and is therefore a compromise between data accuracy and test burden (see Section IV.C). The test burden associated with the assigned df and OHV Field Durability Program has been limited to an appropriate level because it is covered by a maximum number of field aged engines that a manufacturer would be required to test on an annual basis (see Section IV.D.3.c ''Maximum Rates for Field Tested Nonhandheld Engines''). However, the proposed OHV Field Durability Demonstration does not permit a compromise on the accuracy of the field test data which would result from a field/bench adjustment program. Therefore, the Agency believes it is not appropriate that an alternative (i.e., manufacturer calculated dfs) to this primary program should allow such a compromise. The Engine Manufacturers Association [45] has recommended to the Agency that manufacturers be allowed to determine their own OHV dfs by performing a field/bench adjustment program. The Agency requests comment on this suggestion.

In the ANPRM, EPA indicated that it would consider during the rulemaking process the appropriateness of reserving certification credits pending verification of the dfs through in-use testing for families for which the manufacturer generates its own df. EPA believes that today's proposal for field aging three engines per engine family for calculating dfs provides adequate data up front to provide assurance as to the deterioration of these engines, and obviates the need to reserve certification credits pending in-use testing. However, engines for which the manufacturer calculates its own df would be subject to the OHV Field Durability Program. EPA requests comment on the proposal not to reserve certification credits

[45] See Memo to the Docket regarding the October 3, 1997 meeting between U.S. EPA and the Engine Manufacturers Association, EPA Air Docket A–96–55, Item #II–E–11.

pending verification of the dfs through in-use testing.

Finally, to provide flexibility during the phase-in of the 12.1 g/kW–hr Class II standard, EPA is proposing that manufacturers choosing to establish their own dfs for the 500 and 1000 hour useful life categories for Class II OHV engine families may, with the advance approval of the Administrator, base their dfs on good engineering judgement (subject to future verification, as discussed below in Section IV.E).

*b. Handheld Certification.* This notice proposes that the certification of handheld engines continue as in Phase 1, except that manufacturers would be required to generate and apply a df to their stabilized emission results. EPA is proposing that manufacturers would be allowed to establish a df for each engine family based on technically appropriate analysis of test data on that engine family (or engine families of sufficiently similar design to be expected to have the same emissions durability) to reflect the emission deterioration expected to occur over the useful life of the engine. Manufacturers would be required to retain test data and description of their analysis to support their choice of dfs and to furnish this information to EPA upon request. EPA may reject the manufacturer's choice of df if it has evidence that the actual df is significantly higher or if the test data and analysis do not support the manufacturer's determination of a df. Data in support of the df could include data from the field/bench adjustment factor program as well as data from the in-use testing program.

EPA believes that the proposal to allow manufacturers flexibility in determining the test data necessary to establish dfs for handheld engine families is a reasonable program designed to assure the environmental benefits of the program are met without placing an undue burden on manufacturers at the time of certification. EPA requests comment on all aspects of the proposed provisions for certification of handheld engines and determination of emission deterioration factors for compliance purposes.

*c. Certification to CO Emissions Standards.* EPA is proposing that provisions for establishing CO emission dfs for use in the certification and production line testing programs would be the same as the provisions for established $HC+NO_X$ (or $NMHC+NO_X$) emission dfs, except in the case of OHV technology engines for which the manufacturer elected to use an assigned df. For these engines, the manufacturer would be allowed to establish a df for CO emissions using good engineering judgment.

*d. Streamlining of the Certification Process.* Since the promulgation of the Phase 1 rule, EPA has taken great strides to reduce the volume of information that must be submitted to obtain certification. A direct final rule published on May 8, 1996 (61 FR 20738), greatly reduced the reporting requirements necessary to obtain certification under the Phase 1 program. This proposal would continue the reduced reporting requirements, adding only information items related to new provisions required for the Phase 2 program.

EPA has also made strides to facilitate the electronic submittal of certification materials. Certification applications can currently be submitted on a computer disk, and the Agency hopes soon to be able to receive applications through a telephone data link. Further, EPA is working with the California Air Resources Board (CARB) in an effort to develop a common application format that would reduce the certification burden for manufacturers. EPA anticipates that for the Phase 2 program, EPA and CARB would accept the same application format and would have the same application submittal process.

2. Production Line Testing

This section addresses the production line testing program proposed today for nonhandheld and handheld engines. EPA is proposing that manufacturers conduct a manufacturer-run production line testing (PLT) program using the Cumulative Sum (CumSum) procedure, as the primary program for ensuring the emission performance of production engines.[46] The Phase 1 rule relies upon a traditional Selective Enforcement Auditing (SEA) program for production line compliance. SEA is a statistical sampling and testing scheme that must be initiated by EPA and provides a snapshot indication of whether a given engine family complies with applicable standards or FELs at a given point in time.

In the proposed Phase 2 PLT program, manufacturers would conduct continuous production line testing of all engine families and feed the results of that testing back into their design and production processes. CumSum is a statistical sampling and testing procedure which results in random periodic sampling and testing of engines from each engine family. The proposed CumSum procedure is useful both as an assessment tool for EPA and a quality control tool for engine manufacturers. The CumSum procedure assures that all configurations are susceptible to testing proportional to their production, and provides for continuous testing throughout the model year (except in cases in which an engine family shows clear compliance with the standards, in which cases testing can halt early, in as few as two engines). The CumSum procedure also allows manufacturers to monitor their own production and to fit production line testing into their normal production quality control procedures. The procedure is capable of detecting significant changes in the average level of a process, while ignoring minor fluctuations that are simply acceptable variation in the process. In summary, EPA believes that the CumSum procedure provides an effective measure for meeting EPA's goal of assuring that production engines comply with the applicable standards or FEL before they leave the production facility.

As testing of each engine family begins with a new model year, the CumSum process computes an action limit and a test statistic based on the deteriorated test results for each pollutant for each family. As new data are received, both the action limit and the test statistic are updated. The action limit and the test statistic are functions of the standard deviation of the sample. If the test results are clearly below the standard or FEL, and the standard deviation of the test result is appropriately low, the process will declare a halt to testing. With very low emitting engines, this can occur in as few as two tests. If test data are highly variable or the test results are very close to the standard or FEL, testing may proceed to as many as thirty tests per family (the proposed maximum test limit) spread equally throughout the model year. If the test statistic crosses the action limit for two sequential tests, then the process indicates a nonconformity and the manufacturer would be required to take corrective measures.

EPA is proposing a manufacturer-run PLT program for both nonhandheld and handheld engines. However, for nonhandheld engines, while PLT is the preferred option, EPA also is proposing an alternative program under which manufacturers would have the option to elect to be subject to the traditional SEA program (rather than PLT), as described in Section IV.D.2.d, below. In addition,

[46] The CumSum procedure has been promulgated for marine engines in EPA's spark-ignition marine rule at 40 CFR Part 91 (61 FR 52088, October 4, 1996). In this section, ''PLT'' refers to the manufacturer-run CumSum procedure, or other manufacturer-run production line testing procedure approved by EPA. ''PLT'' does not include Selective Enforcement Auditing (SEA), which is addressed separately in Section IV.D.2.d.

EPA is proposing to retain SEA for ''backstop'' purposes when manufacturer-run PLT is being conducted for nonhandheld and handheld engines, as described below. Under the proposal, in some cases, some manufacturers or engine families may have the option not to conduct production line testing requirements, including manufacturers of very clean engine families, or manufacturers or families which qualify for small volume flexibilities, as described in Section IV.E. The following discussions outline the proposed CumSum procedure, reporting of PLT results, procedures in the event of PLT failures, the use of SEA, and other topics related to production line compliance testing.

*a. The CumSum Procedure.* The proposed CumSum procedure is outlined in this section. At the start of each model year, manufacturers would begin to test each newly-certified engine family at a rate of one percent of production. After conducting two tests, a manufacturer would determine the required sample size for the rest of the model year according to the sample size equation.[47] For carry-over engine families, to reduce testing burden, the manufacturer would determine the necessary sample size by conducting one test, then combining the test result with the last test result from the previous model year, and finally calculating the required sample size for the rest of the model year according the sample size equation. Tests would be required to be distributed evenly throughout the remainder of the model year. After each new test, the sample size would be recalculated with the updated sample mean, sample standard deviation, and 95 percent confidence coefficient.

The manufacturer would be allowed to stop testing at any time throughout the model year if the sample mean for each pollutant is less than or equal to the applicable standard or FEL, and if the number of tests required of the manufacturer, as calculated by the sample size equation, is less than the number of tests conducted. However, if at any time throughout the model year the sample mean for any pollutant is greater than the applicable standard or FEL, and if the manufacturer has not reached a ''fail'' decision, the manufacturer would be required to continue testing that engine family at the appropriate sampling rate.

The maximum required sample rate for an engine family, regardless of the result of the sample size equation, would be the lesser of three tests per month to a maximum of 30 per year, or one percent of projected annual production, distributed evenly throughout the model year. For example, if the sample size equation produces a value of 252 tests for a family with annual production of 20,000 engines, a manufacturer could elect to test only three engines per month to a maximum of 30 per year, instead of either 21 per month (which would be required if 252 tests were distributed evenly throughout the model year), or 17 per month (which would be required if one percent of annual production were distributed evenly throughout the model year).

Although the sample size equation may calculate sample sizes greater than the proposed maximum sample rates, EPA believes that above some sample size, the cost of testing would become unnecessarily burdensome for manufacturers of small SI engines. Further, EPA believes that the proposed maximum sample rates (e.g., 30 engines) are sufficiently large to adequately characterize the emission levels of the engine family for the purpose of making a compliance decision. After determining the appropriate sample size, the manufacturer would construct a CumSum equation for each regulated pollutant for each engine family. Following each emission test, manufacturers would update current CumSum statistics for each pollutant according to the CumSum equation. Manufacturers would continue to update the CumSum statistics throughout the model year.[48]

Manufacturers could elect to test additional engines provided that testing of the additional engines is performed in accordance with the applicable federal testing procedures for small SI engines. Such testing could be used, for example, to bracket a nonconformity determined through the CumSum procedure, and such bracketing could be used to reduce a manufacturer's liability for past production. If a manufacturer elects to perform additional testing, the results would not be included in the CumSum equation. However, the results of additional tests would be included in the quarterly reports to EPA. Manufacturers would be required to randomly select which engines are to be included in the CumSum program prior to any knowledge of the emission levels of CumSum engines or engines used for additional testing.

In cases where the CumSum sample size equation indicates that testing can be halted, the CumSum process indicates that there is 95 percent probability for each pollutant that the mean emission level for the engine family is below the applicable standard (or FEL). In cases where the test statistic exceeds the action limit for two consecutive tests, then EPA is highly confident, based on extensive computer simulations of the CumSum program, that the mean emission level of the engine family for that pollutant exceeds the standard (or FEL), i.e., that the engine family is in noncompliance for that pollutant. The risk that a complying engine family will incorrectly be determined to be noncomplying (manufacturer risk) is set at similar levels as in EPA's historical SEA program. The risk that a noncomplying engine family will incorrectly be determined to be in compliance (consumer risk) is set at improved (lower) levels as in EPA's SEA program. The Agency requests comment on all aspects of the proposed production line testing program and CumSum procedure. For more information on the derivation of the sample size and CumSum equations and some examples of the CumSum procedure, see the document *''Proposed Procedure for Quality Audits of Marine and Small Engines: A Cumulative Sum Approach''* (EPA Air Docket A–92–28, Item # IV–B–03).

*b. Reporting of CumSum Results.* EPA proposes that production line emission test results, as well as sample size calculations and CumSum calculations, would be reported to EPA on a quarterly basis. The Agency would then review the test data, sample size and CumSum calculations to assess the validity and representativeness of each manufacturer's production line testing program. If the CumSum process determines that an engine family is in noncompliance, the manufacturer would be required to report the emission test results and the appropriate sample size and CumSum equation calculations within two working days of the occurrence of the noncompliance.

EPA received comments on the ANPRM recommending that, in the event of a PLT failure, manufacturers should be required to report such exceedances within thirty days of discovering the failure, suggesting that thirty days provides a reasonable time for manufacturers to evaluate and verify test data and determine the existence of any production line problems. EPA

[47] For more discussion of the sample size equation, see *Proposed Procedure for Quality Audits of Marine and Small Engines: A Cumulative Sum Approach,* Item #IV–B–03 in EPA Air Docket A–92–28.

[48] For more discussion of maximum sample rates and updating CumSum statistics, see *Proposed Procedure for Quality Audits of Marine and Small Engines: A Cumulative Sum Approach,* Item #IV–B–03, in EPA Air Docket A–92–28.

believes that thirty days is too long a period for the Agency to not be made aware of a PLT failure. Such delays would not occur, for example, under a traditional SEA program. In the event of a traditional SEA, EPA is aware immediately of the existence of an SEA failure, and can immediately begin working with the manufacturer to remedy the problem. EPA is proposing that the appropriate PLT test results be reported within a two working days, a time period consistent with that promulgated for the gasoline marine PLT program. A two-day delay in reporting would not unnecessarily delay EPA's ability to begin to work with manufacturers during that time to determine an appropriate response to a PLT failure. As discussed below, the manufacturer would have 30 days after the date of the last test before any suspension or revocation of a certificate for the engine family would occur. The manufacturer could use that time to determine the existence of production line problems.

EPA also received a comment that manufacturers should not be required to report all resultant test data to EPA quarterly (e.g., extensive raw test data in addition to calculated emissions results). This commenter suggests that the submission of a completed CumSum summary data sheet, permitting EPA to confirm that an engine family is in PLT compliance and to see where in the CumSum process compliance was attained, should be sufficient for quarterly reporting, and that manufacturers could maintain raw PLT data for a reasonable period of time and make such data available to EPA upon request.

It is not clear which raw data this commenter would prefer be allowed to be retained at the manufacturer's facility. EPA is proposing that manufacturers would submit to EPA on a quarterly basis pertinent engine information, individual test results, relevant CumSum calculations, and other information at Section 90.709(e) of the proposed regulations. EPA does not believe that this reporting requirement is overly burdensome. EPA expects that manufacturers will keep track of PLT data electronically, and EPA intends to develop a standard CumSum summary data sheet to facilitate electronic submittal of data for the quarterly reports. EPA requests comments on these proposed provisions.

*c. Production Line Testing Failures.* If an engine family is determined to be in noncompliance, or a manufacturer's submittal to EPA reveals that production line tests were not performed in accordance with applicable federal testing procedures, under the proposal EPA could suspend or revoke the manufacturer's certificate of conformity in whole or in part for that engine family subject to a thirty day waiting period (discussed in more detail below in Section IV.D.2.c.iv). EPA could reinstate a certificate of conformity subsequent to a suspension, or reissue one subsequent to a revocation, after the manufacturer demonstrates that improvements or modifications have brought the engine family into compliance. The proposed regulations include provisions for a hearing in which a manufacturer may challenge EPA's decision to suspend or revoke a certificate of conformity based on the CumSum procedure.

EPA is proposing procedures whereby a manufacturer could remedy the emissions problems from engines produced prior to the PLT failure. In EPA's traditional SEA program, SEA failures have typically been addressed by a recall of the past production engines for the failing family. Future production engines are expected to be brought into compliance by either adjustments to the certification FEL, in cases where the manufacturer is participating in a certification ABT program, or through appropriate engine and emission control system modifications. As discussed in Section III of this preamble, above, EPA is proposing alternative remedies in the event of PLT failures, given the likely difficulties of applying a traditional recall program to the small SI engine industry. For handheld engines, these procedures include the use of in-use credits or other alternative remedies. For nonhandheld engines, these procedures include the use of certification credits through the adjustment of a family's FEL or other alternative remedies. These procedures are discussed below.

i. Handheld Engines

EPA is proposing that when handheld manufacturers experience PLT failures, the excess emissions from engines that have already been introduced into commerce could be addressed by the application of in-use credits or another alternative remedy. In-use credits are discussed in detail in Section IV.D.3, below. The emission performance of future production would be addressed through a running change to the existing configuration or certification of a new configuration such that compliance is demonstrated.

ii. Nonhandheld Engines

Unlike the proposed program for handheld engines, the program proposed today for nonhandheld engines does not include provisions for in-use credit generation. Since in-use credits would not be available, and since recall of small SI engines is not likely to be effective, for nonhandheld engine manufacturers who use averaging, banking and trading to obtain certification, this notice proposes that, in the event of a CumSum failure, the manufacturer would be permitted to adjust its certification FEL to a level for which compliance could be demonstrated. This adjustment would apply to both past and future production of that family.

EPA has held in past programs that manufacturers should be liable for their FELs, and that the past production of that family is subject to recall if the family exceeds its FEL during an SEA. The Agency continues to believe that manufacturers should set FELs appropriately based upon adequate testing and engineering analysis. Thus, while proposing that nonhandheld engine manufacturers would be permitted to adjust FELs for past production of an engine family, EPA expects that the need for manufacturers to change an engine family's FEL retroactively in the event of CumSum failures should be rare or nonexistent. If there are substantial occurrences of the need to adjust FELs retroactively, this would suggest that manufacturers are not correctly setting FELs carefully and accurately for individual families, in which case the Agency should appropriately revisit this provision.

EPA is also proposing that nonhandheld manufacturers who experience CumSum failures could adjust their FELs even if they did not have adequate credits, provided that they could obtain the necessary credits by the end of the model year following the model year in which the production line failure occurs. If sufficient credits were still not obtained, the manufacturer would have two more years to obtain them, but would then be required to use credits on a 1.2 to 1 basis (i.e., such credits would be discounted twenty percent). Unlike in the proposed handheld engine in-use credit program, in which manufacturers would have opportunities to generate additional credits, the nonhandheld certification ABT program would not afford such opportunities. Thus, EPA believes it is reasonable in the program for nonhandheld small SI engines to provide additional time for manufacturers to acquire certification credits necessary to offset PLT exceedances. Requiring future model year credits to be discounted if used to remedy past production on

noncompliance assures that the manufacturer will not benefit economically from delayed compliance with the standards.

Because EPA believes manufacturers should set FELs accurately and carefully, and to encourage manufacturers to set FELs accurately, EPA is proposing that these provisions (e.g., the retroactive use of credits, and the ability to carry a credit ''deficit'') would only apply in the case of a manufacturer who fails no more than one engine family in a given model year, or who fails more than one engine family but the total production of those families is no greater than 10 percent of the manufacturer's U.S. sales. EPA requests comment on all aspects of this retroactive use of certification credits and its likely impact on the accuracy of the FELs determined at certification.

iii. Alternative Programs and Voluntary Recall

In the event of PLT failures, EPA prefers that handheld manufacturers use in-use credits for past production engines and that nonhandheld engines be recertified to a higher FEL which may require the application of certification credits, rather than some other alternative to recall. However, EPA is proposing that in the case of handheld or nonhandheld engines where the manufacturer did not have and could not obtain adequate in-use or certification credits, as appropriate, a manufacturer could conduct a voluntary recall, if it could show that an appropriate response rate was likely. EPA would also consider the appropriateness of alternative projects. These projects are essentially alternatives to recall and would be designed to provide an environmental benefit as well as an economic incentive to the manufacturer to produce complying engines. Guidelines for such projects are discussed in more detail in Section IV.D.4, below. A mandatory recall could be ordered by EPA for past production engines pursuant to proposed § 90.808 in cases where the manufacturer could not obtain appropriate credits and was unwilling to perform an alternative project acceptable to EPA.

iv. Suspensions and Revocations

EPA is proposing for engine families that fail production line compliance testing, that EPA would have the authority to suspend or revoke the certificate for that family. However, no suspension or revocation for a family could occur before thirty days after the date of the last test. During the thirty day period, EPA intends to work diligently with the manufacturer, as it always has in the case of SEA failures, to provide certification of appropriate production line changes. Further, this notice proposes that EPA would approve or disapprove a manufacturer's production line change within fifteen days of receipt, or the change would be considered automatically approved.

EPA believes that these waiting periods are reasonable to afford manufacturers and EPA sufficient time to work together to address problems, without the concern that EPA would hastily suspend or revoke the certificate of a family determined to be in nonconformity by a production line testing program. EPA believes that the proposed time frames are reasonable, and are consistent with longstanding EPA practices in the SEA program of providing a waiting period following an audit failure. In such failures, EPA works closely with the manufacturer to arrive at a solution for the problem engine family. With on-highway engines, such solutions have typically involved a recall of engines that have already been produced along with the recertification of the family to a new FEL, or the certification of a replacement engine configuration. As discussed above, for small SI engines, such solutions could involve the use of certification or in-use credits, voluntary recalls, or other alternative remedies. EPA has never caused an assembly line to shut down because of an audit failure and does not intend to start such a practice where other alternatives can be used.

*d. Selective Enforcement Audits (SEA).* While EPA is proposing the CumSum manufacturer-run PLT program as the preferred production line testing program for the Phase 2 program, EPA still sees a function for traditional SEA and is therefore not proposing to eliminate traditional SEA altogether. EPA is proposing that for both nonhandheld and handheld manufacturers, SEA would remain as a ''backstop'' for EPA to use in cases where there is evidence of improper testing procedures or nonconformities not being addressed by the CumSum process.

As mentioned earlier, the Agency is also proposing an alternative program under which nonhandheld manufacturers could choose not to conduct manufacturer-run PLT program, in which case all families would continue to be subject to an SEA program as under Phase 1. Although currently not preferred by the Agency, EPA is considering this option since it was included in the ANPRM and received support from the nonhandheld industry. EPA solicits comment on the appropriateness of providing this option, and on whether it would be better to require PLT for all families. Only one approach, either PLT with SEA as a ''backstop'', or manufacturers having the choice to use either PLT or SEA as the primary program, will be adopted as the final rule for nonhandheld manufacturers.

Under this alternative program, EPA is also proposing that nonhandheld engine manufacturers be limited in their ability to switch back and forth between PLT and SEA. Manufacturers involved in PLT would be required to implement that approach for a minimum of three consecutive model years and to provide EPA with notice one complete model year prior to the model year for which they were planning to opt out. In addition, a manufacturer would not be allowed to opt out of PLT while carrying a negative certification credit balance. However, a manufacturer would be allowed to opt in to PLT at any time.

Finally, where small volume engine manufacturers or small volume engine families would be entitled to exemptions from the PLT program under the proposal (see Section IV.E), those families would remain subject to SEA, although EPA would be unlikely to issue test orders without evidence of nonconformity.

In the event of an SEA failure for handheld engine manufacturers, EPA is proposing that the option to use in-use credits or another alternative to recall would be available to remedy past production engines. For future production, the manufacturer would be expected to modify the engine to come into compliance with all applicable standards.

In the event of an SEA failure for nonhandheld engine manufacturers, the manufacturer would have the option to adjust the FEL for future production of the engine family. EPA would address a remedy for the past production in the event of an SEA failure on a case-by-base basis, seeking to both preserve the environmental benefits of the program, maintain incentives to accurately set FELs in advance, and minimize the burden on the industry. Such a remedy might include, for example, a combination of measures such as mandatory PLT for appropriate time periods and portions of production, recertification of all or part of an engine family, and generation of credits to remedy exceedances over an appropriate period of time. However, consistent with past practice, EPA does not anticipate allowing the retroactive use of certification credits to remedy past production failures determined via

SEA, or the carryover of any credit deficits, as would be allowed if the manufacturer chooses to conduct manufacturer-run PLT. Since SEA only evaluates production line performance during a ''snap shot'' in time and not throughout the entire production period, it would be inappropriate to use credits generated on the basis of total annual production to correct the SEA failure. Instead, a manufacturer would likely be expected to recall the noncomplying family or conduct an alternative remedy proposed by the manufacturer and accepted by EPA. EPA requests comments on the proposed provisions related to remedies for SEA failures.

EPA received a comment on the ANPRM that handheld manufacturers should be permitted to elect to be subject to routine SEA testing, as they currently are under Phase 1 emissions regulations, rather than conducting manufacturer-run PLT. This commentor suggested that manufacturers may desire to elect SEA for reasons of cost, confidence in their quality control, or familiarity with SEA, and that such an option could enhance the flexibility and reduce the cost of the PLT process, while at the same time assuring new engine compliance with Phase 2 emissions regulations.

EPA is not proposing routine SEA testing for handheld manufacturers. EPA believes that a manufacturer-run PLT program such as CumSum is a superior method of assuring that both handheld and nonhandheld production line engines meet the standards, that testing occurs continuously throughout the model year, and that each configuration is susceptible to testing. In addition, PLT affords benefits to the manufacturers of identifying problems early and addressing them without the disruption of an EPA-initiated SEA. EPA believes it is most useful and appropriate that manufacturers be responsible for and bear the burden of continuously monitoring their own emissions.

Under the production line compliance program proposed today, EPA expects that nonhandheld manufacturers may in some cases choose SEA as their primary production line compliance program, for cost reasons or fear of the unknown. However, EPA believes that the downsides of the choice of SEA as the primary production line compliance program are potentially great for all involved. EPA believes that in choosing SEA, the manufacturers would be foregoing an effective quality control tool for monitoring their own production, and would risk expensive and disruptive SEAs. In addition, EPA would not get the same coverage of engine families in the testing process. The regulations proposed today reflect the option, consistent with the program outlined in the ANPRM, for nonhandheld manufacturers in some cases to choose either PLT or SEA as the primary production line compliance program. However, EPA is also proposing in the alternative that the nonhandheld production line compliance program would be the same as the handheld program. That is, the manufacturer would not have the option to choose SEA as the primary production line compliance method. Rather, manufacturer-run PLT would be the primary program in all cases, with SEA existing as a backstop. Again, EPA requests comment on the appropriateness of the proposed program which allows nonhandheld manufacturers the option to elect routine SEA testing in lieu of PLT testing. EPA also requests comment on the option that nonhandheld manufacturers would use only PLT as the primary production line compliance program, with SEA existing as a backstop, and the effectiveness of this option in providing assurance of environmental benefits in-use, easing the implementation burden for EPA and the industry, and achieving greater commonality in the compliance programs for the handheld and nonhandheld sides of the small SI engine industry.

*e. Annual Limits for SEA.* The Phase 1 program contains annual limits on the number of SEAs the Agency may perform each year on a manufacturer, based on their number of engine families and sales. The Phase 1 annual limits serve to restrict the maximum number of audits for most manufacturers to a quantity equal to one fifth of the number of engine families (see 40 CFR 90.503(f)(1)). However, under the Phase 1 program, any test which the family fails or for which testing is not completed does not count against the annual limit (see 40 CFR 90.503(f)(3)). In addition, even if the annual limit is reached, EPA may initiate additional SEA testing to test families for which evidence exists indicating noncompliance (see 40 CFR 90.503(f)(4)).

EPA is not proposing any changes to the Phase 1 SEA annual limit provisions for Phase 2 except for the additional proposed provision that EPA may initiate additional SEA testing beyond the annual limit for families or configurations which the Administrator has reason to believe are not being appropriately represented or tested in production line testing (see proposed § 90.503(f)(4)).

EPA also requests comment on an option, not proposed, to raise the annual limit by one or two families for each failing audit in a given model year in cases where manufacturers choose SEA as the primary production line compliance program, should the regulations allow SEA as the primary production line compliance program. While this option is not included in the proposed regulatory text, EPA requests comment on the potential benefits or costs of this option for a higher number of potential routine SEAs for manufacturers who experience SEA failures. EPA requests comment on all aspects of the proposal for annual limits for SEAs under the proposed Phase 2 program.

*f. Alternate Statistical Procedures for Production Line Testing.* Consistent with the program outlined in the March 1997 ANPRM, EPA is proposing that manufacturers conducting manufacturer-run PLT could propose test schemes for EPA approval on a case-by-case basis other than the CumSum procedures described in this section and proposed in today's notice. EPA believes that this is reasonable because there may be situations where a single test scheme is not appropriate for a specific engine family or company. However, EPA also believes that it is desirable to avoid a multiplicity of testing schemes, and is concerned about the burden this could place on the Agency if multiple testing schemes are analyzed and developed with individual manufacturers. This notice proposes that EPA would have the right to review any alternate procedure to determine the ability of the procedure to (1) produce substantially the same levels of ''producer risk'' and ''consumer risk'' as the CumSum Procedure, i.e., the risk to a manufacturer that a complying family would fail in PLT testing, or the risk to the public that a failing family would pass in PLT testing; (2) to provide for continuous rather than point-in-time sampling; and (3) to include an appropriate decision mechanism for determining noncompliance upon which the Administrator can suspend or revoke the certificate of conformity. Further, it would be the requesting manufacturer's responsibility to provide an analysis and documentation that demonstrated the alternative satisfied these criteria. EPA would expect to reject any alternate statical procedure that did not fully satisfy these proposed criteria.

*g. Test Procedures for PLT.* EPA believes that the best way to determine whether new engines meet certification

standards is to test them under the test used at certification. Therefore, EPA is proposing that the manufacturer-run PLT program proposed in this notice would require testing based on the full federal test procedure as used for certification and described in Subpart E of the attached regulations. EPA recognizes the potential need to permit minor adjustments to the test procedure to accommodate production line testing. Consistent with other compliance test programs for mobile sources, the proposed regulations allow the Administrator to approve such test procedure adjustments.

*h. Harmonization of Production Line Testing with CARB.* EPA is interested in finding ways to harmonize the production line testing requirements proposed today for Phase 2 with any production line testing requirements manufacturers must meet for the California small engine regulatory program. In particular, EPA would expect that data from production line testing of a 50-state family conducted for a California Quality Audit program could be acceptable for the CumSum process, if the subject engines are sold nationwide and test engines are appropriately selected and tested. EPA will also continue to work with the California Air Resources Board to harmonize reporting formats, and similar information needs.

3. In-use Emission Testing

EPA believes that a critical element in the success of its small SI engine program is ensuring that manufacturers build engines that continue to meet emission standards beyond certification and production stages and comply with standards for their full regulatory useful lives. Section 213(d) of the CAA specifically subjects nonroad engines to the in-use compliance provision of section 207.[49] EPA has authority to subject manufacturers to in-use testing (conducted by the Agency or by the manufacturer under section 208 of the Act) and to remedy any noncompliance (for example, by recall and repair of engines) for the full regulatory useful life of an engine. In-use compliance enforcement has proven to be an effective incentive for manufacturers to build emission durable motor vehicles.

However, as discussed above in Section III, in the case of small SI engines, EPA does not believe that a mandatory in-use compliance program which relies on recall, for example, is likely to be as effective and practical as it has proven to be in EPA's on-highway programs. Small SI engines differ from motor vehicles in that they are not registered and are therefore difficult to track so that their owners can be notified. Many are not easily transported to a servicing dealer for repair. The in-use programs described below are therefore designed to provide data on in-use performance and to provide incentives to manufacturers to produce emission-durable engines without relying on the use of recall. While the Production Line Testing programs described previously are very similar, the in-use programs proposed in this notice differ significantly for the two sides of the industry. Again, EPA requests comment on alternative in-use testing programs, such as applying the in-use testing program proposed for handheld engines to the nonhandheld side of the industry, as well as applying the field durability program proposed for OHV engines to side-valve engines, engines with aftertreatment, and/or handheld engines.

*a. Nonhandheld Side-Valve Engines and Engines with Aftertreatment.* For nonhandheld side-valve engines and engines with aftertreatment, the in-use program would consist of a certification program in which the engines would be aged to their full useful lives during the certification process and no certificates would be issued unless the engine family can first be shown to meet standards (or FELs) for its useful life, as described above in Section IV.C and Section IV.D.1. EPA believes that a program which does not rely on in-use testing after certification especially makes sense for Class II SV technology engines which are expected to be phased out by 2005. In addition, EPA would have data on SV technologies aged in the field for the field/bench adjustment factor program; if EPA suspected serious problems with regard to whether the emissions reductions anticipated by this rule were in fact being achieved, EPA would address these concerns through appropriate programmatic changes. EPA requests comment on the appropriateness of this full useful life certification to predict the in-use emissions durability of SV engines and engines with aftertreatment.

*b. Nonhandheld OHV Field Durability and In-use Performance Demonstration Program.* For overhead valve nonhandheld engines, the proposed in-use program would be one whose primary function is to verify that the industry-wide deterioration factors predicted for the OHV engines are indeed correct. The proposed OHV field durability and in-use performance demonstration program (''Field Durability Program'') would generate significant quantities of emission data from engines aged in real field usage in representative pieces of equipment. If EPA's belief that the dfs of these engines are stable and predictable proves to be incorrect after receiving these data, or the assigned dfs specified in this rulemaking are significantly different than those that occur in real field usage of Phase 2 engines, then EPA would initiate appropriate programmatic changes through the regulatory process.

The proposed Field Durability Program is designed to provide data on the deterioration of OHV engines in actual field usage. EPA is proposing that engines for the program would be selected from or placed into service with residential or professional users. This program would be designed to provide a representative picture of actual in-use emissions, including representative age, maintenance, and sales mix of engines in the field. To the extent practical, engines would be selected from residential customers or professional users, in order to most accurately reflect actual usage patterns such as number of cold starts, typical maintenance patterns, and overwintering. However, EPA would also allow engines to be selected from manufacturers' fleets, provided the engines and their operation and maintenance are typical of in-use engines. Each engine in the program would be baseline tested at a number of hours equal to the break-in hours used in certification. The engine would then be field aged in an appropriate piece of equipment to full useful life, at which time the engine would be removed and retested. The df would be determined mathematically from the two test points from each engine.

Data from the OHV Field Durability and In-Use Emissions Performance Demonstration Program would not be designed to provide a basis for EPA to make in-use compliance determinations as to whether a particular engine family complies with its standard or FEL at the end of its useful life. Rather, the program is primarily designed to determine whether, in the aggregate, the industry-average assigned dfs for OHV engines are valid. Given the number of manufacturers expected to produce OHV engines and participate in this program, the program would generate meaningful volumes of real in-use data which would yield results indicating whether assigned dfs are realistic.

[49] Section 207(c) of the Act authorizes EPA to enforce compliance by vehicles and engines to applicable standards in actual use. Manufacturers are subject to recall ''[i]f the Administrator determines that a substantial number of any class or category of vehicles or engines, although properly maintained and used, do not conform to the regulations * * * when in actual use * * *''.

This notice proposes that the OHV Field Demonstration Program testing could be spread over multiple years. EPA proposes that manufacturers provide a schedule to EPA each year of the engine families and approximate quantities of engines they intend to produce for U.S. sales over the coming four year period, as well as estimates of the number of field aged engines that would be tested each year for the field/bench adjustment program (see Section IV.C) and for calculating dfs for OHV engines at the time of certification (see Section IV.D.1). In addition, manufacturers may wish to recommend a proposed testing plan for the Field Durability Program that, for example, best fits testing into their marketing, production, test facility and budgetary constraints. EPA would consider such information in determining the engine families to be field tested over that time period as part of the OHV Field Durability Program.

Manufacturers have indicated their desire to perform industry-wide OHV Field Durability Program testing to try to reduce the number of engines that must be field aged. EPA is proposing that it would consider requests by manufacturers to work together when it reviews a manufacturer's plan for engine families to be field aged. EPA will review proposals for joint testing to evaluate how thoroughly they cover a portion of overhead valve engine sales, whether they will provide statistically useful quantities of data, and other factors to help EPA ascertain whether OHV dfs from certification are accurate and appropriate.

*c. Maximum Rates for Field Tested Nonhandheld Engines.* EPA believes that emission data from real field-aged engines would serve a crucial role in validating the use of assigned dfs, calculated dfs, and the aging cycles used for bench-aged certification of side-valve engines. While recognizing the importance of and need for these data, EPA is also sensitive to the cost and testing burden associated with directing large numbers of engines to be field aged and tested in a given year.

In today's action, EPA is proposing that in any one year the Agency would not require field testing for the OHV Field Durability Program such that, when added to the field testing a manufacturer performs for the optional certification df generation or for the field/bench adjustment program, it would require the manufacturer to emission test more than 24 total engines that were field aged to their full useful life. EPA believes that this number will provide important quantities of data without placing an undue burden on manufacturers. EPA is proposing that it would have the right to require field testing to the maximum amount, and expects that the maximum testing may be required in the initial years of the program. Manufacturers would have the option to field test more engines than required by EPA. EPA anticipates it would reduce the testing burden as appropriate, especially for smaller manufacturers, in subsequent years should, for example, EPA determine that the data being developed is quite stable from year to year.

The discussion of the Field Durability Program in the March 1997 ANPRM indicated EPA would provide ''appropriate delays or waivers from the requirement of the bench correlation program in years when a manufacturer also runs the field durability program'' (see 62 FR 14754). In the development of this proposal, EPA considered the need to propose procedures to provide for EPA granting delays or waivers from the requirements of the field/bench adjustment program in years when a manufacturer also runs the OHV Field Durability Program. In today's action, EPA is proposing no formal process by which manufacturers would request a waiver from the requirements of the field/bench adjustment program. EPA believes that the need for delays or waivers is obviated by the cap on the number of fully field aged engines EPA would be able to require to be tested in any one year.

The discussion of the Field Durability Program outlined in the March 1997 ANPRM also suggested that EPA would propose an appropriate scaling of the field engine test burden for smaller volume manufacturers (see 62 FR 14754). For this proposal, EPA considered proposing a cap on the number of field tested engines of fewer than 24 engines per year for smaller nonhandheld manufacturers by sales volume. However, EPA believes that a scaling back of the test burden would not be appropriate. Such a scaling would most appropriately be based on the inability of manufacturers to sustain the costs associated with the OHV Field Durability program; however, the ability to sustain the costs of the program would not appear to differ significantly among manufacturers. Therefore, EPA is proposing the same cap on the field engine test burden for all manufacturers. EPA believes that this 24 engine per year cap is a manageable burden on the smaller volume manufacturers as well as the larger volume manufacturers. The Agency does not anticipate identifying families certified by manufacturers who would qualify as small volume engine manufacturers for in-use testing, unless there was evidence of a nonconformity (see discussion in Section IV.E). EPA requests comment on all aspects of the applicability of a cap to the number of field aged engines that EPA could require to be tested in any one year.

*d. In-Use Testing Program for Handheld Engines.* In today's action, EPA is proposing an in-use testing program for handheld engines similar to that promulgated in the gasoline spark-ignition marine engine rule (see 40 CFR Part 91, Subpart I). As in the marine rule, EPA is also proposing an in-use credit program, as well as a number of criteria for evaluating other alternatives to mandatory recall. Mandatory recall is the primary remedy for noncompliance. However, as in the marine program, EPA is interested in considering options to mandatory recall and, if implemented, will monitor the use of these alternatives to make sure they are as effective as anticipated. EPA believes that the successful implementation of the in-use credits program and the other alternatives would provide a comprehensive remedy to address in-use emission noncompliance, as well as incentives to manufacturers to produce emission-durable engines, without the use of recall. The program for handheld engines proposed today differs from the gasoline marine engine program in that the engines may be bench-aged rather than field-aged, at the manufacturer's option, provided the manufacturer has previously established an adjustment factor between the bench aging cycle and field aging through the program described above at Section IV.C. EPA requests comment on the technical requirements which would allow bench-aged engines to represent the emission performance of field-aged products.

i. In-use Testing for Handheld Engines

EPA is today proposing an in-use testing program for handheld engines which would make all engine families potentially subject to mandatory in-use testing by the manufacturer. The manufacturer would age the test engines in the field to their full useful lives. Alternatively, the manufacturer could choose to age the engines on a bench cycle to their full useful lives, providing that an adjustment factor had previously been established between the bench-aged and field-aged results, through the procedures described above in Section IV.C. The engines would then be emission tested for all regulated pollutants using the full test procedure described in this proposed rule. The number of engines per engine family tested would vary depending on test results. Except for small volume and carry-over engine families, the

minimum number of test engines would be four. For each engine that failed any pollutant, the manufacturer would test two additional engines, up to a maximum of ten. Small volume engine manufacturers would begin by testing two engines, adding two more for each failing engine up to the same maximum (see discussion of provisions for small volume engine manufacturers and other flexibilities in Section IV.E). Carry-over engine families would start with one engine. In the end, the emissions for each pollutant would be averaged and the family average compared against the appropriate standard to ascertain compliance. The in-use testing program proposed is designed as a method to provide adequate data on which to make compliance decisions, while allowing the testing of families which are found to emit below standard to conclude as expeditiously as possible.

Manufacturers would provide a schedule to EPA each year of the engine families and approximate quantities of engines they intend to produce for U.S. sale over the coming four year period. EPA would then select engine families to be in-use tested by the manufacturer over that time period or a fraction of that time period. EPA would identify no more than 25 percent of a manufacturer's families for in-use testing in any one year.

EPA received a comment on the ANPRM that it would be equally effective and potentially less costly to permit engine manufacturers to select the engine families for in-use testing. This would allow manufacturers to schedule in-use testing to better conform to production, marketing and budgetary constraints, and to choose their own mixture of commercial and residential engines to test each year. This commenter added that manufacturers could provide a testing schedule in advance to enable EPA to raise any concerns it has with a manufacturer's test plans.

EPA believes it is important to retain the authority to select engine families for in-use testing that potentially show risk of higher emissions in-use than predicted at the time of certification. Therefore, EPA is proposing to retain the authority select the engine families for in-use testing. However, EPA would work with manufacturers in an attempt to schedule testing to take into account production, marketing, test facility and budgetary constraints and would invite manufacturers to recommend a testing program which best suits their needs.

ii. In-Use Credit Program for Handheld Engines

As discussed above, the proposed in-use credit program for handheld engines is designed to address in-use nonconformities of handheld engines without the need for ordering manufacturers to conduct recalls of nonconforming engines. A reasonable means must exist to address in-use noncompliance that provides incentives to manufacturers to build emission-durable engines, that can be implemented practically, that encourages additional in-use testing, that offsets additional emissions resulting from noncompliance, and that is not unduly burdensome. EPA believes that the successful implementation of the proposed in-use credit program described below could be part of a comprehensive remedy to address in-use noncompliance, and that EPA would not, in practice, order mandatory recall of Phase 2 engines. When a manufacturer determines its average in-use emission levels for each pollutant, it would compare those numbers against the applicable standards. Emission levels below the standards could generate in-use credits. Emission levels above the standard would require the use of in-use credits. The credit formula as proposed here would be a function of the sales of the engine family, the difference between the family emission average and the applicable standard, the power rating of the engine, load factor, and the useful life of the engine.

In-use credits could be used to remedy emission exceedances of previously produced engines determined to be in nonconformity by in-use testing, production line testing or SEA failures. They would not be useable in handheld certification, and they would not be transferrable to nonhandheld engines, due to the considerable differences between the handheld and nonhandheld programs. Unlike certification credits for nonhandheld engines, they would not be useable for offsetting the high emissions from prospective production of an engine family following a PLT or SEA failure. In such cases, the manufacturer would be required to make a product change to improve emission performance of future production.

EPA is proposing that these in-use credits could be used at any time during the Phase 2 program, and that any future rulemaking concerning Phase 3 standards would address the use of the Phase 2 credits in Phase 3. EPA believes this unlimited life for in-use credits during the Phase 2 handheld program is justified since, if an engine demonstrates that it can remain under standards for its full useful life, then an environmental benefit has occurred and the manufacturer is entitled to that benefit for later use. However, unlimited life is not being extended beyond the Phase 2 program at this point, given the concern that Phase 2 credits could be used to effectively delay the implementation date of any Phase 3 standards. EPA requests comments on all aspects of credit life for in-use credits in the handheld in-use credits program.

A manufacturer could use in-use credits to average against in-use failures identified in that model year's testing. It could bank the credits for use in a later model year or trade the credits to another manufacturer. Manufacturers could test additional families and would generate or require additional credits according to that testing. However, the manufacturer would be required to report all in-use testing to EPA, including any test engines that were deleted from the aging process or testing process, and to provide to EPA a technical justification to support the deletion.

No restrictions are proposed on the application of in-use credits from one handheld engine class to another. EPA is not aware of any environmental or competitive concerns with allowing unrestricted use of in-use credits across handheld engine classes. EPA requests comments on the need for cross-class averaging restrictions, and the impact of having or not having them.

EPA is also proposing an adjustment factor to increase credits earned as the in-use testing sample size increases, similar to the program promulgated for the gasoline marine engine rule (see 40 CFR 91.1307). The proposal for an adjustment factor is reasonable because EPA's statistical certainty of the sample mean generally will increase with sample size.

In addition, EPA is proposing a provision that would require manufacturers to apply in-use test results to two past and one future model year when the engine family being tested meets the carryover criteria for those model years. EPA contemplates that manufacturers would not make frequent significant changes to engine families and that carryover certification would be common. Essentially, under this provision, the test results from one model year could apply to up to four model years; the one subject to testing, the two previous model years and the next model year. In-use credits would be generated or required, as appropriate. EPA requests comment on the

appropriateness of and the need for these provisions.

The handheld in-use credit program is meant, in part, to obviate the need to resort to a traditional recall program, and the Agency wants to ensure that this alternative program, or any other alternatives considered, provide incentives to manufacturers to design engine configurations that will comply with standards for their entire useful lives. EPA believes that manufacturers should make every effort to prove out their designs prior to certification so that in-use nonconformities will not occur. Therefore, this notice proposes that credits be discounted by 10 percent before they are used. This would require a manufacturer to obtain or generate credits sufficient to offset 110 percent of the emissions from a family found to be in noncompliance. This discount is consistent with that applied to in-use credits in the gasoline marine rule. Comment is requested on the appropriateness of such discounting and on the appropriate size of the discount.

4. Criteria for Evaluating Alternatives to Mandatory Recall

This proposal contemplates that for handheld engines, in-use credits would be the primary method of addressing emission nonconformities determined through in-use testing or production line testing, whether through the use of credits banked or averaged, or credits purchased through available sources. For nonhandheld engines, EPA is proposing that in some cases, the use of certification credits would be allowed as a method of addressing emission exceedances determined through production line testing (as discussed above in Section IV.D.2).

However, EPA is also proposing that manufacturers have available alternatives to using in-use credits or certification credits, if they lack sufficient credits and are unable to obtain them, that would still avoid necessitating an order for mandatory recall. One such alternative could be for the manufacturer to conduct a voluntary recall. However, EPA would consider other alternatives as well. This proposal contains a number of criteria for evaluating alternatives to determine whether they meet the goals of addressing the environmental impact of the in-use problem while providing incentives to the manufacturer to produce emission-durable engines. EPA intends to allow a manufacturer to implement a reasonable alternative that met these criteria prior to making a determination of substantial nonconformity under section 207 of the Act.

In evaluating alternatives to mandatory recall, EPA would consider alternatives which (1) represent a new initiative that the manufacturer was not otherwise planning to perform at that time and that has a nexus to the emission problem demonstrated by the subject engine family; (2) cost substantially more than foregone compliance costs and consider the time value of the foregone compliance costs and the foregone environmental benefit of the subject family; (3) offset at least 100 percent of the exceedance of the standard; and (4) are able to be implemented effectively and expeditiously and completed in a reasonable time.

These proposed criteria would function as ground rules for evaluating projects to determine whether their nature and burden is appropriate to remedy the environmental impact of the nonconformity while providing assurance to the manufacturer that EPA would not require excessive projects.

In addition to being evaluated according to the above criteria, EPA is proposing that alternatives would be subject to a cost cap, as contemplated by the proposal for handheld engines in the March 1997 ANPRM. EPA proposes a cost cap of 75 percent above and beyond the foregone costs adjusted to present value, provided the manufacturer can appropriately itemize and justify these costs. EPA believes that this is an appropriate value which is both ''substantial'' and sufficient to encourage manufacturers to produce emission durable engines and maintain positive in-use credit balances.

In deciding what cost cap to propose, EPA believes a figure of 75 percent more than the foregone costs adjusted to present value is consistent with and informed by the principles inherent in the criteria for evaluating alternatives to recall. For example, criterion (2) would require that the alternative must cost substantially more than the costs the manufacturer was able to forego by producing a nondurable engine, and consider the time value of those foregone costs.

EPA believes that manufacturers should prove out the in-use durability of their designs carefully before certification and desires to set the cost cap for alternative projects high enough that manufacturers will take measures to carefully evaluate in-use durability before certification and to bank and maintain substantial in-use credits to handle an unforeseen problem. EPA believes that a cost cap which would merely measure the foregone costs, and adjust them to their present value would not provide the appropriate incentive, because the manufacturer would ''break even'' and may become indifferent between assuring in-use durability up front and addressing it only when durability problems are detected.

EPA is proposing in this rule that in-use credits be discounted by 10 percent when they are used. If in-use credits are marketed freely and their price is determined by what it costs to generate them, a manufacturer would pay at least 10 percent more than it cost another manufacturer to comply with the standards and generate the credits. This suggests that the minimum figure for the cap should be at least 10 percent of the failing manufacturer's foregone costs, after those costs have been adjusted to the present value. Given that under the proposal no more than one fourth of a manufacturer's families would be subject to in-use testing in a given year, a manufacturer that produces a non-durable, non-carryover family has at most a 25 percent chance that EPA would be aware that such a non-durable family was being produced. A reasonable individual might risk a 10 percent cost penalty if the risk of actually having to pay it was never more than 25 percent. EPA can not estimate the savings a manufacturer may reap by building a non-durable engine, and therefore can not compute the expected value of the savings when the 25 percent risk factor is added in.

EPA believes a figure of 75 percent more than the foregone costs adjusted to present value would be both ''substantial'' and sufficient to encourage manufacturers to produce emission durable engines and maintain positive in-use credit balances. EPA notes that these projects are alternatives to recall and that a recall with a response rate similar to those in the motor vehicle program would likely have a much higher cost than would be permitted under a 75 percent cap. EPA considered proposing that the cap be tied to the cost of purchasing in-use credits on the open market, but is concerned that these alternatives would be needed when there are no in-use credits available for sale. Further, based on EPA experience with other ABT programs, there is no guarantee that routine sales of credits would ever occur. EPA requests comment on the appropriate cap and the appropriate methodology for determining the cap, and the difficulties that could be faced in trying to ascertain foregone costs.

*E. Flexibilities*

This section addresses a variety of flexibilities proposed today to ease the transition from the Phase 1 to the Phase 2 program, to ensure that the Phase 2

standards are cost-efficient and achievable, and to reduce the compliance burden while maintaining the environmental benefits of the rule. Following an overview of the approach to providing compliance flexibilities, and a discussion of the proposed cutoffs for determining whether a manufacturer, an engine family, or an equipment model would qualify for the flexibilities proposed today, this section describes the flexibility provisions proposed today, including general flexibilities, phase-in flexibilities, flexibilities to address the concerns of small volume engine manufacturers, flexibilities to address the concerns of small volume equipment manufacturers, and provisions to encourage engine availability. While some of these flexibilities may overlap, EPA is proposing these flexibilities as a means to reduce the compliance costs of the proposed rule for those that can least afford them, while maintaining the environmental benefits of the proposed rule and adopting the most stringent emissions standards achievable. EPA requests comment on the proposed flexibilities individually and as a whole.

1. Overview of Approach to Providing Compliance Flexibilities

In this proposal, EPA has attempted to facilitate compliance by creating provisions that help avoid unnecessary hardship for engine and equipment manufacturers but that still achieve the desired environmental benefits. EPA believes that these provisions will help to avoid disruption of supplies of engines needed by equipment manufacturers and will enable both engine and equipment manufacturers to more easily and economically make the transition from Phase 1 to Phase 2. These provisions will also help ensure that the stringent standards proposed in the rule are achievable with technology that will be available during the Phase 2 time frame.

Some engine manufacturers have expressed concern that the Phase 2 program might be too burdensome for engine families with small volume production or for small volume manufacturers. These manufacturers have stated that, without some kind of relief, these burdens will lead them to stop producing certain engines rather than bear the additional costs. The engines most likely to be affected are special engines designed for niche markets. For these markets, there could be significant consequences to equipment manufacturers and operators if production of special engines were to cease. To address these concerns, EPA is proposing several compliance flexibilities intended especially to reduce the compliance burden on small volume products or small volume engine or equipment manufacturers.

2. Proposed Production Volume Cutoffs

EPA has developed proposed cutoffs to determine whether a manufacturer or engine/equipment family would qualify for the flexibilities proposed today. These cutoffs are described here, with a more detailed discussion in Chapter 9 of the Draft RSD. EPA decided not to propose the Small Business Administration's definition of ''small business'' as the criterion for a manufacturer to qualify for the proposed flexibilities (the SBA definition is either 500 or 1000 employees, depending on the SIC code of the industry). This is because, of 15 engine manufacturers qualifying as ''small business'' by the SBA definition, at least three produce large volumes of engines, between 75,000 and 700,000 units, and have very high annual income. EPA believes these companies will not experience significant burdens in complying with the proposed Phase 2 program. Instead, EPA is proposing the following production volume cutoffs [50] for qualifying for the flexibilities proposed today.

First, nonhandheld engine manufacturers would be considered ''small volume engine manufacturers'' when their total annual production is 10,000 units or less; handheld engine manufacturers would be considered ''small volume engine manufacturers'' when their total annual production is 25,000 units or less. While over 50 percent of the nonhandheld engine manufacturers, and up to 30 percent of the handheld engine manufacturers could qualify under this proposed cutoff, fewer than 1 percent of the engines sold in the U.S. would be covered by these cutoffs.

Second, nonhandheld small volume engine families would be those families of 1000 units of less; handheld small volume engine families would be those families of 2,500 units or less. These proposed thresholds were selected as high enough to include approximately 30 percent of the engine families in each category, while low enough to account for less than 1 percent of the engines sold. At these levels, EPA believes a reasonable amount of flexibility could be provided to a significant number of manufacturers without undue risk of loss in emission control. In comments to the ANPRM, PPEMA has recommended 10,000 units or less as a definition for small volume handheld families. Since this definition will impact the number of engines families within a manufacturer that could be exempt from PLT testing, EPA is uncertain as to why a larger sales volume cut-off is both appropriate from an enforcement perspective and of particular benefit to the manufacturer. EPA requests information on the necessity for expanding its small volume engine family definition to include larger volume family sales such as recommended by PPEMA (and a comparable volume for nonhandheld engine families), especially regarding the cost benefit to specific individual manufacturers, and the impact such a higher number would have on the confidence EPA would have that its PLT compliance program adequately evaluates the emission performance of the manufacturer's production.

Third, equipment manufacturers using nonhandheld engines would be considered ''small volume equipment manufacturers'' when their total annual output across all models is 2500 units or less; equipment manufacturers using handheld engines would be considered ''small volume equipment manufacturers'' when their total annual output across all models is 5000 units or less. Again, while over 80 percent of the nonhandheld equipment manufacturers, and up to 67 percent of the handheld equipment manufacturers could qualify under this proposed cutoff, fewer than 2 percent of the nonhandheld engines and 1 percent of the handheld engines sold in the U.S. would be covered under these thresholds.

Finally, equipment models using nonhandheld engines would be considered ''small volume equipment models'' when 500 or fewer units are produced per year; equipment models using handheld engines would be considered ''small volume equipment models'' when 2500 or fewer units are produced per year. On the nonhandheld side up to 3 percent of the equipment sold in the U.S. would be considered small volume equipment models. On the handheld side, up to 3.5 percent of the equipment sold in the U.S. would be considered small volume equipment models.

3. General Flexibilities

The program proposed today contains several general provisions intended to facilitate compliance for engine manufacturers. One proposed flexibility, available to both handheld and

[50] Annual production volume of U.S. sales, as defined by these proposed regulations. Note that the vast majority of ''small'' manufacturers together produce a very small fraction of the engines; a few very large manufacturers produce the large majority of the engines.

nonhandheld engine manufacturers, is the ability to carry-over certification from one year to the next. This would reduce certification costs after the first year for those engines using technology that does not change significantly from year to year.

In addition, today's proposal contains two sets of proposed standard structure flexibilities which differ for handheld and nonhandheld engine manufacturers. For handheld engine manufacturers, the standards proposed in today's rule would be phased in, on a percentage of sales basis, which would facilitate compliance by allowing a manufacturer to spread initial compliance costs out over several years. It would also provide an opportunity for engine manufacturers to continue to supply Phase 1 engines to various equipment manufacturers, including the small volume equipment manufacturers that would also benefit from the special flexibilities described below.

For nonhandheld engine manufacturers, a declining corporate average standard for Class II nonhandheld engines would achieve those same goals. In addition, nonhandheld engine manufacturers would benefit from the certification averaging, banking, and trading program, which would help reduce compliance costs by allowing manufacturers to meet the standards with the most cost-effective technologies. Today's proposal would also allow manufacturers of nonhandheld overhead valve engines to use an assigned deterioration factor for nonhandheld overhead valve engines, further easing the compliance burden by reducing the number of tests needed to determine compliance.

For equipment manufacturers, EPA is proposing that the current provisions of 40 CFR 90.1003(b)(4) applicable for the transition from uncontrolled to Phase 1 emission regulations would also apply in concept during the transition from Phase 1 to Phase 2. Under today's proposal, equipment manufacturers would be allowed to continue to use Phase 1 engines until their stocks of engines are depleted, provided they do not engage in ''stockpiling'' (i.e., build up of an inventory of engines outside of normal business practices).

4. Phase-In Flexibilities

In addition to these general flexibilities, EPA is proposing two other provisions that would be applicable to all manufacturers of certain kinds of nonhandheld engines to ease compliance during the phase-in of the standards and ensure their achievability. First, because manufacturers' testing capacities may be substantially constrained during the transition to fully-phased-in standards, EPA is proposing to allow manufacturers of Class II OHV nonhandheld engines who elect not to use assigned dfs to use good engineering judgment to establish deterioration factors for the 500 and 1000 hour useful life categories during the phase-in of the 12.1 g/kW-hr Class II standard, subject to the approval of the Administrator. Recognizing the need to verify deterioration factors established based on good engineering judgment, EPA is proposing that, beginning in 2006, the Administrator may direct manufacturers to verify such deterioration factors using the same process as that for calculating deterioration factors described in Section IV.D.1 above (i.e, aging at least three engines in the field and calculating the deterioration factor based on the average of the test data). EPA is also proposing that the manufacturer would be allowed to offset any emission shortfalls resulting from a low deterioration factor through the use of certification credits (see discussion, Section IV.A.5) or other compensating measures approved by the Administrator.

Second, EPA is proposing an additional flexibility for manufacturers of Class II nonhandheld engines that use side-valve technology engines or engines with aftertreatment. During the transition to the Phase 2 standards, for engines which the manufacturer commits to cease production by the end of the 2004 model year, manufacturers would have the option to age engines for less than their full useful lives and extrapolate the deterioration factor to the full useful life using good engineering judgment.[51] Again, demonstration of such good engineering judgment would need to be made to the satisfaction of the Administrator. For the engine families which the manufacturer commits to phase out, engines certified to 250 hours could be aged for 120 hours, engines certified to 500 hours could be aged to 250 hours, and engines certified to 1000 hours could be aged to 500 hours. This flexibility, like the previous one, is intended to reduce the testing burden during the phase-in of the 12.1 g/kW-hr standard. However, EPA is not proposing to extend this flexibility to Class II engines which the manufacturer does not commit to cease production. In essence, this flexibility is designed to reduce the compliance burden at the start of the program for engines that are to be phased out, and thus to allow manufacturer to focus their resources on transitioning to engines that will meet the 2005 standards.

5. Flexibilities for Small Volume Engine Manufacturers and Small Volume Engine Families

EPA is proposing five compliance flexibilities to ensure the achievability of the standards and reduce the compliance burden on small volume engine manufacturers and small volume engine families, as follows.

First, small volume engine manufacturers could opt out of mandatory production line testing. This option would apply only to nonhandheld engine manufacturers with a total annual production of 10,000 engines or less and to handheld engine manufacturers with a total annual production of 25,000 engines or less. These engines would be subject to SEA testing. However, EPA anticipates little such testing unless it receives evidence of nonconformities or other problems.

Second, manufacturers of small volume nonhandheld engine families (those with total annual production of 1000 engines or less) and manufacturers of small volume nonhandheld engine families (those with total annual production of 2500 engines or less) could opt out of mandatory production line testing for those engine families. As above, these engines would remain subject to SEA testing, which would likely only occur if EPA had evidence of nonconformity.

Third, manufacturers of very clean engine families, that is, those whose $HC+NO_X$ certification levels are at least 50 percent below the standard (or FEL, if applicable) could also opt out of mandatory production line testing for those families. These engines would also be subject to SEA testing, although EPA sees little likelihood of conducting SEAs on engines certified substantially below the standard (or FEL). EPA seeks comment on the margin below the standard (or FEL) necessary to qualify for this exemption.

Fourth, small volume Class II side-valve technology engine families (whose annual production is 1,000 engines or less) would be allowed to meet an $HC+NO_X$ standard of 24 g/kW-hr, which represents the Phase 1 standard adjusted for deterioration. Note that these families could also opt out of mandatory production line testing, consistent with provision 2 above. This flexibility is intended to ensure that manufacturers can continue to produce these small

[51] As described in Section IV.D.1 of this preamble, Class II side-valve engines and engines with aftertreatment would be able to certify through a bench aging certification program, provided that a field/bench adjustment factor had been established.

volume engines, many of which are used in niche-market specialty equipment.

Fifth, small volume engine manufacturers could defer compliance with Phase 2 handheld requirements and Class II nonhandheld standards until the last year of the phase in. For handheld engines, this would mean that the engine manufacturer could, at its option, produce Phase 1 engines exclusively through the 2004 model year, with full Phase 2 compliance required in 2005. For nonhandheld Class II engines, the engines would be subject to the Phase 2 requirements beginning in 2001, but would not have to comply with the actual Phase 2 corporate average standards until the 2005 model year. These manufacturers could certify Class II engines to a standard of 24 g/kW-hr through 2004. These engines would neither use nor generate certification credits. If a small volume engine manufacturer desired to generate credits prior to the 2005 model year, it could do so for those engines certified below the applicable corporate average emission standard. Note that, consistent with the first provision above, these families would not have to be tested under mandatory production line testing. This flexibility is intended to provide another mechanism to reduce impact on small volume engine manufacturers and help ensure that manufacturers can continue to produce engines for specialty equipment.

EPA is not proposing to specifically exempt from in-use testing any group of engines to which in-use testing requirements are applicable based on the group's or the manufacturer's size. The Agency believes that all engines should meet their standards (or FELs, as applicable) for their full useful life and that manufacturers should design engines to be emission durable. It is therefore appropriate that all engines to which in-use testing or demonstration requirements are applicable be subject to in-use testing. However, under this proposal, the choice of engines which would require in-use testing or demonstration is EPA's. EPA would not be inclined to identify for mandatory in-use testing a very small volume engine family or a family certified by a very small company unless there was evidence of a nonconformity. EPA requests comment on the appropriateness of this position.

6. Flexibilities for Small Volume Equipment Manufacturers and Small Volume Equipment Models

Several equipment manufacturers who do not make their own engines have expressed concern that the transition to the Phase 2 program may disrupt their production because engine suppliers do not always provide adequate lead time for equipment redesigns needed to accommodate engine design changes. Engine changes could affect mounting and connection locations, heat rejection loads, and engine compartment requirements, for example. In addition, some equipment manufacturers cannot implement equipment design changes quickly, even with timely information from manufacturers because of the sheer volume of redesign work needed to change diverse product offerings with limited engineering staffs.

EPA believes that the engine manufacturer flexibilities described above will extend the availability of engines currently used by small volume equipment manufacturers and will help ease the transition from Phase 1 to Phase 2 for those entities. However, to respond more directly to concerns raised by equipment manufacturers, EPA is proposing three compliance flexibilities to help enable equipment manufacturers to make the transition from Phase 1 to Phase 2 engines.

First, EPA is proposing to temporarily exempt small volume equipment manufacturers from the requirement to use Phase 2 engines in cases where no Phase 2 engines with appropriate physical and performance characteristics are available to fit existing equipment models. This exemption would apply to those equipment manufacturers whose annual output across all models uses 2500 or fewer nonhandheld engines, or 5000 or fewer handheld engines, and would last through the third year after the last applicable phase-in date for that class of engines. Thus, for example, small volume equipment manufacturers who use Class II nonhandheld engines in an existing piece of equipment could continue using Phase 1 engines through the end of the 2008 model year, in cases where no suitable Phase 2 engines are available to fit existing equipment models.

Second, EPA is proposing to delay the impact of the Phase 2 requirements on individual small volume equipment models in cases where no suitable Phase 2 engines are available to fit existing equipment models. A small volume model, as proposed, is one with 500 or less units produced per year for nonhandheld equipment, and 2500 or fewer units produced per year for handheld equipment. These small volume models could continue to use Phase 1 engines throughout Phase 2, except as discussed below. EPA is proposing that this exemption would be allowed only for those equipment models in which a certified Phase 2 engine will not fit, and would apply only to models in production prior to the effective date of the Phase 2 standards. This is to avoid encouraging manufacturers to bring out new models designed to use Phase 1 engines after the Phase 2 standards have gone into effect. This exemption would also apply only so long as the equipment is not significantly modified. EPA believes that if the equipment manufacturer takes steps to significantly redesign a particular model, the use of a Phase 2 engine should be included. Finally, this exemption could apply only through the applicability of the Phase 2 program. EPA seeks comments on each of these restrictions, especially with regard to how they would affect equipment manufacturers who might incur a significant change in the cost of the engine if they were required to switch to a Phase 2 engine as the result of a significant model redesign.

Finally, EPA is proposing a hardship relief provision by which any equipment manufacturer could obtain relief to continue using Phase 1 engines, by demonstrating to the Administrator's satisfaction that, despite its best efforts, the manufacturer cannot meet the implementation dates without incurring substantial economic hardship, even with the transition flexibilities described above, due to unforeseeable factors beyond the equipment manufacturer's control. Such a situation may occur if an engine supplier were to change or drop an engine model very late in the implementation process. The intent of this provision is to recognize the concerns of equipment manufacturers about the uncertainty of timely supply of engines that meet equipment requirements by providing fair, objective criteria for hardship appeal that minimize the potential loss in environmental benefit, minimize the Agency's involvement in the financial affairs of the affected equipment manufacturer, and avoids straining the Agency's resources.

As proposed, this hardship relief provision would require requests to be made in writing, submitted before the earliest date of noncompliance, include evidence that failure to comply was unforeseeable and was not the fault of the equipment manufacturer (such as a supply contract broken by the engine supplier), and include evidence that the inability to sell the subject equipment will have a major impact on the company's solvency. The Agency would work with the applicant to ensure that all other remedies available under the flexibility provisions are exhausted

before granting further relief, and would limit the period of relief to no more than one year. Furthermore, the Agency proposes that applications for hardship relief could only be submitted through the first year after the last effective date of the phase-in period. EPA seeks comment on all aspects of this flexibility provision and on whether the Agency should require those who receive relief to cover some of the lost environmental benefit, such as purchasing lower emitting engines.

7. Engine Availability

EPA recognizes that the above-described equipment manufacturer flexibility provisions are of little use if Phase 1 engines are not available. Therefore, to help ensure availability of Phase 1 engines necessary for the above relief provisions to have full effect, EPA is proposing that engine manufacturers be allowed to build and sell the engines needed to meet the market demand created by these flexibilities. Specifically, EPA is proposing to continue to apply the Phase 1 compliance provisions to these engines. Thus, these Phase 1 engines would not be subject to Phase 2 useful life, production line testing or in-use demonstration requirements contained in today's program, since Phase 1 engines are not currently subject to those provisions. EPA desires to minimize any disincentives that engine manufacturers may have to producing these engines for small volume equipment users and is therefore proposing that these engines would be counted only to the extent necessary to determine the availability of the specific flexibility item that was being applied. These engines would not count in any other calculation of compliance with phase in requirements or against any other ceilings or limits proposed in this rule. These engines would not be required to use any emission credits nor would they be permitted to generate any such credits.

However, to prevent abuse of the ability to continue to produce Phase 1 engines, EPA believes it is necessary to impose some restrictions on the continued manufacture and sale of those engines. Therefore, EPA is proposing that equipment manufacturers procuring engines for use under the flexibility programs described above provide written assurance to the supplying engine manufacturer that such engines are being procured for this purpose. EPA requests comment on the need for a requirement that engine manufacturers maintain or annually provide to EPA records on the engines manufactured in support of the equipment manufacturer flexibilities described above, or whether EPA should rely on equipment manufacturer records.

*F. Nonregulatory Programs*

The following is a description of three nonregulatory programs which, though outside of the scope of the regulation, could yield important environmental benefits from the small SI engine sector. The first program is a voluntary incentive and recognition program for low-emitting nonhandheld and handheld engines, which would take the form of a ''green labeling'' program to identify engines which have emissions significantly lower than required by the proposed standards. The second program is a voluntary fuel spillage reduction program for nonhandheld and handheld engines. The third program is a particulate matter (PM) and hazardous air pollutant (HAP) testing program for handheld engines. These programs are described in the remainder of this section.

1. Voluntary ''Green'' Labeling Program

EPA is very interested in encouraging the design, production, and sale of small engines which are substantially cleaner than would be required by today's proposed Phase 2 programs. EPA plans to implement a voluntary program which would include consumer labeling of engines and equipment with superior emission performance as a way of providing public recognition and also allowing consumers to easily determine which engines have especially clean emission performance. At this time, EPA is considering a threshold of around 50 percent of the proposed standard (e.g., around 12.5 g/kW-hr for Class I engines) as the level below which engines would qualify for ''green'' labeling. To develop the details of such a program, the Agency requests comment on all aspects of the program, including the threshold for determining a ''green'' engine, whether the sales weighted certification level after dfs are applied should be used to establish the eligibility of an engine family, the design of and information to be included on the label, and other matters relevant to the successful implementation of the program. The Agency requests comment on program recommendations as part of today's proposal. In particular, the Agency seeks information on when such a program must be in place to effectively impact the sale of especially clean Phase 2 engines. The Agency is interested in working closely with consumer groups, engine and equipment manufacturers and others with an interest in making this program work. The Agency invites comment on the interest of any of these groups in working with the Agency to develop and implement this program.

2. Voluntary Fuel Spillage and Evaporative Emission Reduction Program

EPA is planning to develop a voluntary fuel spillage and evaporative emission reduction program specifically for the small engine industry and its customers. While this program would not impose enforceable requirements on engine manufacturers subject to this rulemaking, it is important to reduce fuel spillage and other sources of evaporative emissions. Every year, millions of gallons of gasoline are lost during refueling. It is estimated that if a few ounces are spilled during each refueling of lawn and garden equipment, they would total about 17 million gallons of gasoline, most of which evaporates into the air to contribute to the ground-level ozone problems. To reduce and prevent this pollution, a variety of measures will be needed, most involving increased public awareness and education.

The Agency believes it is appropriate to develop and implement a program targeted at the small SI industry and its customers to encourage public awareness and act as an incentive for technology investments. The Agency is interested in a voluntary partnership program which would involve EPA, engine manufacturers and equipment manufacturers, regional, state, and local air pollution agencies, health and environmental organizations, fuel container manufacturers, and other interested parties who would all contribute to the successful development and implementation of a voluntary fuel spillage and evaporative emission reduction program.

While the design of such a program will benefit from the thoughtful input of all partners, the program would likely encourage the development of technology that will assist equipment users in reducing spills and evaporative emissions, provide recognition for implementing technology developments that will assist equipment users in reducing spills, and provide education and training to commercial operators of equipment and to those persons who influence individuals doing the refueling (such as equipment sales staff or small engine course instructors), and similar target audiences.

Initial steps in this program involve identifying interested partners and convening a meeting to discuss the roles and responsibilities of each partner. The Agency seeks comment on the proposed voluntary partnership program, interest

in participating in this partnership, appropriate strategies and target audiences, and other matters pertinent to establishing this program.

3. Particulate Matter and Hazardous Air Pollutant Testing Program for Handheld Engines

While section 213(a)(4) of the Clean Air Act allows EPA to establish standards for nonroad emissions of any air pollution which may reasonably be anticipated to endanger public health or welfare, today's notice does not propose to establish emission standards in Phase 2 for particulate matter (PM) or non-hydrocarbon hazardous air pollutants (HAP) listed under section 112(b) of the Clean Air Act. However, EPA and other parties have agreed that a PM and HAP test program will be conducted (see 62 FR 14746). The Portable Power Equipment manufacturers Association (PPEMA), in cooperation with EPA, will conduct a test program to evaluate and quantify emissions of PM and HAP including, but not limited to, formaldehyde, acetaldehyde, benzene, toluene, and 1,3 butadiene. EPA anticipates that testing will be conducted on Phase 2 technology handheld engines, with a sufficient magnitude of engines tested to represent the range of new basic technologies used to comply with Phase 2 small engine standards. EPA expects that the information generated by this program will be useful in informing any future implementation of section 213(a)(4) regarding small SI engines.

*G. General Provisions*

This section includes a description of certain other general provisions proposed in today's notice, including provisions related to annual production period flexibilities during the transition to Phase 2, the definition of handheld engines, a small displacement nonhandheld engine class, propane fueled indoor power equipment, dealer responsibility, engines used in recreational vehicles, engines used in rescue and emergency equipment, and replacement engines.

1. Model Year Definition and Annual Production Period Flexibilities During Transition to Phase 2

The programs for nonhandheld and handheld engines proposed today would be effective beginning with the 2001 and 2002 model years, respectively. EPA is not proposing to change the Phase 1 definition of model year for Phase 2. That is, model year (MY) would continue to mean the manufacturer's annual new model production period which includes January 1 of the calendar year, ends no later than December 31 of the calendar year, and does not begin earlier than January 2 of the previous calendar year. When a manufacturer has no annual new model production period, model year would mean calendar year (see 40 CFR 90.3). Under no circumstances would the model year definition be allowed to be interpreted to let existing models ''skip'' annual certification by pulling ahead the production of every other model year.

In addition, in order to provide additional lead time for the implementation of the program for nonhandheld engines, EPA is proposing to adopt similar flexibilities for the beginning of the Phase 2 program for nonhandheld engines as were available for the Phase 1 program (see 40 CFR 90.106 (a) and (b)). Thus, for the start up of Phase 2, EPA is proposing that every manufacturer of new nonhandheld engines produced during or after model year 2001 would be required to certify those engines to the Phase 2 program requirements. Nonhandheld engines manufactured during an annual production period beginning prior to September 1, 2000, would be allowed to certify to Phase 1 standards. However, annual production periods beginning prior to September 1, 2000, would not be allowed to exceed 12 months in length. In effect, all nonhandheld engine families would be required to be certified to the Phase 2 program by September 1, 2001. EPA is not proposing this provision for handheld engines, which have both a later effective date as well as a phase-in of the Phase 2 program based on percentage of engine sales. EPA requests comment on whether similar provisions for handheld engines should be adopted (except that in the case of handheld engines, September 1 of each year would be the date that the percentage of engine sales requirements for Phase 2 certification would have to be met). EPA requests comments on all aspects of these provisions relating to annual production periods in the transition from Phase 1 to Phase 2 certified engines.

2. Definition of Handheld Engines

EPA is not proposing any changes to the criteria listed in Phase 1 used to determine whether engines could be classed as Class III, IV or V. For Phase 2, EPA would continue to make determinations of applicability of the Class III, IV, or V standards based on the criteria found at 40 CFR 90.103(a)(2). During Phase 1, the multipositional use criterion has been used by EPA to make handheld determinations for certain two-person earth augurs, breakers and rammers, and power shovels. In each case, the manufacturer presented evidence to the satisfaction of the Agency demonstrating the multipositional use of the equipment, and provided a discussion of any constraints on engine design imposed by the usage of the equipment. The interpretation of multipositional use by EPA has been made relative to the equipment category and the technology available to meet the constraints imposed by the usage of the equipment.

EPA received comment on the ANPRM that EPA should revise the definition of handheld.[52] This commenter suggests that the Phase 1 definition of handheld restricts the replacement of 2-strokes by significantly cleaner 4-stroke engines, making it difficult to introduce a significantly cleaner engine for a product application. This commenter suggests that a different handheld definition and interpretation would improve the environment and permit the continued use of necessary products.

EPA believes that the current interpretation of criteria used to determine applicability of Class III, IV and V standards addresses this concern. Provided the 4-stroke engines are capable of performing the same intended functions as 2-stroke engines used in similar handheld applications, then EPA would likely determine that the 4-stroke engine also meets the criteria for applicability of the Class III, IV or V standards.

3. Small Displacement Nonhandheld Engine Class

EPA has considered whether there is a need for changes or additions to the five classes of small SI engines for regulatory purposes. In particular, the Agency has considered whether there is a need for addition of a new, small displacement class that would be considered ''nonhandheld.'' In comments on the ANPRM, one commenter specifically requested EPA to consider proposing a new class, as follows: the new class would be nonhandheld engines with displacements less than 75cc, and be subject to an in-use standard of 72.4 g/kW-hr with useful life categories of 125 hours and 250 hours. The commenter believes a new class for nonhandheld is needed for several reasons. The commenter believes the existing Phase 1 standards did not contemplate small displacement nonhandheld engines, yet the Phase 1 rule left a void in the market

[52] See comments from Honda, Item #II–D–07 in EPA Air Docket A–96–55.

which could be filled by small displacement nonhandheld engines. The commenter believes the Phase 1 standards prevented less than 75 cc 2-stroke engines from being certified into some nonhandheld applications which utilize small displacement engines, but that the proposed Phase 2 Class I standard is too stringent for less than 75 cc 4-strokes to meet.

The Agency is not proposing the addition of a new small displacement nonhandheld class. The Agency believes that the proposed Class I standard, which can be met through averaging, will allow a full range of small displacement nonhandheld engines to certify to the proposed Phase 2 standards. If the proposed Class I standard can be met through averaging, the creation of a new displacement class with a higher standard could result in a smaller environmental benefit from the Phase 2 program.

The Agency understands it is possible that some nonhandheld applications which use small displacement engines may no longer be able to utilize two-stroke engines if the Phase 2 standards are adopted as proposed, but believes that complying engines, perhaps of larger displacement, can be used. EPA requests additional information on this issue and the extent of its occurrence. The Agency also once again requests comment on the need for a new small displacement class, in particular, whether the proposed average Class I standard is sufficient to cover smaller displacement engines. The Agency also requests comment on the displacement cutoff (75cc), standard (72.4g/kW-hr), and useful lives (125 hours and 250 hours) suggested by the ANPRM commenter.

4. Liquefied Petroleum Gas Fueled Indoor Power Equipment

Manufacturers of equipment using liquefied petroleum gas (LPG) have argued that their situation deserves special consideration within the Phase 2 regulations.[53] The type of equipment they produce is often designed specifically for indoor use including, for example, floor washing and buffing equipment. The relatively low sales (likely fewer than 10,000 annually nationwide for the industry) and the fact that many of these manufacturers likely sell less than one thousand pieces of equipment annually means that both individually and collectively they account for a very small portion of the small SI engines sold annually. LPG is a popular fuel for indoor equipment due to the proven ability to calibrate LPG-fueled engines to operate at very low carbon monoxide (CO) levels. Low CO performance is especially important for indoor equipment to minimize CO exposure to the operator and others in the building. The Occupational Health and Safety Administration (OSHA) has set maximum CO standards for indoor ambient concentrations and some states have adopted even tighter indoor CO standards. While these are ambient standards, not emission limits for individual pieces of equipment, equipment manufacturers, to successfully market in this area, must be assured their equipment emits very low levels of CO and thus can be routinely used indoors without causing violations of OSHA or state indoor air quality requirements.

Because the specialized nature of their equipment places unique demands on these engines and due to the typically low sales volumes of many of the pieces of equipment, many of these indoor equipment manufacturers must not only design and produce their equipment but also to a significant extent are responsible for the modification of engines to power their equipment. In a number of cases these indoor equipment manufacturers buy gasoline-fueled engines and convert them to operate on LPG.

While manufacturers of LPG-fueled indoor power equipment must power their equipment with engines which meet all the requirements of the small engine Phase 1 rules, the manufacturers argue that the proposed Phase 2 rules would add significantly to their burden. While meeting the proposed federal $HC+NO_X$ Phase 2 standard should not be particularly difficult for LPG engines compared to gasoline-fueled engines, the combined need to also achieve very low CO emission levels in order to not cause violations of indoor ambient CO standards may present a design challenge. The necessary controls may well exceed those required to meet just the Phase 2 standards and may include, for example, the use of electronically controlled fuel systems and perhaps catalysts. This could add significant cost to a relatively few engines. Even at a higher cost, those equipment manufacturers currently being supplied LPG-fueled engines by an original engine manufacturer are concerned that their suppliers may decide it is not worth the effort to supply engines complying with the Phase 2 standards. For those equipment manufacturers modifying engines to operate on LPG at low CO levels, the same technical challenges are faced while their ability to spread the development costs across their engines is limited by the low number of engines modified.

While EPA has not done a thorough cost analysis for the impact of Phase 2 standards on this unique segment of the industry, EPA is persuaded that the technical challenges faced by this segment are significant. Many of these manufacturers would be considered ''small volume engine manufacturers'', with engines produced in ''small volume engine families'', under the criteria proposed today, and would therefore qualify for proposed compliance flexibilities for small volume engine manufacturers and small volume engine families. These include both additional flexibilities in the phase-in of the Phase 2 standard, and also an option to opt out of mandatory production line testing. In effect, the additional phase-in flexibilities would allow nonhandheld manufacturers of indoor LPG-fueled power equipment engines, whose annual production of small SI engines is 10,000 units or less, to continue producing Class II nonhandheld engines which meet a Phase 1 equivalent standard (24 g/kW-hr) until 2005. Beginning in 2005, when the Phase 2 standards are proposed to be fully phased in for gasoline-fueled engines, these LPG-fueled engines are proposed to also be required to meet the Phase 2 $HC+NO_X$ standards. This extra lead time would allow manufacturers to spread their development efforts over several additional years, for those manufacturers choosing or required to make their own fuel modifications. In addition, while these engine families would be certified to the Phase 2 program, the cost of the proposed compliance program for these manufacturers would be minimized, as these manufacturers and engine families would likely qualify for the proposed flexibilities that would allow manufacturers to carry-over certification from one year to the next and to opt out of mandatory production line testing. The provisions for small volume engine manufacturers and small volume engine families are discussed in more detail in Section IV.E.

Comments are requested on the impact of this proposed phase-in flexibility and other proposed compliance program flexibilities on the technical and economic ability of the indoor power equipment engine industry segment to successfully comply with the Phase 2 standard beginning in 2005, and any air quality impact concerns such a delayed implementation might cause.

EPA is also requesting comment on the possible deletion of the existing § 90.1003(b)(3). EPA believes this

[53] See EPA Air Docket A–96–55, Items #II–D–02, II–D–04, and II–D–08.

provision may be of only limited utility for this program and believes it could prove problematic for small SI engines. This provision provides that certain activities connected to conversion of engines to alternative fuels will not be regarded as tampering. At one point, the existing regulatory paragraph makes reference to ''vehicle'' standards, of which, of course, there are none in the small SI program. Further, it might be misconstrued as requiring an engine modifier to reinstall hardware that was removed in the conversion process after the conversion was complete. Under such a misreading, a modifier engaged in converting gasoline engines to operate on propane might be viewed as having to reinstall the original gasoline carburetor on an engine after conversion, even if that were not feasible.

Existing converters of small SI engines are currently certifying their products on the alternative fuel or are operating under EPA's tampering enforcement Memorandum 1–A. In light of this, for small SI engines, EPA believes that the discussion of the tampering implications of alternative fuel conversions for small SI engines could be best handled by the application of Memorandum 1–A. EPA does not expect that existing engine modifiers would be harmed by the deletion of this paragraph.

Text similar to existing § 90.1003(b)(3) is found in other nonroad rules. EPA intends, at some future date, to review the appropriateness and usefulness of this language in those rules.

5. Dealer Responsibility

This proposal contains no new constraints or responsibilities for dealers and repair facilities from the Phase 1 rule. Dealers and repair shops, like all other persons, would continue to be prohibited from tampering or causing tampering. Tampering refers to the removal or rendering inoperative of any device or element of design installed on or in an engine for purposes of emission control.

During the Phase 2 regulatory negotiation process, the issue of dealer responsibility was frequently raised out of concern that increasingly sophisticated control technologies would result in greater numbers of tampered engines being brought in for service. Another concern was that the Phase 2 rule not require that repair parts for emission control systems be obtained from the engine manufacturer.

While all persons, including dealers and repair facilities, are prohibited from tampering or causing tampering, they are not prohibited from working on tampered engines. Under EPA tampering policies, dealers and repair facilities are not expected to restore tampered products to their originally certified and functioning configuration unless the repair is to the tampered system or a component of the tampered system. In such a case, the dealer or repair facility should restore the system to a certified and properly functioning condition, but need not conduct emission testing to verify compliance with emission standards. With regard to the use of emission control repair parts, dealers and repair facilities may use parts represented by their manufacturers to be functionally equivalent to original equipment parts.

6. Engines Used in Recreational Vehicles

EPA is not proposing any changes to the provision in the Phase 1 rule that engines used in recreational vehicles would not be subject to the small SI engine regulations. EPA continues to believe that these engines are more appropriately regulated under a rulemaking separate from this small SI engine program. Thus, these engines would remain outside the scope of the program when Phase 2 takes effect. The Agency's rationale for excluding engines used to propel recreational vehicles was presented in the preamble for the Phase 1 Notice of Proposed Rulemaking (NPRM) (see 59 FR 25403, 25414), and the Agency addressed the comments received on this topic in the Phase 1 Response to Comments document (see Section 3.8 ''Non-Coverage of Recreational Propulsion Engines'', EPA Air Docket A–93–25, Docket Item V–C–01). As discussed in the Preamble for the Phase 1 NPRM, ''EPA's primary reason for this exclusion is the extremely transient operation of the products in which these engines are used, which limits the ability of the proposed steady state test procedure to adequately represent exhaust emissions. This exclusion is not based on a determination that these engines do not contribute to air pollution and therefore need not be controlled.'' (59 FR 25414) EPA continues to be concerned that the test procedures covering the Phase 1 and Phase 2 engines may not be appropriate for engines used to propel recreational vehicles.

Engines used in recreational vehicles are defined at 40 CFR 90.1(b)(5), in part, as having a rated speed greater than or equal to 5,000 RPM and having no installed speed governor. While EPA is not proposing any changes to the provisions which exclude recreational vehicles from this rule, EPA does wish to clarify that some engines with installed ''speed governors'' and with ungoverned rated speed above 5000 rpm still qualify as recreational. For example, engines used in typical recreational vehicles such as snowmobiles and 4-wheel ATVs which, when designed for use by children have ''speed governors'' installed for safety purposes to limit the top speed of the vehicle, have been found by EPA to be ''recreational vehicles'' in implementation of Phase 1. These vehicles are still operated in a typical fashion for recreational vehicles up to that top speed. During the development of the Phase 1 rule, the Agency was not aware of the existence of snowmobiles designed for children, and therefore not aware of the existence of snowmobiles with ''speed governors.'' The Agency would like to clarify that EPA continues to believe snowmobiles should not be covered under this rule, including snowmobiles designed for use by children which may in fact have a ''speed governor'' installed for safety purposes.

7. Engines Used in Rescue and Emergency Equipment

In consideration of safety factors associated with compliance with the Phase 2 program, today's proposal includes a provision that would exempt engines which are used exclusively in emergency and rescue equipment from compliance with any standards if the equipment manufacturer can demonstrate that no certified engine is available to power the equipment safely and practically. Although under Phase 1 EPA has received no reports of problems caused by the need to use certified engines in emergency and rescue equipment, EPA is concerned that such problems could arise. EPA foresees this exemption applying especially to handheld items used to work in tight places to perform such tasks as cutting metal to extricate passengers from wrecked vehicles, if the size, heat or other characteristics of the certified engine would render its use unsafe. EPA does not foresee this exemption applying to portable generators, compressors or hydraulic pumps that may be used to power rescue equipment from a distance, since such devices are not as subject to the size, weight and other considerations surrounding a tool that contains its own source of power.

EPA proposes this exemption to avoid any possible conflict between emission control and public safety. EPA wishes to reduce the chance that a piece of rescue equipment will go out of production or become more cumbersome because of the need to use certified engines. EPA sees no significant air quality impact

from such an exemption, because it would apply only to engines that are few in number and are subject to infrequent use for very short periods of time. In fact, EPA is not currently aware of any engine that is used exclusively in emergency or rescue equipment. The exemption, as proposed, would apply to engines and equipment produced during the remainder of the Phase 1 period as well as Phase 2 engines and equipment.

8. Replacement Engines

After promulgation of the Phase 1 rule, equipment manufacturers approached EPA with concerns that, once the rule took effect, they would not be able to obtain replacement engines to repair certain items of more expensive equipment such as commercial mowing and construction equipment when their engines fail. The equipment manufacturers provided evidence that many Phase 1 engines, especially Class II nonhandheld engines, would be configured differently from uncertified engines and would not fit in the engine compartments of some pre-regulatory equipment. The equipment manufacturers explained that occasional engine failures are often best remedied by replacing the engine. Commercial operators, many of whom are small businesses, may not be able to afford the downtime associated with waiting for an extensive engine repair. In effect, repairing the engines becomes more costly than replacing the engines, and may be less environmentally beneficial. EPA evaluated these concerns and gathered information from engine manufacturers, equipment manufacturers and their associations. EPA concluded that permitting the sale of uncertified replacement engines, which likely constitute less than one percent of annual small SI engine sales, was a cheaper alternative that was no worse for air quality than the repair or rebuilding of the failed engines, which were not prohibited by the Phase 1 rule. On August 7, 1997 (62 FR 42638), EPA issued a direct final rule amending the Phase 1 rule to allow engine manufacturers to sell uncertified engines for replacement purposes subject to certain controls designed to prevent abuse.[54] These controls require that the engine manufacturer ascertain that there is no currently certified engine that will fit in the equipment, that the engines be labeled for replacement purposes only, and that the engine manufacturer or its agent take ownership and possession of the old engine.

An environmental group has recently expressed concern to EPA about the replacement engine provisions for small SI engines published in the direct final rule described above. This group recommends that additional constraints and controls should be placed on the sale of these engines to prevent abuse since these engines either will not be built to comply with any standards, or will be built to comply with Phase 1 standards after those standards have been superseded by Phase 2 standards.

In today's notice, EPA is proposing to continue the replacement engine provision with an accommodation necessary to address Phase 1 engines after the implementation of Phase 2. EPA is also proposing additional requirements to address the concerns of the environmental group and better ensure that the ability to use replacement engines is not abused.

During Phase 2, the universe of small SI engines will expand to include uncertified engines, Phase 1 engines and Phase 2 engines. Consequently, the provision as proposed would be amended to permit uncontrolled engines to be sold for pre-regulatory equipment, and Phase 1 engines to be sold for equipment built with Phase 1 engines, subject to certain constraints. EPA has no reason to believe that this provision will result in significant adverse air quality impacts. In fact, many replacement engines for older equipment will be certified Phase 2 engines. This provision provides flexibility and cost savings for equipment operators. It affects primarily commercial equipment where the equipment cost is high enough to justify major engine repairs or replacement and the usage of the equipment is such that downtime for repairs is costly. Replacement engines are not typically used in handheld equipment, nor in lower cost nonhandheld items such as walk behind mowers. A more detailed discussion of the rationale for the replacement engine provision can be found in the preamble to the direct final rule cited above.

Although EPA does not believe that replacement engines will cause any significant air quality impacts, it is proposing to add safeguards and reporting and record keeping requirements to further ensure against abuse. EPA is proposing to amend the existing replacement engine provisions to require: (1) that manufacturers follow specific guidelines when ascertaining that no certified engine is available which can suitably repower a specific item of equipment; (2) that old engines being replaced are destroyed; (3) that engine manufacturers report to EPA annually the number of uncertified engines sold under the replacement engine provisions; (4) that manufacturers keep records, accessible to EPA, of the purchasers, quantities and equipment applications of replacement engines; and (5) that there be a limit on the time period for which uncertified replacement engines are normally available. EPA requests comment on the need for these additional requirements, and the burden they may pose to industry, equipment operators and engine distributors.

## V. Environmental Benefit Assessment

National Ambient Air Quality Standards (NAAQS) have been set for criteria pollutants which adversely affect human health, vegetation, materials and visibility. Concentrations of ozone ($O_3$) are impacted by HC and $NO_X$ emissions. Ambient concentrations of CO are, of course, impacted by CO emissions. EPA believes that the standards proposed today would reduce emissions of HC and $NO_X$ and help most areas of the nation in their progress towards compliance with the NAAQS for ozone. The following provides a summary of the roles of HC and $NO_X$ in ozone formation, the estimated emissions impact of the proposed regulations, and the health and welfare effects of ozone, CO, hazardous air pollutants, and particulate matter.

Much of the evaluation of the health and environmental effects related to HC, $NO_X$ and CO found in this section is also discussed in the draft Regulatory Support Document (RSD), and in the March 1997 ANPRM. EPA encourages comments on the Agency's beliefs expressed in this proposal and in the RSD, a copy of which is in the public docket for this rulemaking.

### *A. Roles of HC and $NO_X$ in Ozone Formation*

Both HC and $NO_X$ contribute to the formation of tropospheric ozone through a complex series of reactions. In a recent report, researchers emphasize that both HC and $NO_X$ controls are needed in most areas of the United States.[55] EPA's primary reason for controlling emissions from small SI engines is the role of their HC emissions in forming ozone. Of the major air pollutants for which NAAQS have been designated under the CAA, the most widespread problem continues to be ozone, which is the most prevalent photochemical oxidant and an

[54] The docket for this rulemaking, EPA Air Docket #A–97–25, is incorporated by reference.

[55] National Research Council, *Rethinking the Ozone Problem in Urban and Regional Air Pollution*, National Academy Press, 1991.

important component of smog. The primary ozone NAAQS represents the maximum level considered protective of public health by the EPA. Ozone is a product of the atmospheric chemical reactions involving oxides of nitrogen and volatile organic compounds. These reactions occur as atmospheric oxygen and sunlight interact with hydrocarbons and oxides of nitrogen from both mobile and stationary sources.

A critical part of this problem is the formation of ozone both in and downwind of large urban areas. Under certain weather conditions, the combination of $NO_X$ and HC has resulted in urban and rural areas exceeding the national ambient ozone standard by as much as a factor of three. Thus it is important to control HC over wider regional areas if these areas are to come into compliance with the ozone NAAQS.

*B. Health and Welfare Effects of Tropospheric Ozone*

Ozone is a powerful oxidant causing lung damage and reduced respiratory function after relatively short periods of exposure (approximately one hour). The oxidizing effect of ozone can irritate the nose, mouth, and throat causing coughing, choking, and eye irritation. In addition, ozone can also impair lung function and subsequently reduce the respiratory system's resistance to disease, including bronchial infections such as pneumonia.

Elevated ozone levels can also cause aggravation of pre-existing respiratory conditions such as asthma.[56] Ozone can cause a reduction in performance during exercise even in healthy persons. In addition, ozone can also cause alterations in pulmonary and extrapulmonary (nervous system, blood, liver, endocrine) function.

The newly revised primary NAAQS[57] for ozone based on an 8-hour standard of 0.08 parts per million (ppm) is set at a level that, with an adequate margin of safety, is protective of public health. EPA also believes attainment of the new primary standard will substantially protect vegetation. Ozone effects on vegetation include reduction in agricultural and commercial forest yields, reduced growth and decreased survivability of tree seedlings, increased tree and plant susceptibility to disease, pests, and other environmental stresses, and potential long-term effects on forests and ecosystems.

High levels of ozone have been recorded even in relatively remote areas, since ozone and its precursors can travel hundreds of miles and persist for several days in the lower atmosphere. Ozone damage to plants, including both natural forest ecosystems and crops, occurs at ozone levels between 0.06 and 0.12 ppm.[58] Repeated exposure to ozone levels above 0.04 ppm can cause reductions in the yields of some crops above ten percent.[59] While strains of some crops are relatively resistant to ozone, many crops experience a loss in yield of 30 percent at ozone concentrations below the pre-revised primary NAAQS.[60] The value of crops lost to ozone damage, while difficult to estimate precisely, is on the order of $2 billion per year in the United States.[61] The effect of ozone on complex ecosystems such as forests is even more difficult to quantify. However, there is evidence that some forest types are negatively affected by ambient levels of ozone.[62] Specifically, in the San Bernadino Mountains of southern California, ozone is believed to be the agent responsible for the slow decline and death of ponderosa pine trees in these forests since 1962.[63]

Finally, by trapping energy radiated from the earth, tropospheric ozone may contribute to heating of the earth's surface, thereby contributing to global warming (that is, the greenhouse effect),[64] although tropospheric ozone is also known to reduce levels of UVB radiation reaching the earth's surface, the increase of which is expected to result from depletion of stratospheric ozone.[65]

**C. Estimated Emissions Impact of Proposed Regulation**

The emission standards proposed in today's action should reduce average in-use exhaust HC+$NO_X$ emissions from small SI engines 30 percent beyond Phase 1 standards by year 2025, by which time a complete fleet turnover is realized. This translates into an annual nationwide reduction of roughly 134,674 tons of exhaust HC+$NO_X$ in year 2025 over that expected from Phase 1. Reductions in CO beyond Phase 1 levels, due to improved technology, is also to be expected by year 2025.

Along with the control of all hydrocarbons, the proposed standards should be effective in reducing emissions of those hydrocarbons considered to be hazardous air pollutants (HAPs), including benzene and 1,3-butadiene. However, the magnitude of reduction would depend on whether the control technology reduces the individual HAPs in the same proportion as total hydrocarbons.

These emission reduction estimates are based on in-use population projections using estimates of annual engine sales, engine attrition (scrappage), activity indicator, and current new engine and proposed in-use emission factors. Data on activity indicators were based on the Phase 1 small SI regulation. Estimates of annual engine sales for years from 1973 to 1995 were based on engine data available from the PSR databases[66] and national shipment data provided by Outdoor Power Equipment Institute (OPEI), the Portable Power Equipment Manufacturers Association (PPEMA), and a study done for the California Air Resources Board by Booz Allen & Hamilton (BAH). Sales projections into the future were for the most part based on estimates of population growth for the United States. Attrition rates (survival probability that an engine remains in service into a specific calendar year) for all engines included in this analysis were developed on the assumption that the equipment attrition function may be represented by a two-parameter Weibull cumulative distribution function. The in-use emission factors are based on a multiplicative deterioration factor which is a function of the square root of the hours of equipment usage.

For the analysis summarized in Table 18, the emission inventories were developed for the five regulated engine classes as well as for all pieces of equipment using engines covered by this proposed rule. Using estimated engine sales and attrition, EPA projected the total in-service engine population for each year from 1973 to 2025. EPA projected the total annual nationwide HC, $NO_X$ and CO emissions from small SI engines included in the proposal under the baseline (that is, with Phase 1 controls applied) and controlled (Phase 2) scenarios.

For the controlled scenario, EPA assumed that for both handheld and

[56] United States Environmental Protection Agency, Review of the National Ambient Air Quality Standards for Ozone—Assessment of Scientific and Technical Information: OAQPS Staff Paper, EPA–450/2–92–001, June 1989, pp. VI–11 to 13.

[57] See 62 FR 38896, Friday, July 18, 1997.

[58] U.S. EPA, *Review of NAAQS for Ozone,* p. X–10.

[59] U.S. EPA, *Review of NAAQS for Ozone,* p. X–10.

[60] See 62 FR 38856, Friday, July 18, 1997.

[61] U.S. EPA, *Review of NAAQS for Ozone,* p. X–22.

[62] U.S. EPA, *Review of NAAQS for Ozone,* p. X–27.

[63] U.S. EPA, *Review of NAAQS for Ozone,* p. X–29.

[64] NRC, *Rethinking the Ozone Problem,* p. 22.

[65] *The New York Times,* September 15, 1992, p. C4.

[66] Power Systems Research, Engine Data and Parts Link data bases, St. Paul, Minnesota, 1992.

nonhandheld engines the standards would be phased in on a percentage of production basis as proposed in today's notice. Deterioration factors were determined using manufacturer-supplied in-use emission data and other relevant information.

TABLE 18.—PROJECTED ANNUAL NATIONWIDE EXHAUST HC+$NO_X$ EMISSIONS

[tons/year]

| Year | Without proposed controls (Phase 1) | With proposed controls | Tons reduced from Phase 1 revised baseline | Percentage reduction |
|---|---|---|---|---|
| 2000 | 378,700 | 378,700 | | |
| 2005 | 368,195 | 297,873 | 70,322 | 19.1 |
| 2010 | 389,641 | 279,061 | 110,580 | 28.4 |
| 2015 | 414,626 | 292,829 | 121,797 | 29.4 |
| 2020 | 439,413 | 309,221 | 130,192 | 29.6 |
| 2025 | 452,973 | 318,299 | 134,674 | 29.7 |

For simplicity in modeling the projected emission reductions, the Agency has assumed in the emissions inventory model that under the Phase 2 program, each engine would meet the proposed standard for the minimum useful life category: i.e., Class I engines meet the proposed standards at 66 hours; Class 2 engines at 250 hours; and Classes III, IV, and V at 50 hours. Therefore, the Agency has under estimated the emission benefits of the proposed standards, because some engines will be certifying to the longer useful life categories, and therefore a greater emission reduction than predicted in Table 18 will occur. The Agency will attempt to address this issue for a more accurate prediction of the emission benefits of the proposed program for the final rule.

In addition to the reductions in exhaust HC+$NO_X$ emissions, the Agency is also estimating the proposed standards would result in a small reduction in HC refueling emissions (refueling emissions are HC emissions caused from fuel spillage and vapor displacement during the refueling of a small engine). As discussed in the RSD, refueling emissions represent approximately an additional 89,000 tons/year of HC in 2025 without Phase 2 controls. The Agency estimates that refueling emissions would be reduced under Phase 2 by the percent reduction in fuel consumption under Phase 2. The Agency estimates the proposed Phase 2 program would result in approximately a 9 percent reduction in fuel consumption by 2025. Therefore, the Agency estimates refueling emissions would be reduced by 9 percent. A 9 percent reduction in refueling emissions equates to an approximate 8,000 ton/year reduction in HC emissions in 2025.

*D. Health and Welfare Effects of CO Emissions*

Carbon monoxide (CO) is a colorless, odorless gas which can be emitted or otherwise enter into ambient air as a result of both natural processes and human activity. Although CO exists as a trace element in the troposphere, much of human exposure resulting in elevated levels of carboxyhemoglobin (COHb) in the blood is due to incomplete fossil fuel combustion, as occurs in small SI engines.

The concentration and direct health effect of CO exposure are especially important in small SI engines because the operator of a small SI engine application is typically near the equipment as it functions. In some applications, the operator must be adjacent to the exhaust outlet and is in the direct path of the exhaust as it leaves the engine. According to numbers published in the Nonroad Engine and Vehicle Emission Study (NEVES), a 4-stroke, 2.9 kW lawnmower engine emits 1051.1 g/hr CO, while a 2-stroke, 2.9 kW engine emits 1188.4 g/hr CO.

A Swedish study [67–69] on occupational exposure to 2-stroke chainsaw exhaust concludes, among other things, that a rich fuel-air mixture results in high levels of CO emissions (a mean exposure rate of 37.0 $^{mg/m3}$). The work conditions that gave rise to the most intense problems for loggers were deep snow, thick forest stands and calm weather. The main discomforts experienced by loggers from chainsaw exhaust were cough and eye, nose and throat irritation. In view of the discomfort experienced by loggers and the complex nature of the exposure to chainsaw exhaust, it was recommended that action be taken to reduce exposure by making technical modifications to the engine or control exhaust emissions.

The toxicity of CO effects on blood and tissues, and how these effects manifest themselves as organ function changes, have also been topics of substantial research efforts. Such studies provided information for establishing the National Ambient Air Quality Standard for CO. The current primary and secondary NAAQS for CO are 9 parts per million for the one-hour average and 35 parts per million for the eight-hour average.

*E. Health and Welfare Effects of Hazardous Air Pollutant Emissions*

The focus of today's action is reduction of HC emissions as part of the solution to the ozone nonattainment problem. However, direct health effects are also a reason for concern due to direct human exposure to emissions from small SI engines during operation of equipment using such engines. Of specific concern is the emission of hazardous air pollutants (HAPs). In some applications, the operator must be adjacent to the exhaust outlet and is in the direct path of the exhaust as it leaves the engine. Today's proposed regulations should be effective in reducing HAPs such as benzene and 1,3-butadiene, in so far as these are components of the HC emissions being reduced by the Phase 2 standards.

Benzene is a clear, colorless, aromatic hydrocarbon which is both volatile and flammable. Benzene is present in both exhaust and evaporative emissions. Health effects caused by benzene emissions differ based on concentration and duration of exposure. The International Agency for Research on Cancer (IARC), classified benzene as a Group I carcinogen., namely an agent carcinogenic to humans. Exposure to benzene has also been linked with genetic changes in humans and animals. 1,3-butadiene is a colorless, flammable

[67–69] Occupational Exposure to Chain Saw Exhausts in Logging Operations, Am. Ind. Hyg. Assoc. J48, 1987.

gas at room temperature. This suspected human carcinogen is insoluble in water and its two conjugated double bonds make it highly reactive. 1,3-butadiene is formed in internal combustion engine exhaust by the incomplete combustion of the fuel and is assumed not present in evaporative and refueling emissions.

Epidemiologic studies of occupationally exposed workers were inconclusive with respect to the carcinogenity of 1,3-butadiene in humans. IARC has classified 1,3-butadiene as a Group 2A, probable human carcinogen. Other adverse noncancer health effects due to very high levels of exposure include heart, blood and lung diseases.

Since air toxic levels generally decrease in proportion to overall emissions once emission control technology is applied, the amount of benzene and 1,3-butadiene produced by new small SI engines should diminish after this rule becomes effective. Consequently, exposure to HAPs from new small SI engines would be reduced, as would associated health and environmental effects. Although there is little data on direct health effects of small SI engines, the Swedish study concludes benzene emissions from chain saw engines as being rather high. No study has been conducted involving the health effects of HAP emissions specifically from small SI engines. The Agency requests additional information on this topic.

*F. Particulate Matter*

Particulate matter, a term used for a mixture of solid particles and liquid droplets found in the air, has been linked to a range of serious respiratory health problems. These fine particles are of health concern because they easily reach the deepest recesses of the lungs. Batteries of scientific studies have linked particulate matter, especially fine particles (alone or in combination with other air pollutants), with a series of significant health problems including premature death, aggravated asthma and chronic bronchitis and increased hospital admissions. EPA has recently (July 1997) announced new NAAQS standards for particulate matter (PM) , by adding two new primary PM2.5 standards set at concentrations of 15 micrograms per cubic meter ($\mu g/m3$), annual arithmetic mean, and 65$\mu g/m3$, 24-hour average, to provide increased protection against the PM-related health effects found in community studies. EPA believes that the new standards will protect and improve the lives of millions of Americans.

Separate from the proposed rule, which would not establish emission standards for PM or toxic air contaminants listed under section 112(b) of the Clean Air Act, an agreement with PPEMA to conduct PM/HAP testing program for handheld engines in cooperation with EPA has been reached. Testing under the program would be conducted on Phase 2 technology handheld engines at EPA, industry, and/or independent facilities. The test program is to be designed to evaluate and quantify emissions of particulate matter and toxics including, but not limited to: formaldehyde, acetaldehyde, benzene, toluene and 1,3 butadiene.

## VI. Economic Impacts

EPA has calculated the cost effectiveness of this proposed rule by estimating costs and emission benefits from these engines. EPA made best estimates of the combination of technologies that an engine manufacturer might use to meet the new standards, best estimates of resultant changes to equipment design, engine manufacturer compliance program costs and engine fuel savings in order to assess the expected economic impact of the proposed Phase 2 emission standards. Emission benefits are taken from the results of the environmental benefit assessment (Section V, above). The cost-effectiveness result of this rule is $390 per ton of $HC+NO_X$ when fuel savings are not taken into account. When fuel savings are also considered, the cost-effectiveness calculation results in $-$700 per ton of $HC+NO_X$. This section describes the background and analysis behind these results.

The analysis for this proposed rulemaking is based on data from engine families certified to EPA's Phase 1 standards. It does not include any engine families or production volumes that are covered by CARB's Tier 1 standard. The California Air Resources Board (CARB) will implement emission standards for many of these engines a year or two prior to the proposed federal Phase 2 regulations. Therefore, this rule only accounts for costs for each engine sold outside California and those engines sold in California that are not covered by the CARB Tier II rulemaking, such as those used in farm and construction equipment. Although EPA expects that engines already designed to meet CARB's earlier standards would incur no additional design cost to meet federal standards, no effort was made to estimate which models would be sold in California and subject to the earlier California standards. Rather for the purpose of this proposal, any Phase 1 engine design that would need to be modified to meet Phase 2 standards was assumed to incur the full cost of that modification including design cost. Similarly, the cost to equipment manufacturers was assumed to be fully attributed to this federal rule even if an equipment manufacturer would have to make the same modifications in response to the CARB Tier 2. Therefore, in both of these cases, the cost to the manufacturer due to these proposed rules is likely over estimated. EPA requests comment on these assumptions. The details of EPA's cost and cost-effectiveness analyses can be found in Chapters 4 and 7 of the Draft RSD.

*A. Engine Technologies*

Table 19 lists the changes in technology, compared to Phase 1 engines, that have been considered in the cost estimation for this rulemaking. As discussed in Section IV.A of this preamble, the proposed standards would require different engine improvements amongst the five classes and engine designs within those classes.[70] For example, several Class I SV models are expected to require some internal improvements to reduce new engine out emissions and several additional components to increase emission durability. For the purposes of this cost analysis, Class II standards are assumed to require that engines be of clean OHV design. For Classes III–V, the proposed standards for the handheld engines are assumed to require improved scavenging techniques, for the two stroke engines, to be developed to reduce the approximately 30 percent of the air/oil/fuel mixture that traditionally escapes from these engines unburned. This analysis assumes that engine manufacturers would not be required to adopt advanced technologies such as catalysts or fuel injection systems. Manufacturers who did adopt such technologies would choose to do so for other perceived benefits. Therefore, the cost of such optional technology is not included in this cost estimate. Additional detail regarding the impact of these modifications can be found in Chapter 3 and 4 of the Draft RSD.

[70] Currently, carbureted two-stroke, four-stroke side-valve and four-stroke overhead valve engine designs comprise the vast majority of engines used in nonhandheld and handheld applications.

TABLE 19.—POTENTIAL TECHNOLOGY IMPROVEMENTS PER CLASS AND ENGINE DESIGN

| Class | Engine design | Technologies |
|---|---|---|
| I ..... | 4 stroke—SV ..... | Carburetor Improvements.<br>Combustion Chamber Improvements and Intake System.<br>Improved Oil Consumption (Piston oil control rings, valve stem seals). |
| I ..... | 4 stroke—OHV ..... | None necessary. |
| I ..... | 2 stroke ..... | None necessary. |
| II ..... | 4 stroke—SV ..... | Conversion to clean OHV. |
| II ..... | 4 stroke—OHV ..... | Piston and piston ring improvements.<br>Improved combustion and intake system. |
| III–V ..... | 2 stroke ..... | Carburetor Improvements.<br>Improved Scavenging and Combustion Chamber Design.<br>Manufacturing Tolerance Improvements. |
| IV ..... | 4-stroke ..... | None necessary. |

*B. Engine Costs*

The engine cost increase is based on incremental purchase prices for new engines and is comprised of variable costs (for hardware, assembly time and compliance programs), and fixed costs (for R&D and retooling). Variable costs were applied on a per engine basis and fixed costs were amortized at seven percent over five years. Engine technology cost estimates were based on the study by ICF and EF&EE in October 1996 entitled ''Cost Study for Phase Two Small Engine Emission Regulations''. Details of the assumed costs and analysis can be found in Chapters 4 and 7 of the Draft RSD.

1. Nonhandheld Engine Costs

Based on analysis of the EPA Phase 1 certification database, and use of the ABT program available to nonhandheld engines, it is assumed that four high production Class I SV engine families will need to incorporate all those technologies listed in Table 19. Incorporation of these technologies will require the engine manufacturer to incur both variable and fixed costs.

Analysis of Class II engine families, from the EPA Phase 1 certification database and use of the ABT calculation, shows that a number of Class II SV engine families will be converted to OHV engine design and a large number of OHV engine families will need to incorporate emission improvements. Such technologies will require both variable and fixed expenditures.

The proposed Phase 2 emission standards for this diverse industry would impact companies differently depending on the existing product offerings. Some companies currently manufacture very clean Class II OHV engines geared toward the commercial market and would be required to make very few changes in their current models. Companies that target the consumer market with SV and perhaps less expensive OHV engines would require application of the emission reduction technologies.

2. Handheld Engine Costs

Analysis of the Phase 1 certification database for handheld engines shows that nearly all engine families of two stroke design will require technologies to reduce engine emissions. Redesign of the existing two-stroke engine is allocated to fixed costs as companies perform R&D, build prototypes and perform numerous emission tests to achieve production-ready models.

*C. Equipment Costs*

While equipment manufacturers would bear no responsibility for meeting emission standards, they may need to make changes in the design of their equipment models to accommodate the Phase 2 engines. EPA's treatment of the impacts of the proposal therefore includes an analysis of costs for equipment manufacturers. The 1996 PSR EOLINK database was utilized as the source of information for equipment manufacturers, models and sales estimates for all classes. The costs for equipment conversion was derived from the ICF/EF&EE cost study [71] and improved through the work by ICF and EPA on the small business impact analysis. Full details of EPA's cost analysis can be found in Chapter 4 of the Draft RSD. EPA has assumed that capital costs would be amortized at seven percent over ten years.

1. Nonhandheld Equipment Manufacturers

Based on engine technologies estimated for this rulemaking, it is assumed that Class I engine redesign would have no impact on equipment manufacturers since the proposed standard would not require external changes or adversely impact the engine's performance.

The Class II engine change from SV to OHV design will have the largest impact on equipment changes. Review of the PSR database for equipment manufacturers that utilize Class II SV engines reveals that the majority (90 percent) of small engine equipment is produced from 32 companies with the remaining 353 companies representing only 10 percent of the overall production.

EPA's work analyzing small business impacts, as summarized in the work with ICF Incorporated,[72] indicates that many of the small businesses, indicated by the PSR database to use SV Class II engines, have already converted or are in the process of converting to using OHV engine design due to market forces or changes in their engine manufacturer's offerings. These companies tend to produce professional or commercial equipment and competition has driven the use of OHV engines. The study also revealed that at least one equipment manufacturer that produces a large volume of equipment, has already switched their lines from SV to OHV. For today's proposal, EPA assumed only the one large manufacturer has already incurred the costs of converting to the use of OHV engine. For the purpose of this proposal, EPA has assumed that any switch from SV to OHV engines by equipment manufacturers is a cost incurred due to this proposal. The cost estimates were based on equipment application (garden tractor, tiller, commercial turf, etc.) and in the case of the commercial turf equipment, on the power of the engine within that application. Flexibilities within this proposal which may lessen

[71] ICF and Engine, Fuel and Emissions Engineering, Incorporated; ''Cost Study for Phase Two Small Engine Emission Regulations'', Draft Final Report, October 25, 1996, in EPA Air Docket A–93–29, Item #II–A–04.

[72] ''Small Business Impact Analysis of New Emission Standards for Small Spark-Ignition Nonroad Engines and Equipment'', ICF Incorporated, September 1997, located in EPA Air Docket A–96–55, Item#II–A–01 .

the impact of the costs of this rulemaking to equipment manufacturers were also not taken into account.

2. Handheld Equipment Manufacturers

The majority of technologies assumed in this analysis for handheld engines, see Table 19, include only internal redesign and thereby no change in the external design of the handheld engine is expected. Therefore, it is assumed that the outer dimensions and performance characteristics would be similar to the existing models and therefore the handheld equipment would not require any changes. Equipment costs have been included for manufacturers of augers who will need to incorporate changes to the transmission boxes in order to incorporate different speed-torque signatures of Phase 2 compliant engines.

*D. Operating Costs*

The total life-cycle operating costs for this proposed rulemaking include any expected decreases in fuel consumption. Life cycle costs have been calculated per class using the nonroad small engine emission model. The model calculates fuel savings from the year 2001–2026 and takes into account factors including equipment scrappage, projected yearly sales increase per equipment type and engine power. Details on the assumptions and calculations on fuel savings are included in Chapter 4 and 7 of the Draft RSD.

1. Nonhandheld Engines

No fuel consumption savings have been assumed from Class I engines. The addition of oil control piston rings and valve stem seals are not expected to affect fuel economy or maintenance requirements and changes to carburetion are expected to be only slight. The Class II SV engine conversion to OHV design is expected to result in improved fuel economy since data show that OHV engines can run at leaner air to fuel ratio's than SV engines.

2. Handheld Engines

Redesigned two-stroke engines are assumed to result in significant fuel savings as fuel/oil/air scavenging is significantly reduced.

*E. Cost Per Engine and Cost-Effectiveness*

1. Cost Per Engine

Total costs for this proposed rulemaking vary per year as engine families are phased-in to compliance with the Phase 2 standards over several years, capital costs are recovered and compliance programs are conducted. The term ''uniform annualized cost'' is used to express the cost of this rulemaking over the years of this analysis.

The methodology used for estimating the uniform annualized cost per engine is as follows. Cost estimates from 1996 and 1997 model years, for technology and compliance programs respectively, were estimated and increased at an inflation rate of 4 percent per year to the years in which they were assumed to be incurred. For engine technology costs, one set of technologies per class and engine design was assumed (see Table 19). The Phase 1 database was then analyzed to determine the number of engine families per class that would likely incorporate the emission reduction technologies. The estimated costs per year were then calculated by multiplying the number of engine families and corresponding production volume by the fixed and variable costs per technology grouping, respectively. Retail markups used are 16 percent by the engine manufacturer, 5 percent by the equipment manufacturer and 5 percent by the mass merchandiser. All markups are based on industry specific information from Phase 1. For compliance program costs, each program was outlined and assigned costs based on the likely number of participants or engine families to be included in each program which were determined from the Phase 1 certification database. The costs per year were discounted seven percent to the first year of Phase 2 regulation, 2001 for nonhandheld and 2002 for handheld engine classes, respectively. A uniform annualized cost was then calculated. Costs per engine are calculated from the uniform annualized cost for the first full year of implementation of the Phase 2 standard, 2005, and the last year of this analysis, 2026. The average cost per engine is calculated from these two values and the results are presented in Table 20.

The yearly fuel savings (tons/yr) per class were calculated from the nonroad small engine emission model. The tons/yr were converted to savings ($) per year through conversion to gallons per year multiplied by $0.765 (a 1995 average refinery price to end user). The yearly fuel savings were discounted by 3 percent to the first year of Phase 2 regulation, 2001 for nonhandheld engines and 2002 for handheld engines. The yearly results were totaled and then divided by an annualized factor to yield the uniform annualized fuel savings. The engine lifetime fuel savings for each engine class was calculated for the production years of 2005 and 2026. The average of these two values was utilized as the average fuel savings per engine per class is shown in Table 20. In particular, EPA notes that its estimate of fuel savings for Class II engine conversion to OHV technology is greater than the estimated cost of this conversion and thus would be economically beneficial to the consumer. EPA requests comment on its analysis of the fuel economy benefit for Class II conversion from SV to OHV technology and information as to why the market has not responded with a greater penetration of the more fuel efficient OHV technology.

The average resultant cost per engine class is calculated by subtracting the average fuel savings from the average cost, see Table 20. See Chapter 7 of the Draft RSD for more details of this analysis.

TABLE 20.—ENGINE LIFE TIME FUEL SAVINGS AND RESULTANT COST PER ENGINE

[Costs based on uniform annualized costs]

| Class | Cost per engine | Savings per engine | Resultant cost per engine |
|---|---|---|---|
| I | $0.87 | $0.00 | $0.87 |
| II | 10.54 | 33.20 | ($22.66) |
| III | 0.74 | 0.45 | 0.29 |
| IV | 1.92 | 0.99 | 0.92 |
| V | 16.21 | 4.12 | 12.07 |

2. Cost Effectiveness

EPA has estimated the cost-effectiveness (i.e., the cost per ton of emission reduction) of the proposed $HC+NO_X$ standard over the typical lifetime of the small SI equipment that would be covered by today's proposed rule. EPA has examined the cost-effectiveness by performing a nationwide cost-effectiveness in which the net present value of the cost of compliance per year is divided by the nationwide emission benefits per year over a period of 26 years. This is sufficient time to achieve fleet turnover. The resultant cost-effectiveness is $390 cost/ton $HC+NO_X$ without fuel savings. Chapter 7 of the Draft RSD contains a more detailed discussion of the cost-effectiveness analysis. EPA requests comments on all aspects of the cost-effectiveness analysis.

The overall cost-effectiveness of this rule on $HC+NO_X$ emission reductions, with fuel savings, is shown in Table 21. Table 21 contains the cost effectiveness of other nonroad rulemakings, which contain fuel savings, to which the cost-effectiveness of this rulemaking can be compared.

TABLE 21.—COST-EFFECTIVENESS OF THE PROPOSED STANDARDS WITH FUEL SAVINGS

| Standard | NPV cost/NPV ton (with fuel savings) | Pollutants |
|---|---|---|
| Proposed Small SI Engines <19 kW Phase 2 | −$700 | $HC+NO_X$ |
| Small SI Engines <19 kW Phase 1 | $217 | $HC+NO_X$ |
| Spark Ignition Marine Engines | $1000 | HC |
| Proposed Nonroad CI Standards | $180–$400 | $HC+NO_X$ |

## VII. Public Participation

### *A. Comments and the Public Docket*

The Agency welcomes comments on all aspects of this proposed rulemaking. All comments (preferably in duplicate), with the exception of proprietary information, should be directed to the EPA Air Docket Section, Docket No. A–96–02 (see **ADDRESSES**). Commenters who wish to submit proprietary information for consideration should clearly separate such information from other comments by:

- Labeling proprietary information ''Confidential Business Information'' and,
- Sending proprietary information directly to the contact person listed (see **FOR FURTHER INFORMATION CONTACT**) and not to the public docket.
- This will help ensure that proprietary information is not inadvertently placed in the docket. If a commenter wants EPA to use a submission labeled as confidential business information as part of the basis for the final rule, then a nonconfidential version of the document, which summarizes the key data or information, should be sent to the docket.

Information covered by a claim of confidentiality will be disclosed by EPA only to the extent allowed by and in accordance with the procedures set forth in 40 CFR Part 2. If no claim of confidentiality accompanies the submission when it is received by EPA, the submission may be made available to the public without notifying the commenters.

### *B. Public Hearing*

Anyone wishing to present testimony about this proposal at the public hearing (see **DATES**) should, if possible, notify the contact person (see **FOR FURTHER INFORMATION CONTACT**) at least two business days prior to the day of the hearing. The contact person should be given an estimate of the time required for the presentation of testimony and notification of any need for audio/visual equipment. A sign-up sheet will be available at the registration table the morning of the hearing for scheduling those who have not notified the contact earlier. This testimony will be scheduled on a first-come, first-served basis, and will follow the testimony that is arranged in advance.

The Agency recommends that approximately 50 copies of the statement or material to be presented be brought to the hearing for distribution to the audience. In addition, EPA would find it helpful to receive an advance copy of any statement or material to be presented at the hearing at least two business days before the scheduled hearing date. This is to give EPA staff adequate time to review such material before the hearing. Advance copies should be submitted to the contact person listed.

### *C. Obtaining Electronic Copies of Documents*

Materials relevant to this proposed rule are contained in Docket No. A–96–55, located at the Air Docket, 401 M Street, S.W., Washington, DC 20460, and may be reviewed in Room M–1500 from 8:00 a.m. until 5:30 p.m. Monday through Friday. As provided in 40 CFR part 2, a reasonable fee may be charged by EPA for photocopying docket materials.

The preamble, regulatory language and draft Regulatory Support Document are also available electronically from the EPA internet Web site. This service is free of charge, except for any cost you already incur for internet connectivity. The text of the proposed rule is made available on the day of publication on the primary Web site listed below. The EPA Office of Mobile Sources also publishes these notices on the secondary Web site listed below.

Internet (Web)

http://www.epa.gov/docs/fedrgstr/EPA–AIR/

(Either select desired data or use search feature)

http://www.epa.gov/OMSWWW/

(Look in What's New or under the specific rulemaking topic)

Please note that due to differences between the software used to develop the document and the software into which the document may be downloaded, changes in format, page length, etc., may occur.

## VIII. Administrative Requirements

### *A. Administrative Designation and Regulatory Analysis*

Under Executive Order 12866,[73] the Agency must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

[73] 58 FR 51735 (October 4, 1993).

(3) Materially alter the budgetary impact of entitlement, grants, user fees, or loan programs or the rights and obligations of recipients thereof;

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

A regulatory support document which presents EPA's analysis of the cost impacts of this proposed rule is available for review in the public docket. EPA estimates that the proposed standards and other regulatory provisions, if adopted, would not have an annual effect on the economy of more than $100 million, a criterion which is a major determinant in defining an ''economically significant regulatory action.'' Although not ''significant'' based on this criterion, the rule may adversely affect in a material way that sector of the economy involved with the production of small spark-ignition engines or equipment utilizing such engines. As such, this action was submitted to OMB for review. Any written comments from OMB and any EPA response to OMB comments are in the public docket for this proposal.

*B. Paperwork Reduction Act*

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* Copies of the ICR document may be obtained from Sandy Farmer, Regulatory Information Division, EPA, 401 M Street, SW (2137), Washington, DC 20460 or by calling (202) 260–2740.

Table 22 provides a listing of this proposed rulemaking's information collection requirements along with the appropriate information collection request (ICR) numbers. The cost of this burden has been incorporated into the cost estimate for this rule. The Agency has estimated that the public reporting burden for the collection of information required under this rule would average approximately 6702 hours annually for a typical engine manufacturer. The hours spent by a manufacturer on information collection activities in any given year would be highly dependent upon manufacturer specific variables, such as the number of engine families, production changes, emission defects etc.

TABLE 22.—PUBLIC REPORTING BURDEN

| EPA ICR No. | Type of information | OMB control No. |
|---|---|---|
| 151490 | Certification | 2060–0338 |
| 23420 | Averaging, banking and trading | 2060–0338 |
| N/A | Production line testing | N/A |
| 1675.01 | In-use testing | 2060–0292 |
| N/A | In-use credits | N/A |
| 0095.07 | Pre-certification and testing exemption | 2060–0007 |
| 0012 | Engine exclusion determination | 2060–0124 |
| 0282 | Emission defect information | 2060–0048 |
| 1673.01 | Importation of nonconforming engines | 2060–0294 |

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Chief, Information Policy Branch, EPA, 401 M Street, SW (PM–223Y), Washington DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked ''Attention: Desk Officer for EPA.'' The final rule will contain responses to OMB or public comments on the information collection requirements contained in this proposal.

*C. Unfunded Mandates Reform Act*

Section 202 of the Unfunded Mandates Reform Act of 1995 (''Unfunded Mandates Act'') requires that the Agency prepare a budgetary impact statement before promulgating a rule that includes a Federal mandate that may result in expenditure by State, local, and tribal governments, in aggregate, or by the private sector, of $100 million or more in any one year. Section 203 requires the Agency to establish a plan for obtaining input from and informing, educating, and advising and small governments that may be significantly or uniquely affected by the rule.

Under section 205 of the Unfunded Mandates Act, the Agency must identify and consider a reasonable number of regulatory alternatives before promulgating a rule for which a budgetary impact statement must be prepared. The Agency must select from those alternatives the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule, unless the Agency explains why this alternative is not selected or the selection of this alternative is inconsistent with law.

Because this proposed rule is estimated to result in the expenditure by State, local and tribal governments or the private sector of less than $100 million in any one year, the Agency has not prepared a budgetary impact statement or specifically addressed the selection of the least costly, most cost-effective or least burdensome alternative. EPA has estimated the rule to cost the private sector an annualized cost of $90 million per year . However, the Agency has appropriately considered cost issues in developing this proposal as required by section 213(a)(3) of the Clean Air Act, and has designed the proposed rule such that it will in EPA's view be a cost-effective program. Because small governments would not be significantly or uniquely affected by this proposed rule, the Agency is not required to develop a plan with regard to small governments.

*D. Regulatory Flexibility*

The Regulatory Flexibility Act (RFA) generally requires an agency to conduct a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions. For the reasons set out below, this proposed rule would not have a significant impact on a substantial number of small entities.

EPA has identified industries that would be subject to this proposed rule and has contacted small entities and small entity representatives to gain a better understanding of potential impacts of the proposed Phase 2 program on their businesses. This

information was useful in estimating potential impacts of this rule on affected small entities, the details of which are fully discussed in Chapter 8 of the Draft RSD. Small not-for-profit organizations and small governmental jurisdictions are not expected to be impacted by this proposal. Thus EPA's impact analysis focuses on small businesses. For purposes of the impact analysis, ''small business'' is defined by number of employees or dollars of annual receipts according to Small Business Administration (SBA) regulations. The analysis focuses especially on impacts to manufacturers of Class II nonhandheld and Classes III–V handheld engines and equipment, since Class I side-valve engines are only expected to need minor modifications.

The economic impact of the proposed rule on engine and equipment manufacturers defined as small by the SBA was evaluated using a ''sales test'' approach which calculates annualized compliance costs as a function of sales revenue. The ratio is an indication of the severity of the potential impacts. The results of the analysis suggest that of those small entities analyzed, one small business engine manufacturer and two small business equipment manufacturers would experience an impact of greater than one percent of their sales revenue. However, none of these small entities would experience an impact greater than three percent of their sales revenue. These three companies represent approximately five percent of the total small business manufacturers on which the analysis was based. Given this, and the ratio levels at which these companies are projected to be impacted (i.e., less than three percent), EPA expects today's proposal to have a light impact on small business entities. The analysis assumes no passthrough of costs in price increases and thus can be characterized as depicting worst case impacts.

While the Agency does not consider these impacts to be significant, the Agency desires to minimize impacts to the extent possible for those companies which may be adversely affected and to ensure that the proposed emissions standards are achievable. Thus, flexibility provisions for the proposed rule (discussed in Section IV.E) were developed based on information gained through discussions with potentially affected small entities. Many of the flexibilities being proposed in today's rule should benefit both engine and equipment manufacturers qualifying as small. Some, but not all, of these provisions were considered in the impact assessment on small entities (see Chapter 8 of the Draft RSD). Those flexibilities not considered, including a hardship relief provision described in Section IV.E, were developed too late in the rule development process to be included in the impact assessment, but as they were added in order to further ensure the achievability of the proposed standards it is expected that they would further reduce the impacts of the proposed rule. EPA requests comment as to whether these proposed provisions adequately address the needs of affected manufacturers, and small entities in particular.

The results of the impact analysis show minimal impacts on small businesses. EPA expects impacts may be negligible if small companies take advantage of those additional flexibilities not considered in the analysis, and if companies pass through most of their costs to customers as was indicated as likely by most small companies contacted. Furthermore, EPA's outreach activities with small entities indicated that many engine and equipment manufacturers have already made the switch from side-valve engine technology to producing or using overhead valve engine technology for reasons other than today's proposed rule, and therefore may not incur substantial additional costs as a result of this program. Therefore, I certify that this action will not have a significant economic impact on a substantial number of small entities and therefore a regulatory flexibility analysis for this proposal has not been prepared. The Agency continues to be interested in the potential impacts of the proposed rule on small entities and welcomes additional comments during the rulemaking process on issues related to such impacts. In spite of the expected minimal impacts on small entities, the Agency is continuing its efforts to notify other small business engine and equipment manufacturers of this rule and inform them of their opportunities for providing feedback to the Agency.

**List of Subjects in 40 CFR Part 90**

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Labeling, Nonroad source pollution, Reporting and recordkeeping requirements, Research, Warranties.

Dated: December 23, 1997.

**Carol M. Browner,**

*Administrator.*

For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is proposed to be amended as follows:

## PART 90—CONTROL OF EMISSIONS FROM NONROAD SPARK-IGNITION ENGINES

1. The authority citation for part 90 continues to read as follows:

**Authority:** Sections 203, 204, 205, 206, 207, 208, 209, 213, 215, 216, and 301(a) of the Clean Air Act, as amended (42 U.S.C. 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a)).

### Subpart A—General

2. Section 90.1 is amended by removing the period at the end of paragraph (b)(5)(iv) and adding a semicolon in its place, by adding paragraphs (b)(6) and (d) and by revising paragraph (c) to read as follows:

**§ 90.1 Applicability.**

* * * * *

(b) * * *

(6) Engines that are used exclusively in emergency and rescue equipment where no certified engines are available to power the equipment safely and practically, but not including generators, alternators, compressors or pumps used to provide remote power to a rescue tool. The equipment manufacturer bears the responsibility to ascertain on an annual basis and maintain documentation available to the Administrator that no appropriate certified engine is available from any source.

(c) Engines subject to the provisions of this subpart are also subject to the provisions found in subparts B through N of this part, except that subparts C, H, M and N of this part apply only to Phase 2 engines as defined in this subpart.

(d) Certain text in this part is identified as pertaining to Phase 1 or Phase 2 engines. Such text pertains only to engines of the specified Phase. If no indication of Phase is given, the text pertains to all engines, regardless of Phase.

3. Section 90.3 is amended by adding the following definitions in alphabetical order to read as follows:

**§ 90.3 Definitions.**

* * * * *

*Aftertreatment* means the passage of exhaust gases through a device or system such as a catalyst whose purpose is to chemically alter the gases prior to their release to the atmosphere.

* * * * *

*Commercial Engine* means a handheld engine that is not a residential engine.

*DF* or *df* means deterioration factor.

*Eligible sales* or *U.S. sales* means Phase 2 engines sold for purposes of being used in the United States, and includes any engine exported and

subsequently imported in a new piece of equipment, but excludes any engine introduced into commerce, by itself or in a piece of equipment, for use in a state that has established its own emission requirements applicable to such engines pursuant to a waiver granted by EPA under section 209(e) of the Clean Air Act.

* * * * *

*Family Emission Limit* or *FEL* means an emission level that is declared by the manufacturer to serve in lieu of an emission standard for certification, production line testing, Selective Enforcement Auditing, and in-use testing for engines participating in the averaging, banking and trading program. An FEL must be expressed to the same number of decimal places as the applicable emission standard.

* * * * *

*HC+$NO_X$* means total hydrocarbons plus oxides of nitrogen.

*In-use credit* means an emission credit that represents the difference between the mean in-use emission results of a regulated pollutant, CO, HC+$NO_X$ or NMHC+$NO_X$, and the applicable certification emission standard. In-use results below the standard lead to the calculation of positive in-use credits, while in-use results above the standard lead to the calculation of negative in-use credits.

* * * * *

*NMHC+$NO_X$* means nonmethane hydrocarbons plus oxides of nitrogen.

* * * * *

*Overhead valve engine* means an otto-cycle, four-stroke engine in which the intake and exhaust valves are located above the combustion chamber within the cylinder head. Such engines are sometimes referred to as ''valve-in-head'' engines.

*Overhead valve emission performance* or *OEP engine* means a Class II overhead valve engine, or a Class II non-overhead valve engine that complies with the applicable 2005 model year emission standards without using emission credits.

*Phase 1 engine* means any handheld or nonhandheld engine, that was produced under a certificate of conformity issued under the regulations in this part and that is not a Phase 2 engine.

*Phase 2 engine* means any handheld engine as defined in this subpart that is subject to the standards that begin to phase-in in the 2002 model year; and any nonhandheld engine as defined in this subpart of the 2001 model year or later including those 1999 and 2000 model year engines certified under early banking provisions described in this part. Any engines exempted from the Phase 2 standards under this part are excluded from coverage under this definition.

* * * * *

*Residential engine* means a handheld engine for which the engine manufacturer makes a written statement to EPA as part of its certification application that such engine and the equipment it is installed in by the engine manufacturer, where applicable, is not produced, advertised, marketed or intended for commercial or professional usage.

*Round, rounded* or *rounding* means, unless otherwise specified, that numbers will be rounded according to *ASTM–E29–93a*, which is incorporated by reference in this part pursuant to § 90.7.

* * * * *

*Side valve engine* means an otto-cycle, four stroke engine in which the intake and exhaust valves are located to the side of the cylinder, not within the cylinder head. Such engines are sometimes referred to as ''L-head'' engines.

*Small volume engine family* means any handheld engine family whose eligible sales in a given model year are projected at the time of certification to be no more than 2,500 engines; or any nonhandheld engine family whose eligible sales in a given model year are projected at the time of certification to be no more than 1,000 units.

*Small volume engine manufacturer* means, for handheld engines, any engine manufacturer whose total eligible sales of handheld engines subject to regulation under this part are projected at the time of certification of a given model year to be no more than 25,000 handheld engines; and, for nonhandheld engines, any engine manufacturer whose total eligible sales of nonhandheld engines are projected at the time of certification of a given model year to be no more than 10,000 nonhandheld engines.

*Small volume equipment manufacturer* means, for handheld equipment, any equipment manufacturer whose production of handheld equipment subject to regulation under this part or powered by engines regulated under this part, does not exceed 5000 pieces for a given model year or annual production period excluding that equipment intended for introduction into commerce for use in a state that has established its own emission requirements applicable to such equipment or engines in such equipment, pursuant to a waiver granted by EPA under section 209(e) of the Clean Air Act. For nonhandheld equipment, the term ''small volume equipment manufacturer'' has the same meaning except that it is limited to 2500 pieces rather than 5000.

*Small volume equipment model* means, for handheld equipment, any unique model of equipment whose production subject to regulations under this part or powered by engines regulated under this part, does not exceed 2500 pieces for a given model year or annual production period excluding that equipment intended for introduction into commerce for use in a state that has established its own emission requirements applicable to such equipment or engines in such equipment, pursuant to a waiver granted by EPA under section 209(e) of the Clean Air Act. For nonhandheld equipment, the term ''small volume equipment model'' has the same meaning except that it is limited to 500 pieces rather than 2500.

*Technology subgroup* means a group of engine families from one or more manufacturers having similar size, application, useful life and emission control equipment; e.g., Class III, residential, non-catalyst, two stroke engine used in generator set applications.

* * * * *

## Subpart B—Emission Standards and Certification Provisions

4. Section 90.103 is amended by revising paragraph (a) introductory text, and paragraphs (a)(3) and (a)(5) and by adding paragraphs (a)(6) through (a)(9) to read as follows:

### § 90.103 Exhaust emission standards.

(a) Exhaust emissions for new Phase 1 and Phase 2 nonroad spark ignition engines at or below 19 kilowatts (kW), shall not exceed the following levels. Throughout this part, NMHC+$NO_X$ standards are applicable only to natural gas fueled engines at the option of the manufacturer, in lieu of HC+$NO_X$ standards. The tables for Phase 1 and Phase 2 exhaust emissions levels follow:

TABLE 1.—PHASE 1 EXHAUST EMISSION STANDARDS

[Grams per kilowatt-hour]

| Engine displacement class | Hydrocarbons + oxides of nitrogen ($HC+NO_X$) | Hydrocarbons | Carbon monoxide | Oxides of nitrogen ($NO_X$) |
|---|---|---|---|---|
| I | 16.1 | ..... | 519 | ..... |
| II | 13.4 | ..... | 519 | ..... |
| III | ..... | 295 | 805 | 5.36 |
| IV | ..... | 241 | 805 | 5.36 |
| V | ..... | 161 | 603 | 5.36 |

TABLE 2.—PHASE 2 NONHANDHELD EXHAUST EMISSION STANDARDS BY MODEL YEAR

[Grams per kilowatt-hour]

| Engine class | Emission requirement | Model year | | | | |
|---|---|---|---|---|---|---|
| | | 2001 | 2002 | 2003 | 2004 | 2005 and later |
| I | $HC+ NO_X$ | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| | $NMHC+NO_X$ | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| | CO | 610 | 610 | 610 | 610 | 610 |
| II | $HC+NO_X$ | 18.0 | 16.6 | 15.0 | 13.6 | 12.1 |
| | $NMHC+NO_X$ | 16.7 | 15.3 | 14.0 | 12.7 | 11.3 |
| | CO | 610 | 610 | 610 | 610 | 610 |
| | Assumed OEP Percentage | 50 | 62.5 | 75 | 87.5 | 100 |

TABLE 3.—PHASE 2 HANDHELD EXHAUST EMISSION STANDARDS SHOWING PHASE-IN BY AGGREGATE PERCENTAGE OF SALES

[Grams per kilowatt-hour]

| Engine class | Emission standard | | Model year | | | |
|---|---|---|---|---|---|---|
| | $HC+NO_X$ | CO | 2002 (percent) | 2003 (percent) | 2004 (percent) | 2005 and later (percent) |
| III | 210 | 805 | ..... | ..... | ..... | ..... |
| IV | 172 | 805 | 20 | 40 | 70 | 100 |
| V | 116 | 603 | ..... | ..... | ..... | ..... |

* * * * *

(3) Notwithstanding paragraph (a)(2) of this section, two stroke engines used to power lawnmowers or other nonhandheld equipment may meet Phase 1 Class III, IV or V standards and requirements, as appropriate, through model year 2002 subject to the provisions of § 90.107(e), (f) and (h). Such engines shall not be included in any computations of Phase 2 nonhandheld credits or sales nor in any computations used to ascertain compliance with Phase 2 phase-in requirements for handheld engines.

* * * * *

(5) Notwithstanding paragraph (a)(2) of this section, engines used exclusively to power products which are used exclusively in wintertime, such as snowthrowers and ice augers, at the option of the engine manufacturer, need not certify to or comply with standards regulating emissions of HC, $NO_X$, $HC+NO_X$ or $NMHC+NO_X$ , as applicable. If the manufacturer exercises the option to certify to standards regulating such emissions, such engines must meet such standards. If the engine is to be used in any equipment or vehicle other than an exclusively wintertime product such as a snowthrower or ice auger, it must be certified to the applicable standard regulating emissions of HC, $NO_X$, $HC+NO_X$ or $NMHC+NO_X$ as applicable.

(6) During the phase-in of Phase 2 emission requirements for handheld engines, as applicable, those engine families not certified to Phase 2 requirements shall be certified to and shall meet Phase 1 requirements.

(7) Manufacturers of Phase 2 Class II engines must comply with the OEP percentages shown in Table 2 of this section in each model year in cases where the manufacturer desires to engage in cross class averaging of emission credits as permitted under subpart C of this part, and in cases where the manufacturer desires to use credits banked by itself or another manufacturer in the 1999 or 2000 model year as permitted under subpart C of this part. Compliance with OEP percentages shall be determined by dividing the manufacturer's eligible sales of Class II engines that are overhead valve engines or are certified at or below the 2005 $HC+NO_X$ ($NMHC+NO_X$) standard, by the manufacturer's total eligible sales of Class II engines for the subject model year. Side valve engine families with annual US sales of less than 1000 may be excluded from the calculation.

(8) Notwithstanding the standards shown in Table 2 of this section, the $HC+NO_X$ ($NMHC+NO_X$) standard for Phase 2 Class II sidevalve engine families with annual production of 1000 or less shall be 24.0 g/kW-hr (22.0 g/kW-hr) for model years 2005 and later. Engines produced subject to this provision may not exceed this standard and are excluded from the averaging,

banking and trading program and any related credit calculations after the 2004 model year. During the 2001 through 2004 model years these engines are subject to applicable Phase 2 standards, but shall not require the application of certification credits if their $HC+NO_X$ ($NMHC+NO_X$) certification level is 24.0 g/kW-hr (22.0 g/kW-hr) or less.

(9) Notwithstanding the standards shown in Table 2 of this section, small volume engine manufacturers as defined in this part may, at their option, certify Phase 2 Class II engines to an $HC+NO_X$ ($NMHC+NO_X$) standard of 24.0 g/kW-hr (22.0 g/kW-hr) through the 2004 model year. Such engines shall not exceed this standard and are excluded from the averaging, banking and trading program through the 2004 model year.

* * * * *

5–6. Section 90.104 is amended by adding introductory text and paragraphs (d) through (i) to read as follows:

**§ 90.104 Compliance with emission standards.**

Paragraphs (a) through (c) of this section apply to Phase 1 engines only. Paragraphs (d) through (i) of this section apply only to Phase 2 engines.

* * * * *

(d) The exhaust emission standards (FELs, where applicable) for Phase 2 engines set forth in this part apply to the emissions of the engines for their full useful lives as determined pursuant to § 90.105.

(e) For all Phase 2 engines:

(1) If all test engines representing an engine family have emissions, when properly tested according to procedures in this part, less than or equal to each Phase 2 emission standard (FEL, where applicable) in a given engine displacement class and given model year, when multiplicatively adjusted by the deterioration factor determined in this section, that family complies with that class of emission standards for purposes of certification. If any test engine representing an engine family has emissions adjusted multiplicatively by the deterioration factor determined in this section, greater than any one emission standard (FEL, where applicable) for a given displacement class, that family does not comply with that class of emission standards.

(2) Except as otherwise permitted under this section, each manufacturer of handheld engines must comply with the Phase 2 phase-in schedule shown in § 90.103. Compliance with the Phase 2 phase-in schedule shall be determined each model year by dividing the manufacturer's total eligible sales of Phase 2 handheld engines of that model year by the manufacturer's total eligible sales of handheld engines subject to regulation under this part.

(3) In each model year during the Phase 2 phase-in period for handheld engines (i.e. model years 2002, 2003, and 2004), manufacturers of handheld engines shall project, updating as appropriate, and make available to the Administrator upon request, the sales figures necessary to complete the calculation required in paragraph (e)(2) of this section. Within 270 days after the end of each model year in the Phase 2 phase-in period, each manufacturer shall submit a report to the Administrator showing its calculation of compliance with the phase-in schedule.

(4) Small volume manufacturers of handheld engines as defined in this part are not subject to the phase-in requirements applicable to the 2002, 2003 or 2004 model years.

(f) Each manufacturer of nonhandheld engines must comply with all provisions of the averaging, banking and trading program outlined in subpart C of this part for each engine family participating in that program.

(g)(1) Deterioration factors for $HC+NO_X$ and $NMHC+NO_X$ emissions for all nonhandheld OHV Phase 2 engines without aftertreatment may be taken from Table 1 of this section or may be calculated according to the process described in paragraph (h) of this section. Except where the Administrator directs a nonhandheld engine manufacturer to calculate a df under paragraph (g)(2) or (g)(3) of this section, if a manufacturer elects to calculate a df for an engine family, it must do so for all families of that class in the same useful life category. Where a manufacturer elects to take an $HC+NO_X$ or $NMHC+NO_X$ df from the table, it may use good engineering judgment to determine an appropriate CO df, provided it maintains and makes available to the Administrator upon request, such rationale and supporting data used to determine the CO df.

(2) If the Administrator has evidence for a given class and useful life category indicating that a sales weighted average of a manufacturer's actual dfs of those families for which an assigned df is being used, exceeds the assigned df by more than 15%, the Administrator may require the manufacturer to submit appropriate data to establish a df for some or all of the engine families. Such data may be generated through the process described in paragraph (h) of this section or through another process approved by the Administrator.

(3) If the Administrator has evidence indicating that the actual df of an engine family for which a manufacturer is using an assigned df, exceeds 1.8, the Administrator may require the manufacturer to submit appropriate data to establish a df for that engine family. Such data may be generated through the process described in paragraph (h) of this section or through another process approved by the Administrator.

(4) Table 1 follows:

TABLE 1.—ASSIGNED $HC+NO_x$ and $NMHC+NO_x$ DETERIORATION FACTORS FOR NONHANDHELD PHASE 2 OVERHEAD VALVE ENGINES WITHOUT AFTERTREATMENT

| | | | | |
|---|---|---|---|---|
| Class I | Usefule life (hours) | 66 | 250 | 500 |
| | Deterioration factor | 1.3 | 1.3 | 1.3 |
| Class II | Useful life (hours) | 250 | 500 | 1000 |
| | Deterioration factor | 1.3 | 1.3 | 1.3 |

(h) Manufacturers shall obtain an assigned df or calculate a df, as appropriate, for each regulated pollutant for all Phase 2 handheld and nonhandheld engine families. Such dfs shall be used, as applicable, for certification, production line testing, and Selective Enforcement Auditing. For handheld engines, and nonhandheld engines not using assigned dfs from Table 1 of this section, manufacturers shall calculate dfs for each pollutant through one of the following options:

(1) For handheld engines, dfs shall be determined using good engineering judgment and reflect the exhaust emission deterioration expected over the useful life of the engine except that no df may be less than 1.0. EPA may reject a df if it has evidence that the df is not appropriate for that family. The manufacturer must retain actual emission test data to support its choice of df and furnish that data to the Administrator upon request. Acceptable

data sources include, but are not limited to:

(i) In-use data from an earlier model year of this family or a closely related family;

(ii) Data from engines used in the field/bench adjustment program described in subpart M of this part.

(2) For nonhandheld engines:

(i) On at least three test engines representing the configuration chosen to be the most likely to exceed $HC+NO_X$ ($NMHC+NO_X$) emission standards, (FELs where applicable), and constructed to be representative of production engines pursuant to § 90.117, conduct full Federal test procedure emission testing pursuant to the regulations of Subpart E of this part at the number of hours representing stabilized emissions pursuant to § 90.118. Average the results and round to the same number of decimal places contained in the applicable standard, expressed to one additional significant figure. Conduct such emission testing again following field aging in actual usage to a number of hours equivalent to the applicable useful life hours, plus or minus five percent. Average the results and round to the same number of decimal places contained in the applicable standard, expressed to one additional significant figure. Divide the full useful life average emissions for each regulated pollutant by the stabilized average emission results and round to two significant figures. The resulting number shall be the df, unless it is less than 1.0, in which case the df shall be 1.0; or

(ii) On at least three test engines representing the configuration chosen to be the most likely to exceed $HC+NO_X$ ($NMHC+NO_X$) emission standards (FELs where applicable), and constructed to be representative of production engines pursuant to § 90.117, conduct full Federal test procedure emission testing pursuant to the regulation of Subpart E of this part at no fewer than three points as follows: at the number of hours representing stabilized emissions pursuant to § 90.118; again following field aging in actual usage to a number of hours equivalent to the applicable useful life hours, plus or minus five percent; and also at no fewer than one point spaced approximately equally between the other two. The test results for each pollutant shall be rounded to the same number of decimal places contained in the applicable standard, expressed to one additional significant figure and plotted as a function of hours on the engine, rounded to the nearest whole hour. The best fit straight line, determined by the method of least squares, shall be drawn. Using this line, interpolate the emissions of each pollutant at 12 hours and at a number of hours equal to the applicable useful life. Divide the interpolated useful life emissions by the interpolated emissions at 12 hours and round this figure to two significant figures. The resultant number shall represent the df unless it is less than 1.0, in which case the df shall be 1.0; or

(iii) Perform another process, approved in advance by the Administrator, which will have the objective of adequately ascertaining the relationship of field aged emissions at full useful life with those tested with stabilized emissions at low hours; or

(iv) For manufacturers of Class II overhead valve engines certifying to 500 or 1000 hour useful lives, such manufacturers may establish dfs for such engines based on good engineering judgment that has been proposed in advance and determined to be satisfactory to the Administrator, for certification of model years 2001 through 2004. The Administrator may, in model year 2006 or later, direct the manufacturer to verify, in a period of time the Administrator determines to be reasonable, such dfs using methods described in paragraphs (h)(2)(i), (ii) or (iii) of this section. If the dfs established by the manufacturer under this provision underestimate the dfs determined by the methods under paragraphs (h)(2)(i), (ii) or (iii) of this section, by 15% or more, the Administrator shall provide the manufacturer with a period of two model years in which to obtain sufficient certification emission credits from other nonhandheld engines to cover the credit shortfall calculated by substituting the df determined under this provision for the original df in the equation in § 90.207(a).

(3) Calculated deterioration factors may cover families and model years in addition to the one upon which they were generated if the manufacturer submits a justification acceptable to the Administrator in advance of certification that the affected engine families can be reasonably expected to have similar emission deterioration characteristics.

(i)(1) Except as allowed in paragraph (i)(2) of this section, nonhandheld sidevalve engines or nonhandheld engines with exhaust aftertreatment shall be certified by field aging one engine in actual usage or by bench aging one engine on an aging cycle determined to represent field aged engines under § 90.1207 and § 90.1208, to its full useful life followed by emission testing using applicable test procedures under this part. Emission test results for such bench aged engines shall be adjusted using adjustment factors calculated under § 90.1208 to determine the certification levels. The dfs for such engines shall be calculated during this bench aging process using the techniques described in paragraphs (h)(2)(i), (ii) or (iii) of this section, except that bench aging of one engine may be used in place of field aging. In calculating the dfs of bench aged nonhandheld sidevalve engines or nonhandheld engines with aftertreatment, the emission test data at the number of hours equal to full useful life, shall first be multiplied by the adjustment factor applicable to that engine family and determined under § 90.1208.

(2) Sidevalve Class II or aftertreatment-equipped Class II engines for which the manufacturer commits in writing, at the time of certification, to cease production by the end of the 2004 model year, are eligible for reduced certification testing, at the manufacturer's option. Bench aging or field aging for the certification of such engines may be stopped at 120 hours for engines having a useful life of 250 hours as determined pursuant to regulations in this part; at 250 hours for engines having a useful life of 500 hours; and at 500 hours for engines having a useful life of 1000 hours. In such cases, based on emission results from stabilized engines and engines aged as described in this paragraph (i), the manufacturer shall project emissions to 250, 500 or 1000 hours, as applicable, using good engineering judgment acceptable to the Administrator. The manufacturer shall then adjust bench aged emissions (if applicable) with the adjustment factor determined pursuant to § 90.1208 for purposes of certification and computation of credits or credit needs. The manufacturer shall compute dfs for bench aged engines from the adjusted emission levels using good engineering judgment acceptable to the Administrator. For field aged engines, the manufacturer shall compute dfs from the projected 250, 500 or 1000 hour emissions, as applicable, using good engineering judgment acceptable to the Administrator.

7. Section 90.105 is revised to read as follows:

**§ 90.105 Useful life periods for Phase 2 engines.**

(a) Manufacturers shall declare the applicable useful life category for each engine family at the time of certification as described in this section. Unless otherwise approved by the Administrator, such category shall be that category which most closely

approximates the actual useful lives of the equipment into which the engines are expected to be installed. Manufacturers shall retain data appropriate to support their choice of useful life category for each engine family. Such data shall be sufficient to show that the majority of engines or a sales weighted average of engines of that family are used in applications having a useful life best represented by the chosen category. Such data shall be furnished to the Administrator upon request.

(1) For handheld engines:

(i) Engines declared by the manufacturer at the time of certification as residential, as defined in § 90.3, shall have a useful life for purposes of regulation under this part of 50 hours.

(ii) Engines declared by the manufacturer at the time of certification as commercial, as defined in § 90.3, shall have a useful life for purposes of regulation under this part of 300 hours.

(2) For nonhandheld engines: Manufacturers shall select a useful life category from Table 1 of this section at the time of certification, as follows:

TABLE 1.—USEFUL LIFE CATEGORIES FOR NONHANDHELD ENGINES (HOURS)

| | Category C | Category B | Category A |
|---|---|---|---|
| Class I ... | 66 | 250 | 500 |
| Class II .. | 250 | 500 | 1000 |

(3) Data to support a manufacturer's choice of useful life category, for a given engine family, may include but are not limited to:

(i) Surveys of the life spans of the equipment in which the subject engines are installed;

(ii) Engineering evaluations of field aged engines to ascertain when engine performance deteriorates to the point where usefulness and/or reliability is impacted to a degree sufficient to necessitate overhaul or replacement;

(iii) Warranty statements and warranty periods;

(iv) Marketing materials regarding engine life;

(v) Failure reports from engine customers; and

(vi) Engineering evaluations of the durability, in hours, of specific engine technologies, engine materials or engine designs.

(b) [Reserved]

8. Section 90.106 is amended by revising paragraph (a) and adding new paragraph (b)(3) to read as follows:

**§ 90.106 Certificate of conformity.**

(a)(1) Except as provided in § 90.2(b), every manufacturer of new engines produced during or after model year 1997 must obtain a certificate of conformity covering such engines; however, engines manufactured during an annual production period beginning prior to September 1, 1996 are not required to be certified.

(2) Except as required in paragraph (b)(3) of this section, nonhandheld engines manufactured during an annual production period beginning prior to September 1, 2000 are not required to meet Phase 2 requirements.

(b) * * *

(3) Manufacturers who commence an annual production period for a nonhandheld engine family between January 1, 2000 and September 1, 2000 must meet Phase 2 requirements for that family only if that production period will exceed 12 months in length.

* * * * *

9. Section 90.107 is amended by adding a semicolon at the end of paragraph (d)(5), by removing ''and'' at the end of paragraph (d)(9), by removing the period at the end of paragraph (d)(10) and adding a semicolon in its place, and by adding new paragraphs (d)(11) and (d)(12) to read as follows:

**§ 90.107 Application for certification.**

* * * * *

(d) * * *

(11) This paragraph (d)(11) is applicable only to Phase 2 engines.

(i) Manufacturers of nonhandheld engines participating in the Averaging, Banking and Trading Program as described in Subpart C of this part shall declare the applicable Family Emission Limit (FEL) for $HC+NO_X$ ($NMHC+NO_X$).

(ii) Provide the applicable useful life as determined under § 90.105;

(12) In cases where the regulations in § 90.114(f) are applicable, a copy of the language to be included in the documents intended for the ultimate purchaser to describe the emission compliance period.

* * * * *

10. Section 90.108 is amended by adding paragraphs (c) and (d) to read as follows:

**§ 90.108 Certification.**

* * * * *

(c) For certificates issued for engine families included in the averaging, banking and trading program as described in subpart C of this part:

(1) All certificates issued are conditional upon the manufacturer complying with the provisions of subpart C of this part and the averaging, banking and trading related provisions of other applicable sections, both during and after the model year of production.

(2) Failure to comply with all applicable averaging, banking and trading provisions in this part will be considered to be a failure to comply with the terms and conditions upon which the certificate was issued, and the certificate may be determined to be void *ab initio.*

(3) The manufacturer shall bear the burden of establishing to the satisfaction of the Administrator that the conditions upon which the certificate was granted were satisfied or waived.

(d) The Administrator may, upon request by a manufacturer, waive any requirement of this part otherwise necessary for the issuance of a certificate. The Administrator may set such conditions in a certificate as he or she deems appropriate to assure that the waived requirements are either satisfied or are demonstrated, for the subject engines, to be inappropriate, irrelevant or met by the application of a different requirement under this chapter. The Administrator may indicate on such conditional certificates that failure to meet these conditions may result in suspension or revocation or the voiding *ab initio* of the certificate.

11. Section 90.113 is amended by revising the section heading and adding two sentences to the beginning of paragraph (a) to read as follows:

**§ 90.113 In-use testing program for Phase 1 engines.**

(a) This section applies only to Phase 1 engines. In-use testing requirements for Phase 2 engines are found in subpart M of this part.* * *

* * * * *

12. Section 90.114 is amended by removing ''and'' at the end of paragraph (c)(9), by removing the period at the end of paragraph (c)(10) and adding a semicolon in its place, and by adding new paragraphs (c)(11), (c)(12) and (f) to read as follows:

**§ 90.114 Requirement of certification—engine information label.**

* * * * *

(c)* * *

(11) For nonhandheld Phase 2 engines, the useful life category as determined by the manufacturer pursuant to § 90.105. Such useful life category shall be shown by one of the following statements to be appended to the statement required under paragraph (c)(7) of this section:

(i) ''EMISSIONS COMPLIANCE PERIOD: [useful life] HOURS''; or

(ii) ''EMISSIONS COMPLIANCE PERIOD: CATEGORY [fill in C, B or A as indicated and appropriate from the chart in § 90.105], REFER TO OWNER'S

MANUAL FOR FURTHER INFORMATION'';

(12) For handheld Phase 2 engines, the useful life category as determined by the manufacturer pursuant to § 90.105. Such useful life category shall be shown by the following statement to be appended to the statement required under (c)(7) of this section: ''EMISSIONS COMPLIANCE PERIOD: [ 50 or 300, as applicable] HOURS''.

* * * * *

(f)(1) Manufacturers electing to use the labeling language of paragraph (c)(11)(ii) of this section must provide in the documents intended to be conveyed to the ultimate purchaser, the statement:

The Emissions Compliance Period referred to on the label entitled ''Important Engine Information'' indicates the number of operating hours for which the engine has been shown to meet Federal emission requirements. For engines less than 225 cc displacement, Category C= 66 hours, B= 250 hours and A = 500 hours. For engines of 225 cc or more, Category C = 250 hours, B = 500 hours and A = 1000 hours.

(2) The manufacturer must provide, in the same document as the statement in paragraph (f)(1) of this section, a statement of the engine's displacement or an explanation of how to readily determine the engine's displacement. The Administrator may approve alternate language to the statement in paragraph (f)(1) of this section, provided that the alternate language provides the ultimate purchaser with a clear description of the number of hours represented by each of the three letter categories for the subject engine's displacement.

13. Section 90.116 is amended by revising paragraph (d)(6) and (d)(7) and adding paragraphs (d)(8) through (d)(10) to read as follows:

**§ 90.116 Certification procedure—determining engine displacement, engine class, and engine families.**

* * * * *

(d) * * *

(6) The location of valves, where applicable, with respect to the cylinder (e.g., side valves or overhead valves);

(7) The number of catalytic converters, location, volume and composition;

(8) The thermal reactor characteristics;

(9) The fuel required (e.g., gasoline, natural gas, LPG); and

(10) The useful life category.

* * * * *

14. Section 90.117 is amended by revising paragraph (a) to read as follows:

**§ 90.117 Certification procedure—test engine selection.**

(a) For Phase 1 engines, the manufacturer must select, from each engine family, a test engine that the manufacturer determines to be most likely to exceed the emission standard. For Phase 2 engines, the manufacturer must select, from each engine family, a test engine of a configuration that the manufacturer determines to be most likely to exceed the $HC+NO_X$ [$NMHC+NO_X$] Family Emission Limit (FEL), or $HC+NO_X$ [$NMHC+NO_X$] standard if no FEL is applicable.

* * * * *

15. Section 90.118 is amended by revising the section heading and adding a new paragraph (e) to read as follows:

**§ 90.118 Certification procedure—service accumulation and usage of deterioration factors.**

* * * * *

(e) For purposes of establishing whether Phase 2 engines comply with applicable exhaust emission standards or FELs, the test results for each regulated pollutant as measured pursuant to § 90.119 shall be multiplied by the applicable df determined under § 90.104 (g), (h) or (i). The product of the two numbers shall be rounded to the same number of decimal places contained in the applicable standard, and compared against the applicable standard or FEL, as appropriate.

16. Section 90.122 is amended by revising the first sentence of paragraph (a) and adding paragraph (d)(4) as follows:

**§ 90.122 Amending the application and certificate of conformity.**

(a) The engine manufacturer must notify the Administrator when either an engine is to be added to a certificate of conformity, an FEL is to be changed, or changes are to be made to a product line covered by a certificate of conformity.

* * *

* * * * *

(d)* * *

(4) If the Administrator determines that a revised FEL meets the requirements of this subpart and the Act, the appropriate certificate of conformity will be amended, or a new certificate will be issued to reflect the revised FEL. The certificate of conformity is revised conditional upon compliance with § 90.207(b).

* * * * *

17. Subpart C, which was formerly reserved, is added to part 90 to read as follows:

**Subpart C—Certification Averaging, Banking, and Trading Provisions for Nonhandheld Engines**

Sec.



## Subpart C—Certification Averaging, Banking, and Trading Provisions for Nonhandheld Engines

### § 90.201 Applicability.

The requirements of this subpart C are applicable to all Phase 2 nonhandheld spark-ignition engines subject to the provisions of subpart A of this part except as provided in § 90.103(a). These provisions are not applicable to any Phase 1 engines or to any Phase 2 handheld engines. Participation in the averaging, banking and trading program is voluntary, but if a manufacturer elects to participate, it must do so in compliance with the regulations set forth in this subpart. The provisions of this subpart are applicable for $HC+NO_X$ ($NMHC+NO_X$) emissions but not for CO emissions.

### § 90.202 Definitions.

The definitions in subpart A of this part apply to this subpart. The following definitions also apply to this subpart:

*Averaging* means the exchange of emission credits between engine families within a given manufacturer's product line.

*Banking* means the retention of emission credits by the manufacturer generating the emission credits or obtaining such credits through trading, for use in future model year averaging or trading as permitted in this part.

*Emission credits* represent the amount of emission reduction or exceedance, by an engine family, below or above the applicable $HC+NO_X$ ($NMHC+NO_X$) emission standard, respectively. FELs below the standard create ''positive credits,'' while FELs above the standard create ''negative credits.'' In addition, ''projected credits'' refer to emission credits based on the projected applicable production/sales volume of the engine family. ''Reserved credits'' are emission credits generated within a model year waiting to be reported to EPA at the end of the model year. ''Actual credits'' refer to emission credits based on actual applicable sales volume as contained in the end-of-year

reports submitted to EPA. Some or all of these credits may be revoked if EPA review of the end-of-year reports or any subsequent audit action(s) reveals problems or errors of any nature with credit computations.

*Point of first retail sale* means the point at which the engine is first sold directly to an end user. Generally, this point is the retail engine or equipment dealer. If the engine is sold first to an equipment manufacturer for installation in a piece of equipment, the equipment manufacturer may be the point of first retail sale if the equipment manufacturer can determine with reasonable certainty whether the engine is or is not exported or destined for retail sale in a state that has adopted applicable emission standards pursuant to a waiver granted by EPA under section 209(e) of the Act once it has been installed in a piece of equipment.

*Trading* means the exchange of emission credits between manufacturers.

**§ 90.203 General provisions.**

(a) The certification averaging, banking, and trading provisions for $HC+NO_X$ and $NMHC+NO_X$ emissions from eligible engines are described in this subpart.

(b) A nonhandheld engine family may use the averaging, banking and trading provisions for $HC+NO_X$ and $NMHC+NO_X$ emissions if it is subject to regulation under this part with certain exceptions specified in paragraph (c) of this section. $HC+NO_X$ and $NMHC+NO_X$ credits shall be interchangeable subject to the limitations on credit generation, credit usage, cross class averaging and other provisions described in this subpart.

(c) A manufacturer shall not include in its calculation of credit generation and may exclude from its calculation of credit usage, any new engines:

(1) Which are exported, unless the manufacturer has reason or should have reason to believe that such engines have been or will be imported in a piece of equipment; or

(2) Which are subject to state engine emission standards pursuant to a waiver granted by EPA under section 209(e) of the Act, unless the manufacturer demonstrates to the satisfaction of the Administrator that inclusion of these engines in averaging, banking and trading is appropriate.

(d) For an engine family using credits, a manufacturer may, at its option, include its entire production of that engine family in its calculation of credit usage for a given model year.

(e) A manufacturer may certify engine families at Family Emission Limits (FELs) above or below the applicable emission standard subject to the limitation in paragraph (f) of this section, provided the summation of the manufacturer's projected balance of credits from all credit transactions for each engine class in a given model year is greater than or equal to zero, as determined under § 90.207.

(1) A manufacturer of an engine family with an FEL exceeding the applicable emission standard must obtain positive emission credits sufficient to address the associated credit shortfall via averaging, banking, or trading.

(2) An engine family with an FEL below the applicable emission standard may generate positive emission credits for averaging, banking, or trading, or a combination thereof.

(3) In the case of an SEA failure, credits may be used to cover subsequent production of engines for the family in question if the manufacturer elects to recertify to a higher FEL. Credits may not be used to remedy a nonconformity determined by a Selective Enforcement Audit (SEA) or by in-use testing, except that the Administrator may permit the use of credits to address a nonconformity determined by an SEA where the use of such credits is one component of a multi-part remedy for the previously produced engines and the remedy, including the use of credits and the quantity of credits being used, is such that the Administrator is satisfied that the manufacturer has strong and lasting incentive to accurately verify its new engine emission levels and will set or reset its FELs for current and future model years so that production line compliance is assured.

(4) In the case of a production line testing failure pursuant to subpart H of this part, a manufacturer may revise the FEL based upon production line testing results obtained under subpart H of this part and upon Administrator approval pursuant to § 90.122(d). The manufacturer may use certification credits to cover both past production and subsequent production of nonhandheld engines as needed.

(f) No engine family may have an FEL that is greater than 32.2 g/kW-hr for Class I engines or 26.8 g/kW-hr for Class II engines.

(g)(1) All credits generated under this subpart will be designated as Class I or Class II credits, as appropriate. Except as described in § 90.204(b), credits generated in a given model year by an engine family subject to the Phase 2 emission requirements may only be used in averaging, banking or trading, as appropriate, for any nonhandheld engine family of the same class for which the Phase 2 requirements are applicable. Credits generated in one model year may not be used for prior model years, except as allowed under § 90.207(c) or § 90.104(h)(2)(iv).

(2) For the 2005 model year and for each subsequent model year, manufacturers of Class II engines must provide a demonstration that the sales weighted average FEL for $HC+NO_X$ (including $NMHC+NO_X$ FELs), for all of the manufacturer's Class II engines, will not exceed 13.6 g/kW-hr for the 2005 model year, 13.1 g/kW-hr for the 2006 model year and 12.6 g/kW-hr for the 2007 and each subsequent Phase 2 model year. Such demonstration shall be subject to the review and approval of the Administrator, shall be provided at the time of the first Class II certification of that model year and shall be based on projected eligible sales for that model year.

(h) Manufacturers must demonstrate compliance under the averaging, banking, and trading provisions for a particular model year by 270 days after the end of the model year. An engine family generating negative credits for which the manufacturer does not obtain or generate an adequate number of positive credits by that date from the same or previous model year engines will violate the conditions of the certificate of conformity. The certificate of conformity may be voided *ab initio* pursuant to § 90.123 for this engine family.

**§ 90.204 Averaging.**

(a) Negative credits from engine families with FELs above the applicable emission standard must be offset by positive credits from engine families having FELs below the applicable emission standard, as allowed under the provisions of this subpart. Averaging of credits in this manner is used to determine compliance under § 90.207(b).

(b) Cross-class averaging, i.e. the use of credits from Class I engines to cover Class II engines and vice versa, is permitted only for the two situations described in paragraphs (b)(1) and (b)(2) of this section and only when the affected Class II manufacturer meets the following minimum sales percentages for Class II overhead valve emission performance engines in that model year: 2001 (50%); 2002 (62.5%); 2003 (75%); 2004 (87.5%) and 2005 and later (100%). A manufacturer's sales percentage of overhead valve emission performance engines is determined by dividing the manufacturer's eligible sales (as defined in this part) of Class II overhead valve emission performance

engines certified under this part by the manufacturer's total eligible sales of Class II engines certified under this part, and multiplying the resultant quotient by 100.

(1) Cross class averaging is allowed for credit exchanges from credit generating Class II engines to credit using Class I engines.

(2) Cross class averaging is allowed for credit exchanges from Class I engines to Class II engines where credits are necessary to address production line testing failures as permitted in § 90.207 or to address credit shortfalls that arise due to testing pursuant to § 90.104(h)(2)(iv) .

(c) Subject to the limitations in § 90.204(b), credits used in averaging for a given model year may be obtained from credits generated in the same model year by another engine family, credits banked in previous model years, or credits of the same or previous model year obtained through trading. The restrictions of this paragraph notwithstanding, credits from a given model year may be used to address credit needs of previous model year engines as allowed under § 90.207(c).

(d) The use of Class II credits from the 1999 and 2000 model years (early banking) is subject to regulation under this subpart and also to the provisions of § 90.103(a)(7).

**§ 90.205 Banking.**

(a) Beginning with the 2001 model year, a manufacturer of an engine family with an FEL below the applicable emission standard for a given model year may bank credits in that model year for use in averaging and trading. Negative credits may be banked only according to the requirements under § 90.207(c). Credits may also be banked in model years 1999 and 2000 subject to the requirements of paragraph (b) of this section.

(b) A manufacturer may bank credits for a given class of engines in the 1999 and 2000 model years for use in the 2001 and later model years, provided:

(1) For Class I credits: the manufacturer certifies its entire Class I production to the applicable 2001 model year requirements. $HC+NO_X$ ($NMHC+NO_X$) credits may only be banked from engine families certified below 16.0 g/kW-hr (15.0 g/kW-hr) where those credits are not needed to bring the manufacturer's total Class I sales into compliance with the 2001 model year standard.

(2) For Class II credits: the manufacturer certifies its entire Class II product line to the applicable 2001 model year requirements. $HC+NO_X$ ($NMHC+NO_X$) credits may only be banked from engine families certified below 12.1 (11.3 g/kw-hr) for engines where those credits are not needed to bring the manufacturer's total Class II sales into compliance with the 2001 model year standard.

(3) Engines certified under the provisions of this paragraph are subject to all of the requirements of this part applicable to Phase 2 engines.

(c) A manufacturer may bank actual credits only after the end of the model year and after EPA has reviewed the manufacturer's end-of-year reports. During the model year and before submittal of the end-of-year report, credits originally designated in the certification process for banking will be considered reserved and may be redesignated for trading or averaging in the end-of-year report and final report.

(d) Credits declared for banking from the previous model year that have not been reviewed by EPA may be used in averaging or trading transactions. However, such credits may be revoked at a later time following EPA review of the end-of-year report or any subsequent audit actions.

**§ 90.206 Trading.**

(a) An engine manufacturer may exchange emission credits with other nonhandheld engine manufacturers in trading.

(b) Credits for trading can be obtained from credits banked in previous model years or credits generated during the model year of the trading transaction.

(c) Traded credits can be used for averaging, banking, or further trading transactions.

(d) Traded credits are subject to the limitations on cross-class averaging, use for past model years, and the use of credits from early banking as set forth in § 90.204(b), (c) and (d).

(e) In the event of a negative credit balance resulting from a transaction, both the buyer and the seller are liable, except in cases involving fraud. Certificates of all engine families participating in a negative trade may be voided ab initio pursuant to § 90.123.

**§ 90.207 Credit calculation and manufacturer compliance with emission standards.**

(a) (1) For each engine family, $HC+NO_X$ [$NMHC+NO_X$] certification emission credits (positive or negative) are to be calculated according to the following equation and rounded to the nearest gram. Consistent units are to be used throughout the following equation:

Credits = Sales × (Standard—FEL) × Power × Useful life × Load Factor

Where:

Sales = eligible sales as defined in this part. Annual sales projections are used to project credit availability for initial certification. Eligible sales volume is used in determining actual credits for end-of-year compliance determination.

Standard = the current and applicable Small SI engine $HC+NO_X$ ($NMHC+NO_X$) emission standard in grams per kilowatt hour as determined in § 90.103.

FEL = the family emission limit for the engine family in grams per kilowatt hour.

Power = the sales weighted maximum modal power, in kilowatts, as calculated from the applicable federal test procedure as described in this part. This is determined by multiplying the maximum modal power of each configuration within the family by its eligible sales, summing across all configurations and dividing by the eligible sales of the entire family.

Useful Life = the useful life in hours corresponding to the useful life category for which the engine family was certified.

Load Factor = For Test Cycle A and Test Cycle B, the Load Factor = 47% (i.e. 0.47).

(2) For approved alternate test procedures, the load factor in paragraph (a)(1) of this section must be calculated according to the following formula:

$$\sum_{i=1}^{n}\left(\%\text{MTT mode}_i\right) \times \left(\%\text{MTS mode}_i\right) \times \left(\text{WF mode}_i\right)$$

Where:

$\%\text{MTT mode}_i$ = percent of the maximum FTP torque for mode i.

$\%\text{MTS mode}_i$ = percent of the maximum FTP engine rotational speed for mode i.

$\text{WF mode}_i$ = the weighting factor for mode i.

(b) Manufacturer compliance with the emission standard is determined on a corporate average basis at the end of each model year. A manufacturer is in compliance when the sum of positive and negative emission credits it holds for each class is greater than or equal to zero, except that the sum of positive and negative credits for a given class may be less than zero as allowed under paragraph (c) of this section.

(c)(1) A manufacturer may use credits from a later model year to address dfs of model year 2001 through 2004 Class II engines certified to 500 or 1000 hours, when the dfs are shown to be underestimated pursuant to the provisions of § 90.104(h)(2)(iv).

(2) If, as a result of production line testing as required in subpart H of this part, a nonhandheld engine family is determined to be in noncompliance pursuant to § 90.710, the manufacturer may raise its FEL for past and future production as necessary. Further, a manufacturer may carry a negative credit balance (known also as a credit deficit) for the subject class and model year and for the next three model years.

The credit deficit may be no larger than that created by the nonconforming family. If the credit deficit still exists after the model year following the model year in which the nonconformity occurred, the manufacturer must obtain and apply credits to offset the remaining credit deficit at a rate of 1.2 grams for each gram of deficit within the next two model years. The provisions of this paragraph are subject to the limitations in paragraph (d) of this section.

(d) Regulations elsewhere in this part notwithstanding, if a nonhandheld engine manufacturer experiences two or more production line testing failures pursuant to the regulations in subpart H of this part in a given model year, the manufacturer may raise the FEL of previously produced engines only to the extent that such engines represent no more than 10% of the manufacturer's total eligible sales for that model year. For any additional engines determined to be in noncompliance, the manufacturer must conduct offsetting projects approved in advance by the Administrator.

(e) If, as a result of production line testing under this subpart, a manufacturer desires to lower its FEL it may do so subject to § 90.708(c).

(f) Except as allowed at paragraph (c) of this section, when a manufacturer is not in compliance with the applicable emission standard by the date 270 days after the end of the model year, considering all credit calculations and transactions completed by then, the manufacturer will be in violation of these regulations and EPA may, pursuant to § 90.123, void *ab initio* the certificates of engine families for which the manufacturer has not obtained sufficient positive emission credits.

**§ 90.208 Certification.**

(a) In the application for certification a manufacturer must:

(1) Submit a statement that the engines for which certification is requested will not, to the best of the manufacturer's belief, cause the manufacturer to be in noncompliance under § 90.207(b) when all credits are calculated for all the manufacturer's engine families.

(2) Declare an FEL for each engine family for $HC+NO_X$ ($NMHC+NO_X$). The FEL must have the same number of significant digits as the emission standard.

(3) Indicate the projected number of credits generated/needed for this family; the projected applicable eligible sales volume, by quarter; and the values required to calculate credits as given in § 90.207.

(4) Submit calculations in accordance with § 90.207 of projected emission credits (positive or negative) based on quarterly production projections for each family.

(5)(i) If the engine family is projected to have negative emission credits, state specifically the source (manufacturer/engine family or reserved) of the credits necessary to offset the credit deficit according to quarterly projected production.

(ii) If the engine family is projected to generate credits, state specifically (manufacturer/engine family or reserved) where the quarterly projected credits will be applied.

(b) All certificates issued are conditional upon manufacturer compliance with the provisions of this subpart both during and after the model year of production.

(c) Failure to comply with all provisions of this subpart will be considered to be a failure to satisfy the conditions upon which the certificate was issued, and the certificate may be determined to be void *ab initio* pursuant to § 90.123.

(d) The manufacturer bears the burden of establishing to the satisfaction of the Administrator that the conditions upon which the certificate was issued were satisfied or waived.

(e) Projected credits based on information supplied in the certification application may be used to obtain a certificate of conformity. However, any such credits may be revoked based on review of end-of-year reports, follow-up audits, and any other verification steps considered appropriate by the Administrator.

**§ 90.209 Maintenance of records.**

(a) The manufacturer must establish, maintain, and retain the following adequately organized and indexed records for each engine family:

(1) EPA engine family identification code;

(2) Family Emission Limit (FEL) or FELs where FEL changes have been implemented during the model year;

(3) Maximum modal power for each configuration sold;

(4) Projected sales volume for the model year; and

(5) Records appropriate to establish the quantities of engines that constitute eligible sales as defined in § 90.202 for each power rating for each FEL.

(b) Any manufacturer producing an engine family participating in trading reserved credits must maintain the following records on a quarterly basis for each such engine family:

(1) The engine family;

(2) The actual quarterly and cumulative applicable production/sales volume;

(3) The values required to calculate credits as given in § 90.207;

(4) The resulting type and number of credits generated/required;

(5) How and where credit surpluses are dispersed; and

(6) How and through what means credit deficits are met.

(c) The manufacturer must retain all records required to be maintained under this section for a period of eight years from the due date for the end-of-model year report. Records may be retained as hard copy or reduced to microfilm, ADP diskettes, and so forth, depending on the manufacturer's record retention procedure; provided, that in every case all information contained in the hard copy is retained.

(d) Nothing in this section limits the Administrator's discretion in requiring the manufacturer to retain additional records or submit information not specifically required by this section.

(e) Pursuant to a request made by the Administrator, the manufacturer must submit to the Administrator the information that the manufacturer is required to retain.

(f) EPA may, pursuant to § 90.123, void *ab initio* a certificate of conformity for an engine family for which the manufacturer fails to retain the records required in this section or to provide such information to the Administrator upon request.

**§ 90.210 End-of-year and final reports.**

(a) End-of-year and final reports must indicate the engine family, the class (I or II), the actual sales volume, the values required to calculate credits as given in § 90.207, and the number of credits generated/required. Manufacturers must also submit how and where credit surpluses were dispersed (or are to be banked) and/or how and through what means credit deficits were met. Copies of contracts related to credit trading must be included or supplied by the broker, if applicable. The report must include a calculation of credit balances to show that the credit summation for each class of engines is equal to or greater than zero (or less than zero in cases of negative credit balances as permitted in § 90.207(c)). For engines subject to the provisions of § 90.203(g)(2), the report must include a calculation of the sales weighted average $HC+NO_X$ (including $NMHC+NO_X$) FEL.

(b) The calculation of eligible sales for end-of-year and final reports must be based on the location of the point of first retail sale (for example, retail customer

or dealer) also called the final product purchase location. Upon advance written request, the Administrator will consider other methods to track engines for credit calculation purposes that provide high levels of confidence that eligible sales are accurately counted.

(c)(1) End-of-year reports must be submitted within 90 days of the end of the model year to: Manager, Engine Compliance Programs Group (6403–J), U.S. Environmental Protection Agency, Washington, DC 20460.

(2) Unless otherwise approved by the Administrator, final reports must be submitted within 270 days of the end of the model year to: Manager, Engine Compliance Programs Group (6403–J), U.S. Environmental Protection Agency, Washington, DC 20460.

(d) Failure by a manufacturer to submit any end-of-year or final reports in the specified time for any engines subject to regulation under this part is a violation of § 90.1003(a)(2) and section 213(d) of the Clean Air Act for each engine.

(e) A manufacturer generating credits for banking only who fails to submit end-of-year reports in the applicable specified time period (90 days after the end of the model year) may not use the credits until such reports are received and reviewed by EPA. Use of projected credits pending EPA review is not permitted in these circumstances.

(f) Errors discovered by EPA or the manufacturer in the end-of-year report, including errors in credit calculation, may be corrected in the final report.

(g) If EPA or the manufacturer determines that a reporting error occurred on an end-of-year or final report previously submitted to EPA under this section, the manufacturer's credits and credit calculations must be recalculated. Erroneous positive credits will be void except as provided in paragraph (h) of this section. Erroneous negative credit balances may be adjusted by EPA.

(h) If within 270 days of the end of the model year, EPA review determines a reporting error in the manufacturer's favor (that is, resulting in an increased credit balance) or if the manufacturer discovers such an error within 270 days of the end of the model year, EPA shall restore the credits for use by the manufacturer.

**§ 90.211 Request for hearing.**

An engine manufacturer may request a hearing on the Administrator's voiding of the certificate under §§ 90.203(h), 90.206(e), 90.207(f), 90.208(c), or 90.209(f), pursuant to § 90.124. The procedures of § 90.125 shall apply to any such hearing.

## Subpart D—Emission Test Equipment Provisions

18. Section 90.301 is amended by revising paragraph (a) and adding paragraph (d) to read as follows:

**§ 90.301 Applicability.**

(a) This subpart describes the equipment required in order to perform exhaust emission tests on new nonroad spark-ignition engines and vehicles subject to the provisions of subpart A of this part. Certain text in this subpart is identified as pertaining to Phase 1 or Phase 2 engines. Such text pertains only to engines of the specified Phase. If no indication of Phase is given, the text pertains to all engines, regardless of Phase.

* * * * *

(d) For Phase 2 Class I and Phase 2 Class II natural gas fueled engines, the following sections from 40 CFR part 86 are applicable to this subpart. The requirements of these sections which pertain specifically to the measurement and calculation of non-methane hydrocarbon (NMHC) exhaust emissions from otto cycle heavy-duty engines must be followed when determining the NMHC exhaust emissions from Phase 2 Class I and Phase 2 Class II natural gas fueled engines. Those sections are: 40 CFR 86.1306–90 Equipment required and specifications; overview, 40 CFR 86.1309–90 Exhaust gas sampling system; otto-cycle engines, 40 CFR 86–1311–94 Exhaust gas analytical system; CVS bag sampling, 40 CFR 86.1313–94(e) Fuel Specification—Natural gas-fuel, 40 CFR 86.1314–94 Analytical gases, 40 CFR 86.1316–94 Calibrations; frequency and overview, 40 CFR 86.1321–94 Hydrocarbon analyzer calibration, 40 CFR 86.1325–94 Methane analyzer calibration, 40 CFR 86.1327–94 Engine dynamometer test procedures, overview, 40 CFR 86.1340–94 Exhaust sample analysis, 40 CFR 86.1342–94 Calculations; exhaust emissions, 40 CFR 86.1344–94(d) Required information—Pre-test data, 40 CFR 86.1344–94(e) Required information—Test data.

19. Section 90.302 is revised to read as follows:

**§ 90.302 Definitions.**

The definitions in § 90.3 apply to this subpart. The following definitions also apply to this subpart.

*Intermediate speed* means the engine speed which is 85 percent of the rated speed.

*Natural gas* means a fuel whose primary constituent is methane.

*Rated speed* means the speed at which the manufacturer specifies the maximum rated power of an engine.

## Subpart E—Gaseous Exhaust Test Procedures

20. Section § 90.401 is amended by adding paragraphs (c) and (d) to read as follows;

**§ 90.401 Applicability.**

* * * * *

(c) Certain text in this subpart is identified as pertaining to Phase 1 or Phase 2 engines. Such text pertains only to engines of the specified Phase. If no indication of Phase is given, the text pertains to all engines, regardless of Phase.

(d) For Phase 2 Class I and Phase 2 Class II natural gas fueled engines, the following sections from 40 CFR part 86 are applicable to this subpart. The requirements of these sections which pertain specifically to the measurement and calculation of non-methane hydrocarbon (NMHC) exhaust emissions from otto cycle heavy-duty engines must be followed when determining the NMHC exhaust emissions from Phase 2 Class I and Phase 2 Class II natural gas fueled engines. Those sections are: 40 CFR 86.1327–94 Engine dynamometer test procedures, overview, 40 CFR 86.1340–94 Exhaust sample analysis, 40 CFR 86.1342–94 Calculations; exhaust emissions, 40 CFR 86.1344–94(d) Required information—Pre-test data, and 40 CFR 86.1344–94(e) Required information—Test data.

21. Section 90.404 is amended by adding a sentence after the first sentence of paragraph (b) to read as follows:

**§ 90.404 Test procedure overview.**

* * * * *

(b) * * * For Phase 2 Class I and II natural gas fueled engines the test is also designed to determine the brake-specific emissions of non-methane hydrocarbons. * * *

* * * * *

22. Section 90.409 is amended by revising paragraph (a)(3) to read as follows:

**§ 90.409 Engine dynamometer test run.**

(a) * * *

(3) For Phase 1 engines, at the manufacturer's option, the engine can be run with the throttle in a fixed position or by using the engine's governor (if the engine is manufactured with a governor). In either case, the engine speed and load must meet the requirements specified in paragraph (b)(12) of this section. For Phase 2 Class I and Class II engines equipped with an engine speed governor, the governor must be used to control engine speed during all test cycle modes except for Mode 1, and no external throttle control

may be used. For Phase 2 Class I and Class II engines equipped with an engine speed governor, during Mode 1 fixed throttle operation may be used to determine the 100% torque value.

* * * * *

23. Section 90.410 is amended by revising paragraph (b) to read as follows:

**§ 90.410 Engine test cycle.**

* * * * *

(b) For Phase 1 engines and Phase 2 Class III, IV, V, and Phase 2 Class I and II engines not equipped with an engine speed governor, during each non-idle mode, hold both the specified speed and load within ± five percent of point. During the idle mode, hold speed within ± ten percent of the manufacturer's specified idle engine speed. For Phase 2 Class I and II engines equipped with an engine speed governor, during Mode 1 hold both the specified speed and load within ± five percent of point, during Modes 2–5, hold the specified load with ± five percent of point, and during the idle mode hold the specified speed within ± ten percent of the manufacturer's specified idle engine speed (see Table 1 in Appendix A to subpart E of this part for a description of test Modes).

* * * * *

24. In Appendix A to Subpart E of Part 90, Table 2 is revised to read as follows:

**Appendix A to Subpart E of Part 90—Tables**

* * * * *

TABLE 2.—TEST CYCLES FOR CLASS I–V ENGINES

| Mode | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Speed | Rated speed | | | | | Intermediate speed | | | | | Idle |
| Mode Points A Cycle | ..... | ..... | ..... | ..... | ..... | 1 | 2 | 3 | 4 | 5 | 6 |
| Load Percent—A Cycle | ..... | ..... | ..... | ..... | ..... | 100 | 75 | 50 | 25 | 10 | 0 |
| Weighting | ..... | ..... | ..... | ..... | ..... | 9% | 20% | 29% | 30% | 7% | 5% |
| Mode Points B Cycle | 1 | 2 | 3 | 4 | 5 | ..... | ..... | ..... | ..... | ..... | 6 |
| Load Percent—B Cycle | 100 | 75 | 50 | 25 | 10 | ..... | ..... | ..... | ..... | ..... | 0 |
| Weighting | ..... | ..... | ..... | ..... | ..... | 9% | 20% | 29% | 30% | 7% | 5% |
| Mode Points C Cycle | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 |
| Load Percent—C Cycle | 100 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0 |
| Weighting for Phase 1 Engines | 90% | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 10% |
| Weighting for Phase 2 Engines | 85% | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 15% |

## Subpart F—Selective Enforcement Auditing

25. Section 90.503 is amended by revising paragraphs (f)(3) and (f)(4) to read as follows:

**§ 90.503 Test orders.**

* * * * *

(f) * * *

(3) Any SEA test order for which the family or configuration, as appropriate, fails under § 90.510 or for which testing is not completed will not be counted against the annual limit.

(4) When the annual limit has been met, the Administrator may issue additional test orders to test those families or configurations for which evidence exists indicating nonconformity, or for which the Administrator has reason to believe are not being appropriately represented or tested in Production Line Testing conducted under subpart H of this part, if applicable. An SEA test order issued pursuant to this provision will include a statement as to the reason for its issuance.

26. Section 90.509 is amended by revising paragraph (b) to read as follows:

**§ 90.509 Calculation and reporting of test results.**

* * * * *

(b)(1) Final test results are calculated by summing the initial test results derived in paragraph (a) of this section for each test engine, dividing by the number of tests conducted on the engine, and rounding to the same number of decimal places contained in the applicable standard. For Phase 2 engines only, this result shall be expressed to one additional significant figure.

(2) Final deteriorated test results (for Phase 2 test engines only) are calculated by applying the appropriate deterioration factors, from the certification process for the engine family, to the final test results, and rounding to the same number of decimal places contained in the applicable standard.

* * * * *

27. Section 90.510 is amended by revising paragraph (b) to read as follows:

**§ 90.510 Compliance with acceptable quality level and passing and failing criteria for selective enforcement audits.**

* * * * *

(b) A failed engine is a Phase 1 engine whose final test results pursuant to § 90.509(b), for one or more of the applicable pollutants exceed the emission standard. For Phase 2 engines, a failed engine is a Phase 2 engine whose final deteriorated test results pursuant to § 90.509(b), for one or more of the applicable pollutants exceed the emission standard (FEL, if applicable).

* * * * *

28. Section 90.512 is amended by revising paragraph (b) to read as follows:

**§ 90.512 Request for public hearing.**

* * * * *

(b) The manufacturer's request shall be filed with the Administrator not later than 15 days after the Administrator's notification of his or her decision to suspend, revoke or void, unless otherwise specified by the Administrator. The manufacturer shall simultaneously serve two copies of this request upon the Director of the Engine Programs and Compliance Division and file two copies with the Hearing Clerk of the Agency. Failure of the manufacturer to request a hearing within the time provided constitutes a waiver of the right to a hearing. Subsequent to the expiration of the period for requesting a hearing as of right, the Administrator may, in his or her discretion and for good cause shown, grant the manufacturer a hearing to contest the suspension, revocation or voiding.

* * * * *

## Subpart G—Importation of Nonconforming Engines

29. Section 90.612 is amended by revising paragraph (g) to read as follows:

**§ 90.612 Exemptions and exclusions.**

* * * * *

(g) Applications for exemptions and exclusions provided for in paragraphs (b), (c), and (e) of this section are to be mailed to: U.S. Environmental

Protection Agency, Office of Mobile Sources, Engine Compliance Programs Group (6403–J), Washington, D.C. 20460, Attention: Imports.

30. Subpart H, which was previously ''reserved'', is added to part 90 to read as follows:

**Subpart H—Manufacturer Production Line Testing Program**

Sec.



## Subpart H—Manufacturer Production Line Testing Program

### § 90.701 Applicability.

(a) Except as described in paragraph (b) of this section, the requirements of this subpart are applicable to all Phase 2 nonroad engines subject to the provisions of subpart A of this part.

(b) The requirements of this subpart are applicable to all handheld engine families described in paragraph (a) of this section unless otherwise exempted in this part. Manufacturers of nonhandheld engine families described in paragraph (a) of this section may choose between the Production Line Testing Program described in this subpart for all of their engine families and the Selective Enforcement Auditing Program described in Subpart F of this part for all of their engine families, subject to the restrictions of paragraph (d) of this section.

(c) Nonhandheld engine manufacturers shall notify EPA of their selection when they begin their first Phase 2 model year's certification.

(d) A manufacturer of nonhandheld Phase 2 engines may change from the Production Line Testing program described in this subpart to the Selective Enforcement Auditing program described in Subpart F of this part and vice versa, provided that:

(1) It does so for all of its engine families at the same time;

(2) When changing from Production Line Testing to Selective Enforcement Auditing, it has remained under Production Line Testing for a minimum of three model years;

(3) It provides written notice to EPA one complete model year prior to the model year for which it is requesting to change from Production Line Testing to Selective Enforcement Auditing;

(4) It provides written notice to EPA thirty (30) days prior to the date for which it is requesting to change from Selective Enforcement Auditing to Production Line Testing; and

(5) It is not carrying a negative credit balance at the time it changes from Production Line Testing to Selective Enforcement Auditing.

(e) The procedures described in this subpart are optional for small volume engine manufacturers and small volume engine families as defined in this part, and for engine families certified to a level at least 50% below the applicable $HC+NO_X$ ($NMHC+NO_X$) standard (FEL if applicable). Engine families for which the manufacturer opts not to conduct testing under this subpart pursuant to this paragraph shall be subject to the Selective Enforcement Auditing procedures of Subpart F of this part.

### § 90.702 Definitions.

The definitions in subpart A of this part apply to this subpart. The following definitions also apply to this subpart.

*Configuration* means any subclassification of an engine family which can be described on the basis of gross power, emission control system, governed speed, injector size, engine calibration, and other parameters as designated by the Administrator.

*Test sample* means the collection of engines selected from the population of an engine family for emission testing.

### § 90.703 Production line testing by the manufacturer.

(a) Manufacturers of small SI engines shall test production line engines from each engine family according to the provisions of this subpart.

(b) Production line engines must be tested using the test procedure specified in subpart E of this part except that the Administrator may approve minor variations that the Administrator deems necessary to facilitate efficient and economical testing where the manufacturer demonstrates to the satisfaction of the Administrator that such variations will not significantly impact the test results. Any adjustable engine parameter must be set to values or positions that are within the range recommended to the ultimate purchaser, unless otherwise specified by the Administrator. The Administrator may specify values within or without the range recommended to the ultimate purchaser.

(c) The Administrator, on the basis of a written application from a manufacturer, may approve alternate methods to evaluate production line compliance, where such alternate methods are demonstrated by the manufacturer to:

(1) Produce substantially the same levels of producer and consumer risk as the Cum Sum procedure described in this subpart that mean emissions of an engine family are below the appropriate standards (FEL, where applicable);

(2) Provide for continuous rather than point-in-time sampling; and

(3) Include an appropriate decision mechanism for determining noncompliance upon which the Administrator can suspend or revoke the certificate of conformity.

### § 90.704 Maintenance of records; submittal of information.

(a) The manufacturer of any new small SI engine subject to any of the provisions of this subpart must establish, maintain, and retain the following adequately organized and indexed records:

(1) *General records.* A description of all equipment used to test engines in accordance with § 90.703. Subpart D of this part sets forth relevant equipment requirements in §§ 90.304, 90.305, 90.306, 90.307, 90.308, 90.309, 90.310 and 90.313.

(2) *Individual records.* These records pertain to each production line test conducted pursuant to this subpart and include:

(i) The date, time, and location of each test;

(ii) The number of hours of service accumulated on the test engine when the test began and ended;

(iii) The names of all supervisory personnel involved in the conduct of the production line test;

(iv) A record and description of any adjustment, repair, preparation or modification performed prior to and/or subsequent to approval by the Administrator pursuant to § 90.707(b)(1), giving the date, associated time, justification, name(s) of the authorizing personnel, and names of all supervisory personnel responsible for the conduct of the repair;

(v) If applicable, the date the engine was shipped from the assembly plant, associated storage facility or port facility, and the date the engine was received at the testing facility;

(vi) A complete record of all emission tests performed pursuant to this subpart (except tests performed directly by EPA), including all individual

worksheets and/or other documentation relating to each test, or exact copies thereof, in accordance with the record requirements specified in §§ 90.405 and 90.406; and

(vii) A brief description of any significant events during testing not otherwise described under paragraph (a)(2) of this section, commencing with the test engine selection process and including such extraordinary events as engine damage during shipment.

(3) The manufacturer must establish, maintain and retain general records, pursuant to paragraph (a)(1) of this section, for each test cell that can be used to perform emission testing under this subpart.

(b) The manufacturer must retain all records required to be maintained under this subpart for a period of one year after completion of all testing required for the engine family in a model year. Records may be retained as hard copy (i.e., on paper) or reduced to microfilm, floppy disk, or some other method of data storage, depending upon the manufacturer's record retention procedure; provided, that in every case, all the information contained in the hard copy is retained.

(c) The manufacturer must, upon request by the Administrator, submit the following information with regard to engine production:

(1) Projected production or actual production for each engine configuration within each engine family for which certification has been requested and/or approved;

(2) Number of engines, by configuration and assembly plant, scheduled for production or actually produced.

(d) Nothing in this section limits the Administrator's discretion to require a manufacturer to establish, maintain, retain or submit to EPA information not specified by this section.

(e) All reports, submissions, notifications, and requests for approval made under this subpart must be addressed to: Manager, Engine Compliance Programs Group (6403J), U.S. Environmental Protection Agency, Washington, DC 20460.

(f) The manufacturer must electronically submit the results of its production line testing using EPA's standardized format. The Administrator may exempt manufacturers from this requirement upon written request with supporting justification.

**§ 90.705 Right of entry and access.**

(a) To allow the Administrator to determine whether a manufacturer is complying with the provisions of this subpart or other subparts of this part, one or more EPA enforcement officers may enter during operating hours and upon presentation of credentials any of the following places:

(1) Any facility, including ports of entry, where any engine to be introduced into commerce or any emission-related component is manufactured, assembled, or stored;

(2) Any facility where any test conducted pursuant to this or any other subpart or any procedure or activity connected with such test is or was performed;

(3) Any facility where any test engine is present; and

(4) Any facility where any record required under § 90.704 or other document relating to this subpart or any other subpart of this part is located.

(b) Upon admission to any facility referred to in paragraph (a) of this section, EPA enforcement officers are authorized to perform the following inspection-related activities:

(1) To inspect and monitor any aspect of engine manufacture, assembly, storage, testing and other procedures, and to inspect and monitor the facilities in which these procedures are conducted;

(2) To inspect and monitor any aspect of engine test procedures or activities, including test engine selection, preparation and service accumulation, emission test cycles, and maintenance and verification of test equipment calibration;

(3) To inspect and make copies of any records or documents related to the assembly, storage, selection, and testing of an engine; and

(4) To inspect and photograph any part or aspect of any engine and any component used in the assembly thereof that is reasonably related to the purpose of the entry.

(c) EPA enforcement officers are authorized to obtain reasonable assistance without cost from those in charge of a facility to help the officers perform any function listed in this subpart and they are authorized to request the manufacturer to make arrangements with those in charge of a facility operated for the manufacturer's benefit to furnish reasonable assistance without cost to EPA.

(1) Reasonable assistance includes, but is not limited to, clerical, copying, interpretation and translation services; the making available on an EPA enforcement officer's request of personnel of the facility being inspected during their working hours to inform the EPA enforcement officer of how the facility operates and to answer the officer's questions; and the performance on request of emission tests on any engine which is being, has been, or will be used for production line or other testing.

(2) By written request, signed by the Assistant Administrator for Air and Radiation, and served on the manufacturer, a manufacturer may be compelled to cause the personal appearance of any employee at such a facility before an EPA enforcement officer. Any such employee who has been instructed by the manufacturer to appear will be entitled to be accompanied, represented, and advised by counsel.

(d) EPA enforcement officers are authorized to seek a warrant or court order authorizing the EPA enforcement officers to conduct the activities authorized in this section, as appropriate, to execute the functions specified in this section. EPA enforcement officers may proceed *ex parte* to obtain a warrant or court order whether or not the EPA enforcement officers first attempted to seek permission from the manufacturer or the party in charge of the facility(ies) in question to conduct the activities authorized in this section.

(e) A manufacturer must permit an EPA enforcement officer(s) who presents a warrant or court order to conduct the activities authorized in this section as described in the warrant or court order. The manufacturer must also cause those in charge of its facility or a facility operated for its benefit to permit entry and access as authorized in this section pursuant to a warrant or court order whether or not the manufacturer controls the facility. In the absence of a warrant or court order, an EPA enforcement officer(s) may conduct the activities authorized in this section only upon the consent of the manufacturer or the party in charge of the facility(ies) in question.

(f) It is not a violation of this part or the Clean Air Act for any person to refuse to permit an EPA enforcement officer(s) to conduct the activities authorized in this section if the officer(s) appears without a warrant or court order.

(g) A manufacturer is responsible for locating its foreign testing and manufacturing facilities in jurisdictions where local law does not prohibit an EPA enforcement officer(s) from conducting the entry and access activities specified in this section. EPA will not attempt to make any inspections which it has been informed local foreign law prohibits.

**§ 90.706 Engine sample selection.**

(a) At the start of each model year, the small SI engine manufacturer will begin

to randomly select engines from each engine family for production line testing at a rate of one percent of the projected eligible sales of that family. Each engine will be selected from the end of the assembly line.

(1) *For newly certified engine families*: After two engines are tested, the manufacturer will calculate the required sample size for the model year for each pollutant ($HC+NO_X$($NMHC+NO_X$) and CO) according to the Sample Size Equation in paragraph (b) of this section.

(2) *For carry-over engine families*: After one engine is tested, the manufacturer will combine the test with the last test result from the previous model year and then calculate the required sample size for the model year for each pollutant according to the Sample Size Equation in paragraph (b) of this section.

(b)(1) Manufacturers will calculate the required sample size for the model year for each pollutant for each engine family using the Sample Size Equation in this paragraph. N is calculated for each pollutant from each test result. The higher of the two values for the number N indicates the number of tests required for the model year for an engine family. N is recalculated for each pollutant after each test. Test results used to calculate the variables in the following Sample Size Equation must be final deteriorated test results as specified in § 90.709(c):

$$N = \left[ \frac{(t_{95} * \sigma)}{(x - FEL)} \right]^2 + 1$$

Where:

N = required sample size for the model year.

$t_{95}$ = 95% confidence coefficient. It is dependent on the actual number of tests completed, n, as specified in the table in paragraph (b)(2) of this section. It defines one-tail, 95% confidence intervals.

o = actual test sample standard deviation calculated from the following equation:

$$\sigma = \sqrt{\frac{\sum (X_i - x)^2}{n - 1}}$$

$xi_i$ = emission test result for an individual engine.

x = mean of emission test results of the actual sample.

FEL = Family Emission Limit or standard if no FEL.

n = The actual number of tests completed in an engine family.

(2) The following table specifies the actual number of tests (n) & 1-tail confidence coefficients ($t_{95}$):

| n | $t_{95}$ |
|---|---|
| 2 | 6.31 |
| 3 | 2.92 |
| 4 | 2.35 |
| 5 | 2.13 |
| 6 | 2.02 |
| 7 | 1.94 |
| 8 | 1.90 |
| 9 | 1.86 |
| 10 | 1.83 |
| 11 | 1.81 |
| 12 | 1.80 |
| 13 | 1.78 |
| 14 | 1.77 |
| 15 | 1.76 |
| 16 | 1.75 |
| 17 | 1.75 |
| 18 | 1.74 |
| 19 | 1.73 |
| 20 | 1.73 |
| 21 | 1.72 |
| 22 | 1.72 |
| 23 | 1.72 |
| 24 | 1.71 |
| 25 | 1.71 |
| 26 | 1.71 |
| 27 | 1.71 |
| 28 | 1.70 |
| 29 | 1.70 |
| 30 | 1.70 |
| ∞ | 1.645 |

(3) A manufacturer must distribute the testing of the remaining number of engines needed to meet the required sample size N, evenly throughout the remainder of the model year.

(4) After each new test, the required sample size, N, is recalculated using updated sample means, sample standard deviations and the appropriate 95% confidence coefficient.

(5) A manufacturer must continue testing and updating each engine family's sample size calculations according to paragraphs (b)(1) through (b)(4) of this section until a decision is made to stop testing as described in paragraph (b)(6) of this section or a noncompliance decision is made pursuant to § 90.710(b).

(6) If, at any time throughout the model year, the calculated required sample size, N, for an engine family is less than or equal to the actual sample size, n, and the sample mean, x, for HC + $NO_X$ ($NMHC+NO_X$) and CO is less than or equal to the FEL or standard if no FEL, the manufacturer may stop testing that engine family.

(7) If, at any time throughout the model year, the sample mean, x, for HC + $NO_X$ ($NMHC+NO_X$) or CO is greater than the FEL or standard if no FEL, the manufacturer must continue testing that engine family at the appropriate maximum sampling rate.

(8) The maximum required sample size for an engine family (regardless of the required sample size, N, as calculated in paragraph (b)(1) of this section) is the lesser of thirty tests per model year or one percent of projected annual production for that engine family for that model year.

(9) Manufacturers may elect to test additional engines. Additional engines, whether tested in accordance with the testing procedures specified in § 90.707 or not, may not be included in the Sample Size and Cumulative Sum equation calculations as defined in paragraph (b)(1) of this section and § 90.708(a), respectively. However, such additional test results may be used as appropriate to ''bracket'' or define the boundaries of the production duration of any emission nonconformity determined under this subpart. Such additional test data must be identified and provided to EPA with the submittal of the official CumSum results.

(c) The manufacturer must produce and assemble the test engines using its normal production and assembly process for engines to be distributed into commerce.

(d) No quality control, testing, or assembly procedures shall be used on any test engine or any portion thereof, including parts and subassemblies, that have not been or will not be used during the production and assembly of all other engines of that family, unless the Administrator approves the modification in production or assembly procedures in advance.

**§ 90.707 Test procedures.**

(a)(1) For small SI engines subject to the provisions of this subpart, the prescribed test procedures are specified in subpart E of this part.

(2) The Administrator may, on the basis of a written application by a manufacturer, prescribe test procedures other than those specified in paragraph (a)(1) of this section for any small SI engine the Administrator determines is not susceptible to satisfactory testing using procedures specified in paragraph (a)(1) of this section.

(b)(1) The manufacturer may not adjust, repair, prepare, or modify any test engine and may not perform any emission test on any test engine unless this adjustment, repair, preparation, modification and/or test is documented in the manufacturer's engine assembly and inspection procedures and is actually performed by the manufacturer on every production line engine or unless this adjustment, repair, preparation, modification and/or test is required or permitted under this subpart or is approved in advance by the Administrator.

(2) The Administrator may adjust or cause to be adjusted any engine parameter which the Administrator has

determined to be subject to adjustment for certification, Production Line Testing and Selective Enforcement Audit testing, to any setting within the physically adjustable range of that parameter, as determined by the Administrator, prior to the performance of any test. However, if the idle speed parameter is one which the Administrator has determined to be subject to adjustment, the Administrator may not adjust it or require that it be adjusted to any setting which causes a lower engine idle speed than would have been possible within the physically adjustable range of the idle speed parameter if the manufacturer had accumulated 12 hours of service on the engine under paragraph (c) of this section, all other parameters being identically adjusted for the purpose of the comparison. The manufacturer may be requested to supply information necessary to establish an alternate minimum idle speed. The Administrator, in making or specifying these adjustments, may consider the effect of the deviation from the manufacturer's recommended setting on emission performance characteristics as well as the likelihood that similar settings will occur on in-use engines. In determining likelihood, the Administrator may consider factors such as, but not limited to, the effect of the adjustment on engine performance characteristics and information from similar in-use engines.

(c) *Service Accumulation.* (1) Unless otherwise approved by the Administrator, prior to performing exhaust emission production line testing, the manufacturer may accumulate on each test engine a number of hours of service equal to the greater of 12 hours or the number of hours the manufacturer accumulated during stabilization in the certification process for each engine family. For catalyst-equipped engines, the manufacturer must accumulate a number of hours equal to the number of hours accumulated to represent stabilized emissions on the engine used to obtain certification.

(2) Service accumulation must be performed in a manner using good engineering judgment to obtain emission results representative of production line engines.

(d) Unless otherwise approved by the Administrator, the manufacturer may not perform any maintenance on test engines after selection for testing.

(e) If an engine is shipped to a remote facility for production line testing, and an adjustment or repair is necessary because of shipment, the engine manufacturer must perform the necessary adjustment or repair only after the initial test of the engine, except in cases where the Administrator has determined that the test would be impossible or unsafe to perform or would permanently damage the engine. Engine manufacturers must report to the Administrator, in the quarterly report required by § 90.709(e), all adjustments or repairs performed on test engines prior to each test.

(f) If an engine cannot complete the service accumulation or an emission test because of a malfunction, the manufacturer may request that the Administrator authorize either the repair of that engine or its deletion from the test sequence.

(g) *Testing.* A manufacturer must test engines with the test procedure specified in subpart E of this part to demonstrate compliance with the applicable FEL (or standard where there is no FEL). If alternate or special test procedures pursuant to regulations at § 90.120 are used in certification, then those alternate procedures must be used in production line testing.

(h) *Retesting.* (1) If an engine manufacturer reasonably determines that an emission test of an engine is invalid because of a procedural error, test equipment problem, or engine performance problem that causes the engine to be unable to safely perform a valid test, the engine may be retested. A test is not invalid simply because the emission results are high relative to other engines of the family. Emission results from all tests must be reported to EPA. The engine manufacturer must also include a detailed explanation of the reasons for invalidating any test in the quarterly report required in § 90.709(e). If a test is invalidated because of an engine performance problem, the manufacturer must document in detail the nature of the problem and the repairs performed in order to use the after-repair test results for the original test results.

(2) Routine retests may be conducted if the manufacturer conducts the same number of tests on all engines in the family. The results of these tests must be averaged according to procedures of § 90.709.

**§ 90.708 Cumulative Sum (CumSum) Procedure.**

(a) (1) Manufacturers must construct separate CumSum Equations for each regulated pollutant ($HC+NO_X$ ($NMHC+NO_X$) and CO) for each engine family. Test results used to calculate the variables in the CumSum Equations must be final deteriorated test results as defined in § 90.709(c). The CumSum Equation follows:

$C_i = \max [0 \text{ or } (C_{i-1}+X_i-(FEL+F))]$

Where:

$C_i$=The current CumSum statistic.

$C_{i-1}$=The previous CumSum statistic. Prior to any testing, the CumSum statistic=0 (i.e. $C_0=0$).

$X_i$=The current emission test result for an individual engine.

FEL=Family Emission Limit (the standard if no FEL).

$F=0.25\times\sigma$.

(2) After each test pursuant to paragraph (a)(1) of this section, $C_i$ is compared to the action limit, H, the quantity which the CumSum statistic must exceed, in two consecutive tests, before the engine family may be determined to be in noncompliance for a regulated pollutant for purposes of § 90.710.

Where:

H=The Action Limit. It is $5.0\times\sigma$, and is a function of the standard deviation, $\sigma$.

$\sigma$=is the sample standard deviation and is recalculated after each test.

(b) After each engine is tested, the CumSum statistic shall be promptly updated according to the CumSum Equation in paragraph (a) of this section.

(c)(1) If, at any time during the model year, a manufacturer amends the application for certification for an engine family as specified in § 90.122(a) by performing an engine family modification (i.e., a change such as a running change involving a physical modification to an engine, a change in specification or setting, the addition of a new configuration, or the use of a different deterioration factor) with no changes to the FEL (where applicable), all previous sample size and CumSum statistic calculations for the model year will remain unchanged.

(2) If, at any time during the model year, a manufacturer amends the application for certification for an engine family as specified in § 90.122(a) by modifying its FEL (where applicable) for future production, as a result of an engine family modification, the manufacturer must continue its calculations by inserting the new FEL into the sample size equation as specified in § 90.706(b)(1) and into the CumSum equation in paragraph (a) of this section. All previous calculations remain unchanged. If the sample size calculation indicates that additional tests are required, then those tests must be performed. CumSum statistic calculations must not indicate that the family has exceeded the action limit for two consecutive tests. Where applicable, the manufacturer's final credit report as required by § 90.210 must break out the

credits that result from each FEL and corresponding CumSum analysis for the set of engines built to each FEL.

(3) If, at any time during the model year, a manufacturer amends the application for certification for an engine family as specified in § 90.122(a) (or for an affected part of the year's production in cases where there were one or more mid-year engine family modifications), by modifying its FEL (where applicable) for past and/or future production, without performing an engine modification, all previous sample size and CumSum statistic calculations for the model year must be recalculated using the new FEL. If the sample size calculation indicates that additional tests are required, then those tests must be performed. The CumSum statistic recalculation must not indicate that the family has exceeded the action limit for two consecutive tests. Where applicable, the manufacturer's final credit report as required by § 90.210 must break out the credits that result from each FEL and corresponding CumSum analysis for the set of engines built to each FEL.

**§ 90.709 Calculation and reporting of test results.**

(a) Initial test results are calculated following the applicable test procedure specified in § 90.707(a). The manufacturer rounds these results to the number of decimal places contained in the applicable emission standard expressed to one additional significant figure.

(b) Final test results are calculated by summing the initial test results derived in paragraph (a) of this section for each test engine, dividing by the number of tests conducted on the engine, and rounding to the same number of decimal places contained in the applicable standard expressed to one additional significant figure.

(c) The final deteriorated test results for each test engine are calculated by applying the appropriate deterioration factors, derived in the certification process for the engine to the final test results, and rounding to the same number of decimal places contained in the applicable standard.

(d) If, at any time during the model year, the CumSum statistic exceeds the applicable action limit, H, in two consecutive tests for any regulated pollutant, ($HC+NO_X$ ($NMHC+NO_X$) or CO) the engine family may be determined to be in noncompliance and the manufacturer must notify EPA within two working days of such exceedance by the Cum Sum statistic.

(e) Within 30 calendar days of the end of each quarter, each engine manufacturer must submit to the Administrator a report which includes the following information:

(1) The location and description of the manufacturer's or other's exhaust emission test facilities which were utilized to conduct testing reported pursuant to this section;

(2) Total production and sample sizes, N and n, for each engine family;

(3) The FEL (standard, if no FEL) against which each engine family was tested;

(4) A description of the process to obtain engines on a random basis;

(5) A description of the test engines;

(6) For each test conducted:

(i) A description of the test engine, including:

(A) Configuration and engine family identification;

(B) Year, make, and build date;

(C) Engine identification number; and

(D) Number of hours of service accumulated on engine prior to testing;

(ii) Location where service accumulation was conducted and description of accumulation procedure and schedule;

(iii) Test number, date, test procedure used, initial test results before and after rounding, final test results before and after rounding and final deteriorated test results for all exhaust emission tests, whether valid or invalid, and the reason for invalidation, if applicable;

(iv) A complete description of any adjustment, modification, repair, preparation, maintenance, and/or testing which was performed on the test engine, was not reported pursuant to any other paragraph of this subpart, and will not be performed on all other production engines;

(v) A CumSum analysis, as required in § 90.708, of the production line test results for each engine family; and

(vi) Any other information the Administrator may request relevant to the determination whether the new engines being manufactured by the manufacturer do in fact conform with the regulations with respect to which the certificate of conformity was issued;

(7) For each failed engine as defined in § 90.710(a), a description of the remedy and test results for all retests as required by § 90.711(g);

(8) The date of the end of the engine manufacturer's model year production for each engine family; and

(9) The following signed statement and endorsement by an authorized representative of the manufacturer:

This report is submitted pursuant to Sections 213 and 208 of the Clean Air Act. This production line testing program was conducted in complete conformance with all applicable regulations under 40 CFR Part 90. No emission-related changes to production processes or quality control procedures for the engine family tested have been made during this production line testing program that affect engines from the production line. All data and information reported herein is, to the best of (Company Name) knowledge, true and accurate. I am aware of the penalties associated with violations of the Clean Air Act and the regulations thereunder. (Authorized Company Representative.)

**§ 90.710 Compliance with criteria for production line testing.**

(a) A failed engine is one whose final deteriorated test results pursuant to § 90.709(c), for $HC + NO_X$ ($NMHC+NO_X$) or CO exceeds the applicable Family Emission Limit (FEL)or standard if no FEL.

(b) An engine family shall be determined to be in noncompliance, if at any time throughout the model year, the CumSum statistic, $C_i$, for $HC + NO_X$ ($NMHC+NO_X$) or CO, is greater than the action limit, H, for that pollutant, for two consecutive tests.

**§ 90.711 Suspension and revocation of certificates of conformity.**

(a) The certificate of conformity is suspended with respect to any engine failing pursuant to § 90.710 (a) effective from the time that testing of that engine is completed.

(b) The Administrator may suspend the certificate of conformity for an engine family which is determined to be in noncompliance pursuant to § 90.710(b). This suspension will not occur before thirty days after the engine family is determined to be in noncompliance and the Administrator has notified the manufacturer of its intent to suspend. During this thirty day period the Administrator will work with the manufacturer to achieve appropriate production line changes to avoid the need to halt engine production, if possible. The Administrator will approve or disapprove any such production line changes proposed to address a family that has been determined to be in noncompliance under this subpart within 15 days of receipt. If the Administrator does not approve or disapprove such a proposed change within such time period, the proposed change shall be considered approved.

(c) If the results of testing pursuant to these regulations indicate that engines of a particular family produced at one plant of a manufacturer do not conform to the regulations with respect to which the certificate of conformity was issued,

the Administrator may suspend the certificate of conformity with respect to that family for engines manufactured by the manufacturer at all other plants.

(d) Notwithstanding the fact that engines described in the application for certification may be covered by a certificate of conformity, the Administrator may suspend such certificate immediately in whole or in part if the Administrator finds any one of the following infractions to be substantial:

(1) The manufacturer refuses to comply with any of the requirements of this subpart.

(2) The manufacturer submits false or incomplete information in any report or information provided to the Administrator under this subpart.

(3) The manufacturer renders inaccurate any test data submitted under this subpart.

(4) An EPA enforcement officer is denied the opportunity to conduct activities authorized in this subpart and a warrant or court order is presented to the manufacturer or the party in charge of the facility in question.

(5) An EPA enforcement officer is unable to conduct activities authorized in § 90.705 because a manufacturer has located its facility in a foreign jurisdiction where local law prohibits those activities.

(e) The Administrator shall notify the manufacturer in writing of any suspension or revocation of a certificate of conformity in whole or in part, except that the certificate is immediately suspended with respect to any failed engines as provided for in paragraph (a) of this section.

(f) The Administrator may revoke a certificate of conformity for an engine family after the certificate has been suspended pursuant to paragraph (b) or (c) of this section if the proposed remedy for the nonconformity, as reported by the manufacturer to the Administrator, is one requiring a design change or changes to the engine and/or emission control system as described in the application for certification of the affected engine family.

(g) Once a certificate has been suspended for a failed engine, as provided for in paragraph (a) of this section, the manufacturer must take the following actions before the certificate is reinstated for that failed engine:

(1) Remedy the nonconformity;

(2) Demonstrate that the engine conforms to the applicable standards (FELs, where applicable) by retesting the engine in accordance with these regulations; and

(3) Submit a written report to the Administrator, after successful completion of testing on the failed engine, which contains a description of the remedy and test results for each engine in addition to other information that may be required by this part.

(h) Once a certificate for a failed engine family has been suspended pursuant to paragraph (b) or (c) of this section, the manufacturer must take the following actions before the Administrator will consider reinstating the certificate:

(1) Submit a written report to the Administrator which identifies the reason for the noncompliance of the engines, describes the proposed remedy, including a description of any proposed quality control and/or quality assurance measures to be taken by the manufacturer to prevent future occurrences of the problem, and states the date on which the remedies will be implemented; and

(2) Demonstrate that the engine family for which the certificate of conformity has been suspended does in fact comply with the regulations of this part by testing as many engines as needed so that the CumSum statistic, as calculated in § 90.708(a), falls below the action limit. Such testing must comply with the provisions of this part. If the manufacturer elects to continue testing individual engines after suspension of a certificate, the certificate is reinstated for any engine actually determined to be in conformance with the Family Emission Limits (or standards if no FEL) through testing in accordance with the applicable test procedures, provided that the Administrator has not revoked the certificate pursuant to paragraph (f) of this section.

(i) Once the certificate has been revoked for an engine family, if the manufacturer desires to continue introduction into commerce of a modified version of that family, the following actions must be taken before the Administrator may issue a certificate for that modified family:

(1) If the Administrator determines that the proposed change(s) in engine design may have an effect on emission performance deterioration, the Administrator shall notify the manufacturer within five working days after receipt of the report in paragraph (h)(1) of this section whether subsequent testing under this subpart will be sufficient to evaluate the proposed change or changes or whether additional testing will be required;

(2) After implementing the change or changes intended to remedy the nonconformity, the manufacturer must demonstrate that the modified engine family does in fact conform with the regulations of this part by testing as many engines as needed from the modified engine family so that the CumSum statistic, as calculated in § 90.708(a) using the newly assigned FEL if applicable, falls below the action limit; and

(3) When the requirements of paragraphs (i)(1) and (i)(2) of this section are met, the Administrator shall reissue the certificate or issue a new certificate, as the case may be, to include that family. As long as the CumSum statistic remains above the action limit, the revocation remains in effect.

(j) At any time subsequent to a suspension of a certificate of conformity for a test engine pursuant to paragraph (a) of this section, but not later than 15 days (or such other period as may be allowed by the Administrator) after notification of the Administrator's decision to suspend or revoke a certificate of conformity in whole or in part pursuant to paragraph (b), (c), or (f) of this section, a manufacturer may request a hearing as to whether the tests have been properly conducted or any sampling methods have been properly applied.

(k) Any suspension of a certificate of conformity under paragraph (d) of this section shall:

(1) Be made only after the manufacturer concerned has been offered an opportunity for a hearing conducted in accordance with §§ 90.712 and 90.713; and

(2) Not apply to engines no longer in the possession of the manufacturer.

(l) After the Administrator suspends or revokes a certificate of conformity pursuant to this section and prior to the commencement of a hearing under § 90.712, if the manufacturer demonstrates to the Administrator's satisfaction that the decision to suspend or revoke the certificate was based on erroneous information, the Administrator shall reinstate the certificate.

(m) To permit a manufacturer to avoid storing non-test engines while conducting subsequent testing of the noncomplying family, a manufacturer may request that the Administrator conditionally reinstate the certificate for that family. The Administrator may reinstate the certificate subject to the following condition: the manufacturer must commit to performing offsetting measures that remedy the nonconformity at no expense to the owners, and which are approved in advance by the Administrator for all engines of that family produced from the time the certificate is conditionally reinstated if the CumSum statistic does not fall below the action limit.

**§ 90.712 Request for public hearing.**

(a) If the manufacturer disagrees with the Administrator's decision to suspend or revoke a certificate or disputes the basis for an automatic suspension pursuant to § 90.711(a), the manufacturer may request a public hearing.

(b) The manufacturer's request shall be filed with the Administrator not later than 15 days after the Administrator's notification of his or her decision to suspend or revoke, unless otherwise specified by the Administrator. The manufacturer shall simultaneously serve two copies of this request upon the Manager of the Engine Compliance Programs Group and file two copies with the Hearing Clerk for the Agency. Failure of the manufacturer to request a hearing within the time provided constitutes a waiver of the right to a hearing. Subsequent to the expiration of the period for requesting a hearing as of right, the Administrator may, in his or her discretion and for good cause shown, grant the manufacturer a hearing to contest the suspension or revocation.

(c) A manufacturer shall include in the request for a public hearing:

(1) A statement as to which engine configuration(s) within a family is to be the subject of the hearing; and

(2) A concise statement of the issues to be raised by the manufacturer at the hearing, except that in the case of the hearing requested under § 90.711(j), the hearing is restricted to the following issues:

(i) Whether tests have been properly conducted (specifically, whether the tests were conducted in accordance with applicable regulations under this part and whether test equipment was properly calibrated and functioning);

(ii) Whether sampling plans and statistical analyses have been properly applied (specifically, whether sampling procedures and statistical analyses specified in this subpart were followed and whether there exists a basis for distinguishing engines produced at plants other than the one from which engines were selected for testing which would invalidate the Administrator's decision under § 90.711(c));

(3) A statement specifying reasons why the manufacturer believes it will prevail on the merits of each of the issues raised; and

(4) A summary of the evidence which supports the manufacturer's position on each of the issues raised.

(d) A copy of all requests for public hearings will be kept on file in the Office of the Hearing Clerk and will be made available to the public during Agency business hours.

**§ 90.713 Administrative procedures for public hearing.**

The administrative procedures for a public hearing requested under this subpart shall be those procedures set forth in the regulations found at §§ 90.513 through 90.516. References in § 90.513 to § 90.511(j), § 90.512(c)(2), § 90.511(e), § 90.512, § 90.511(d), § 90.503, § 90.512(c) and § 90.512(b) shall be deemed to refer to § 90.711(j), § 90.712(c)(2), § 90.711(e), § 90.712, § 90.711(d), § 90.703, and § 90.712(c) and § 90.712(b), respectively. References to ''test orders'' in § 90.513 can be ignored.

31. Subpart I is amended by revising the subpart heading to read as follows:

## Subpart I—Emission-related Defect Reporting Requirements, Voluntary Emission Recall Program, Ordered Recalls

32. Section 90.801 is amended by designating the existing text as paragraph (a) and adding paragraphs (b), (c), (d), (e), (f) and (g) to read as follows:

**§ 90.801 Applicability.**

* * * * *

(b) Phase 2 engines subject to provisions of subpart B of this part are subject to recall regulations specified in 40 CFR part 85, subpart S, except as otherwise provided in this section.

(c) Reference to section 214 of the Clean Air Act in 40 CFR 85.1801 (a) is deemed to be a reference to section 216 of the Clean Air Act.

(d) Reference to section 202 of the Act in 40 CFR 85.1802(a) is deemed to be a reference to section 213 of the Act.

(e) Reference to ''family particulate emission limits as defined in part 86 promulgated under section 202 of the Act'' in 40 CFR 85.1803(a) and 85.1805(a)(1) is deemed to be a reference to ''family emission limits as defined in subpart C of this part 90 promulgated under section 213 of the Act''.

(f) Reference to ''vehicles or engines'' throughout 40 CFR part 85, subpart S, is deemed to be a reference to ''Phase 2 nonroad small SI engines at or below 19 kw.''

(g) In addition to the requirements in 40 CFR 85.1805(a)(9) for Phase 2 engines include a telephone number which may be used to report difficulty in obtaining recall repairs.

33. Section 90.802 is amended by adding a sentence at the end of the introductory text to read as follows:

**§ 90.802 Definitions.**

* * * The definitions of 40 CFR 85.1801 also apply to this part.

* * * * *

34. Section 90.803 is amended by revising paragraph (c) to read as follows:

**§ 90.803 Emission defect information report.**

* * * * *

(c) The manufacturer must submit defect information reports to EPA's Engine Compliance Programs Group not more than 15 working days after an emission-related defect is found to affect 25 or more engines manufactured in the same certificate or model year. Information required by paragraph (d) of this section that is either not available within 15 working days or is significantly revised must be submitted to EPA's Engine Compliance Programs Group as it becomes available.

* * * * *

35. Section 90.805 is amended by revising paragraph (a) to read as follows:

**§ 90.805 Reports, voluntary recall plan filing, record retention.**

(a) Send the defect report, voluntary recall plan, and the voluntary recall progress report to: Group Manager, Engine Compliance Programs Group, (6403-J), Environmental Protection Agency, Washington, D.C. 20460.

* * * * *

36. A new § 90.808 is added to subpart I to read as follows

**§ 90.808 Ordered recall provisions.**

(a) Effective with respect to Phase 2 small SI engines:

(1) If the Administrator determines that a substantial number of any class or category of engines, although properly maintained and used, do not conform to the regulations prescribed under section 213 of the Act when in actual use throughout their useful life (as defined under § 90.105), the Administrator shall immediately notify the manufacturer of such nonconformity and require the manufacturer to submit a plan for remedying the nonconformity of the engines with respect to which such notification is given.

(i) The manufacturer's plan shall provide that the nonconformity of any such engines which are properly used and maintained will be remedied at the expense of the manufacturer.

(ii) If the manufacturer disagrees with such determination of nonconformity and so advises the Administrator, the Administrator shall afford the manufacturer and other interested persons an opportunity to present their views and evidence in support thereof at a public hearing. Unless, as a result of such hearing, the Administrator withdraws such determination of nonconformity, the Administrator shall, within 60 days after the completion of

such hearing, order the manufacturer to provide prompt notification of such nonconformity in accordance with paragraph (a)(2) of this section. The manufacturer shall comply in all respects with the requirements of this subpart.

(2) Any notification required to be given by the manufacturer under paragraph (a)(1) of this section with respect to any class or category of engines shall be given to dealers, ultimate purchasers, and subsequent purchasers (if known) in such manner and containing such information as required in subparts I and M of this part.

(3)(i) Prior to an EPA ordered recall, the manufacturer may perform a voluntary emissions recall pursuant to regulations at § 90.804. Such manufacturer is subject to the reporting and recordkeeping requirements of § 90.805.

(ii) Once EPA determines that a substantial number of engines fail to conform with the requirements of section 213 of the Act or this part, the manufacturer will not have the option of a voluntary recall.

(b) The manufacturer bears all cost obligation a dealer incurs as a result of a requirement imposed by paragraph (a) of this section. The transfer of any such cost obligation from a manufacturer to a dealer through franchise or other agreement is prohibited.

(c) Any inspection of an engine for purposes of paragraph (a)(1) of this section, after its sale to the ultimate purchaser, is to be made only if the owner of such vehicle or engine voluntarily permits such inspection to be made, except as may be provided by any state or local inspection program.

## Subpart J—Exclusion and Exemption of Nonroad Engines From Regulations

37. Section 90.905 is amended by revising paragraph (f) to read as follows:

**§ 90.905 Testing exemption.**

* * * * *

(f) A manufacturer of new nonroad engines may request a testing exemption to cover nonroad engines intended for use in test programs planned or anticipated over the course of a subsequent one-year period. Unless otherwise required by the Director, Engine Programs and Compliance Division, a manufacturer requesting such an exemption need only furnish the information required by paragraphs (a)(1) and (d)(2) of this section along with a description of the recordkeeping and control procedures that will be employed to assure that the engines are used for purposes consistent with § 90.1004(b).

38. Section 90.906 is amended by revising paragraphs (a) introductory text and (a)(3) introductory text to read as follows:

**§ 90.906 Manufacturer-owned exemption and precertification exemption.**

(a) Any manufacturer owned nonroad engine, as defined by § 90.902, is exempt from § 90.1003, without application, if the manufacturer complies with the following terms and conditions:

* * * * *

(3) Unless the requirement is waived or an alternative procedure is approved by the Director, Engine Programs and Compliance Division, the manufacturer must permanently affix a label to each nonroad engine on exempt status. This label should:

* * * * *

39. Section 90.909 is amended by revising paragraph (c) to read as follows:

**§ 90.909 Export exemptions.**

* * * * *

(c) EPA will maintain a list of foreign countries that have in force nonroad emission standards identical to U.S. EPA standards and have so notified EPA. This list may be obtained by writing to the following address: Group Manager, Engine Compliance Programs Group, Engine Programs and Compliance Division (6403–J), Environmental Protection Agency, Washington, D.C. 20460. New nonroad engines exported to such countries must comply with U.S. EPA certification regulations.

* * * * *

40. Section 90.911 is revised to read as follows:

**§ 90.911 Submission of exemption requests.**

Requests for exemption or further information concerning exemptions and/or the exemption request review procedure should be addressed to: Group Manager, Engine Compliance Programs Group, Engine Programs and Compliance Division (6403J), Environmental Protection Agency, Washington, D.C. 20460.

## Subpart K—Prohibited Acts and General Enforcement Provisions

41. Section 90.1003 is amended by revising paragraphs (a)(2), (a)(4)(i), (b)(4), and (b)(5) and by redesignating paragraphs (a)(4)(iii) and (a)(4)(iv) as paragraphs (a)(4)(iv) and (a)(4)(v) respectively, and by adding new paragraphs (a)(4)(iii) and (b)(6) to read as follows:

**§ 90.1003 Prohibited acts.**

(a) * * *

(2) (i) For a person to fail or refuse to permit access to or copying of records or to fail to make reports or provide information required under § 90.1004.

(ii) For a person to fail or refuse to permit entry, testing or inspection authorized under §§ 90.126, 90.506, 90.705, 90.1004, or 90.1209.

(iii) For a person to fail or refuse to perform tests or to have tests performed as required under §§ 90.119, 90.504, 90.703, 90.1004, 90.1203, or 90.1250.

(iv) For a person to fail to establish or maintain records as required under §§ 90.209, 90.704, 90.805, 90.1004, or 90.1308.

(v) For a person to fail to submit a remedial plan as required under § 90.808.

* * * * *

(4) * * *

(i) To sell, offer for sale, or introduce or deliver into commerce, a nonroad engine unless the manufacturer has complied with the requirements of § 90.1103.

* * * * *

(iii) To fail or refuse to comply with the requirements of § 90.808.

* * * * *

(b) * * *

(4) Certified nonroad engines shall be used in all equipment or vehicles that are self-propelled, portable, transportable, or are intended to be propelled while performing their function, unless the manufacturer of the equipment or vehicle can prove that the vehicle or equipment will be used in a manner consistent with paragraph (2) of the definition of nonroad engine in § 90.3. Nonroad vehicle and equipment manufacturers may continue to use noncertified nonroad engines built prior to the applicable implementation date of the Phase 1 regulations in this part until noncertified engine inventories are depleted; further after the applicable implementation date of the Phase 2 regulations in this part, nonroad vehicle and equipment manufacturers may continue to use Phase 1 engines until Phase 1 engine inventories are depleted. Stockpiling (i.e., build up of an inventory of uncertified engines or Phase 1 engines beyond normal business practices to avoid or delay compliance with the Phase 1 or Phase 2 regulations in this part, respectively) will be considered a violation of this section.

(5) A new nonroad engine, intended solely to replace an engine in a piece of nonroad equipment that was originally produced with an engine manufactured prior to the applicable implementation

date as described in §§ 90.2, 90.103 and 90.106, or with an engine that was originally produced in a model year in which less stringent standards under this part were in effect, shall not be subject to the requirements of § 90.106 or prohibitions and provisions of paragraphs (a)(1) and (b)(4) of this section provided that:

(i) The engine manufacturer has ascertained that no engine produced by itself or the manufacturer of the engine that is being replaced, if different, and certified to the requirements of this subpart, is available with the appropriate physical or performance characteristics to repower the equipment. Certified engines may be ascertained to lack appropriate physical characteristics where the engine is too large for the engine compartment or can not be connected to existing manifolds, air supplies, water supplies, fuel supplies or controls without modifications that add substantial cost or result in reliability or safety concerns. Certified engines may be ascertained to lack appropriate performance characteristics if the horsepower or rated speed of the engine are significantly different from the original engine to reduce the ability of the equipment to perform its function safely and efficiently; and

(ii) The engine manufacturer or its agent:

(A) Accepts the old engine in exchange for the new engine and destroys the old engine; or

(B) Obtains documentation from the purchaser sufficient to identify the old engine and prove that the purchaser has had the old engine destroyed by a separate party; and

(iii) The engine manufacturer retains records of the engine purchasers and the makes and models of equipment for which the engines are sold. Such records shall be made available to the Administrator upon request and shall be sufficient to enable the Administrator to determine the quantities of engines being applied to different makes and models of equipment; and

(iv) The engine manufacturer submits a written report to EPA, within 90 days of the end of each model year in which any uncertified replacement engines, or engines certified to an earlier model year's standards, were sold describing the numbers of such engines sold during the model year; and

(v) The engine manufacturer has determined and documented that the engine being replaced was no older than ten (10) years old or ten (10) model years old; and

(vi) The replacement engine is clearly labeled with the following language, or similar alternate language approved in advance by the Administrator: ''THIS engine does not comply with Federal nonroad or on-highway emission requirements. Sale or installation of this engine for any purpose other than as a replacement engine in a nonroad vehicle or piece of nonroad equipment whose original engine was not certified, or was certified to less stringent emission standards than those that apply to the year of manufacture of this engine, is a violation of Federal law subject to civil penalty''; and

(vii) Where the replacement engine is intended to replace an engine built after the applicable implementation date of regulations under this part, but built to less stringent emission standards than are currently applicable, the replacement engine shall be identical in all material respects to a certified configuration of the same or later model year as the engine being replaced.

(6)(i) Regulations elsewhere in this part notwithstanding, for three model years after the phase-in of each set of Phase 2 standards; i.e. through the 2004 model year for Class I nonhandheld engines and through model year 2008 for handheld engines and Class II nonhandheld engines, small volume equipment manufacturers as defined in this part may continue to use, and engine manufacturers may continue to supply, engines certified to Phase 1 standards (or identified and labeled by their manufacturer to be identical to engines previously certified under Phase 1 standards), provided the equipment manufacturer has demonstrated to the satisfaction of the Administrator that no certified Phase 2 engine is available with suitable physical or performance characteristics to power a piece of nonhandheld equipment in production prior to the 2001 model year, or handheld equipment in production prior to the 2002 model year. The equipment manufacturer must also certify to the Administrator that the equipment model has not undergone any redesign which could have facilitated conversion of the equipment to accommodate a Phase 2 engine.

(ii) Regulations elsewhere in this part notwithstanding, for the duration of the Phase 2 regulations in this part, equipment manufacturers who certify to the Administrator that annual eligible sales of a particular model of equipment will not exceed 500 for a nonhandheld model in production prior to the 2001 model year, or 2500 for a handheld model in production prior to the 2002 model year, may continue to use in that model, and engine manufacturers may continue to supply, engines certified to Phase 1 requirements, (or identified and labeled by their manufacturer to be identical to engines previously certified under Phase 1 standards). To be eligible for this provision, the equipment manufacturer must have demonstrated to the satisfaction of the Administrator that no certified Phase 2 engine is available with suitable physical or performance characteristics to power the equipment. The equipment manufacturer must also certify to the Administrator that the equipment model has not undergone any redesign which could have facilitated conversion of the equipment to accommodate a Phase 2 engine.

(iii) An equipment manufacturer which is unable to obtain suitable Phase 2 engines and which can not obtain relief under any other provision of this part, may, prior to the date on which the manufacturer would become in noncompliance with the requirement to use Phase 2 engines, apply to the Administrator to be allowed to continue using Phase 1 engines, through the 2002 model year for Class I engines and through the 2006 model year for Class II, III, IV and V engines, subject to the following criteria:

(A) The inability to obtain Phase 2 engines is despite the manufacturer's best efforts and is the result of an extraordinary action on the part of the engine manufacturer that was outside the control of and could not be reasonably foreseen by the equipment manufacturer; such as canceled production or shipment, last minute certification failure, unforeseen engine cancellation, plant closing, work stoppage or other such circumstance; and

(B) The inability to market the particular equipment will bring substantial economic hardship to the equipment manufacturer resulting in a major impact on the equipment manufacturer's solvency.

(iv) The written permission from the Administrator to the equipment manufacturer shall serve as permission for the engine manufacturer to provide such Phase 1 engines required by the equipment manufacturers under this paragraph (b)(6). Such engines will not count against an engine manufacturer's final (100%) handheld phase-in percentage requirements, and are excluded from the nonhandheld certification, averaging, banking and trading program. As Phase 1 engines, these engines are exempt from Production Line Testing requirements under subpart H of this part and in-use testing requirements under subpart M of this part.

## Subpart L—Emission Warranty and Maintenance Instructions

42. Section 90.1103 is amended by the revising paragraph (b) to read as follows:

### § 90.1103 Emission warranty, warranty period.

* * * * *

(b)(1) The manufacturer of each new Phase 1 small SI engine must warrant to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform at the time of sale with applicable regulations under section 213 of the Act, and the engine is free from defects in materials and workmanship which cause such engine to fail to conform with applicable regulations for its warranty period.

(2) The manufacturer of each new Phase 2 small SI engine must warrant to the ultimate purchaser and each subsequent purchaser that the engine is designed, built, and equipped so as to conform for its designated useful life with applicable regulations under section 213 of the Act, and is free from defects in materials and workmanship which cause such engine to fail to conform with applicable regulations for its warranty period.

* * * * *

43. Section 90.1104 is amended by adding paragraph (e) to read as follows:

### § 90.1104 Furnishing of maintenance instructions to ultimate purchaser.

* * * * *

(e) If a manufacturer includes in an advertisement a statement respecting the cost or value of emission control devices or systems, the manufacturer shall set forth in the statement the cost or value attributed to these devices or systems by the Secretary of Labor (through the Bureau of Labor Statistics). The Secretary of Labor, and his or her representatives, has the same access for this purpose to the books, documents, papers, and records of a manufacturer as the Comptroller General has to those of a recipient of assistance for purposes of section 311 of the Act.

44. A new subpart, Subpart M is added to part 90 to read:

### Subpart M—In-Use Compliance Testing for Handheld Engines; Bench Aging Adjustment; In-Use Durability Demonstration Testing for Nonhandheld Engines

Sec.



## Subpart M—In-Use Compliance Testing for Handheld Engines; Bench Aging Adjustment; In-Use Durability Demonstration Testing for Nonhandheld Engines

### § 90.1201 Applicability.

The requirements of this subpart from § 90.1201 through § 90.1249 are applicable to all handheld Phase 2 engines subject to the provisions of subpart A of this part. The requirements of this subpart, except for those involving in-use credits, in §§ 90.1201, 90.1202, 90.1207, 90.1208, 90.1209 and those from § 90.1250 through § 90.1299 are applicable to nonhandheld Phase 2 engines subject to the provisions of subpart A of this part.

### § 90.1202 Definitions.

For the purposes of this subpart, except as otherwise provided, the definitions in subparts A and C of this part apply to this subpart.

### § 90.1203 Manufacturer in-use testing program.

(a) Unless otherwise approved by the Administrator, at the time of the first certification for each model year beginning with the 2002 model year, each manufacturer shall submit a schedule to the Administrator of the Phase 2 engine families, their useful lives, their design characteristics (two or four stroke; catalyst or noncatalyst, etc.), and their anticipated eligible sales, it intends to produce, by model year, over the subsequent four year period (the model year now being certified plus the next three model years).

(b) At the time the manufacturer submits the schedule required under paragraph (a) of this section, the manufacturer may include a proposed plan for the Administrator's review and approval for the in-use testing of the current model year and such future model years as it chooses to include. In such plans, the manufacturer shall propose the in-use testing of individual engine families and engine configurations subject to the requirements of this subpart. Such plans shall include a discussion of the rationale behind the choice of each family and configuration that the Administrator shall use to determine whether the manufacturer's plan meets the objective of generating in-use data on substantially all of a manufacturer's engines within a reasonable time period, and periodically updating that data.

(c) Based upon the schedule required in paragraph (a) of this section, any plan submitted under paragraph (b) of this section, and/or such other information as it has available, the Administrator may annually identify handheld engine families and at the Administrator's option, configurations within families which the manufacturer must then subject to in-use testing as described in this section and in § 90.1204. For each model year, the Administrator may identify a number of engine families that is no greater than the number of handheld engine families produced in that model year divided by four and rounded to the nearest whole number. If this calculation produces a value of zero, then the Administrator may identify no more than one engine family for in-use testing for that manufacturer. The Administrator may identify families and configurations under this paragraph by approving the manufacturer's plan described in paragraph (b) of this section, or by providing a written directive to the manufacturer.

(d) For each engine family identified by the Administrator under paragraph (c) of this section, engine manufacturers shall perform emission testing of an appropriate sample of in-use engines from each engine family. Manufacturers shall submit data from this in-use testing to the Administrator.

(e) *Number of engines to be tested.* An engine manufacturer shall test bench aged or field aged in-use engines from each engine family or family and configuration identified by the Administrator. Engines to be tested shall have accumulated a number of hours pursuant to paragraph (g) of this section. The number of engines to be tested by a manufacturer shall be determined by the following method:

(1) A minimum of four (4) engines per family provided that no engine fails any standard. For each failing engine, two more engines shall be tested until the total number of engines equals ten (10).

(2) For small volume engine families for the identified model year or for small volume engine manufacturers, a minimum of two (2) engines per family provided that no engine fails any standard. For each failing engine, two more engines shall be tested until the total number of engines equals ten (10).

(3) If an engine family was certified using carry over emission data and has

been previously tested under paragraphs (e)(1) or (e)(2) of this section (and mean results did not exceed any applicable emission standard), then only one engine for that family must be tested. If that one engine fails any pollutant, testing must be conducted as outlined at paragraph (e)(1) or (e)(2) of this section, whichever is appropriate.

(f) At the discretion of the Administrator, an engine manufacturer may test more engines than the minima described in paragraph (e) of this section or may concede failure before testing a total of ten (10) engines.

(g) The Administrator may approve alternatives to manufacturer in-use testing as described in this subpart, that are designed to determine whether an engine family is in compliance with applicable standards in use, where:

(1) Engines, in their production form, or when removed from the piece of equipment in which they were installed, cannot safely or practically be operated and tested pursuant to subparts D and E of this part; or

(2) The Administrator finds that unique or extraordinary circumstances exist that support the need for alternative methods.

(h) *Collection of in-use engines.* The engine manufacturer shall bench age engines to their full certified useful life as described in subpart B of this part using a bench aging procedure approved by the Administrator under this subpart, or the engine manufacturer shall procure field aged engines which have been operated for at least the engine's useful life. Unless otherwise approved by the Administrator, the manufacturer shall complete emission testing of bench aged engines within 12 calendar months and complete emission testing of field aged engines within 24 calendar months after receiving notice that the Administrator has identified a particular engine family for testing. Field aged engines may be procured from sources associated with the engine manufacturer (i.e., manufacturer established fleet engines, etc.) or from sources not associated with the manufacturer (i.e., consumer-owned engines, independently-owned fleet engines, etc.).

**§ 90.1204 Maintenance, procurement, aging and testing of engines.**

This section is applicable to handheld engines used for in-use testing pursuant to § 90.1203.

(a) An in-use field aged engine must have a maintenance and use history representative of actual in-use conditions.

(1) To comply with this requirement, a manufacturer must obtain information from the end users regarding the accumulated usage, maintenance, operating conditions, and storage of the test engines.

(2) Documents used in the procurement process must be maintained as required in § 90.121.

(3) Each engine of a sample to be field aged shall be assigned a random number. Unless otherwise approved by the Administrator, the engine with the lowest number shall be tested first, followed by the next higher number until testing is completed.

(b)(1) For an engine family which is to be emission tested following bench aging, test engines shall be randomly chosen from normal engine production or storage; or randomly chosen from normal handheld equipment production or storage.

(2) Each engine of a sample to be bench aged shall be assigned a random number. In emission testing of the bench aged engines, the engine with the lowest number shall be tested first, followed by the next higher number until testing is completed.

(c)(1) Bench aged engines must be aged on a dynamometer using a bench aging cycle that has been shown to be capable of representing field aging for the appropriate technology subgroup pursuant to the regulations at §§ 90.1207 and 90.1208.

(2) Unless otherwise approved by the Administrator, once an engine has begun the bench aging process, it can be terminated and deleted only for catastrophic failure or safety concerns requiring major engine repair, or because testing of the engine family has been completed based upon lower numbered engines.

(d) The manufacturer may perform minimal set-to-spec maintenance on components of a test engine that are not subject to parameter adjustment. Unless otherwise approved by the Administrator, maintenance to any test engine may include only that which is listed in the owner's instructions for engines with the amount of service and age of the test engine. Documentation of all maintenance and adjustments shall be maintained and retained as required by § 90.121.

(e) At least one valid emission test, according to the test procedure outlined in subpart E of this part, is required for each test engine. Unless otherwise approved by the Administrator, no other emission testing or performance testing may be performed on a test engine prior to the testing at the end of hour accumulation using the test procedure outlined in subpart E of this part.

(f) The Administrator may waive portions or requirements of the test procedure, if any, that are not necessary to determine in-use compliance with applicable emission standards.

(g) If a selected test engine fails to comply with any applicable emission standard, the manufacturer shall make a reasonable effort, including troubleshooting, repairing and retesting, to determine the cause of noncompliance. The manufacturer must report all such reasons of noncompliance with the in-use test report required pursuant to § 90.1205.

**§ 90.1205 In-use test program reporting requirements.**

(a) The manufacturer shall submit to the Administrator within ninety (90) days of completion of testing for a given model year's engines, all emission testing results generated from the in-use testing program. The following information must be reported for each test engine:

(1) Engine family;

(2) Model;

(3) Engine serial number;

(4) Date of manufacture;

(5) Hours of use;

(6) Date and time of each test attempt;

(7) Results (if any) of each test attempt;

(8) Schedules, descriptions and justifications of all maintenance and/or adjustments performed;

(9) Schedules, descriptions and justifications of all modifications and/or repairs; and

(10) Determinations of noncompliance.

(b) The manufacturer must electronically submit the information required in this section using EPA's electronic information format. The Administrator may exempt manufacturers from this requirement upon written request with supporting justification as to the manufacturer's lack of adequate information processing technology.

(c) The report required in paragraph (a) of this section must include a listing of any test engines that were deleted from the aging process or testing process and provide a technical justification to support the deletion.

(d) All testing reports and requests for approvals made under this subpart shall be addressed to: Manager, Engine Compliance Programs Group (6403–J), U.S. Environmental Protection Agency, Washington, D.C. 20460.

(e) The Administrator may approve and/or require modifications to a manufacturer's in-use testing programs.

**§ 90.1206 [Reserved]**

**§ 90.1207 Bench aging adjustment factor testing.**

(a) This section is applicable to the bench aging procedures for handheld engines for in-use emission testing and to the bench aging procedures for the full useful life certification testing of nonhandheld sidevalve engines and nonhandheld engines with aftertreatment.

(b) The bench aging adjustment procedure described in § 90.1208 shall be used to determine whether a given bench aging cycle, approved for adjustment factor testing by the Administrator, can be used to represent field aged engines for handheld in-use testing under this subpart or for certification of nonhandheld sidevalve engines or nonhandheld engines with aftertreatment; and, if so, what the appropriate adjustment factor should be. If both the $IW_B$ and $IW_F$ as defined in § 90.1208 are less than or equal to 20% of the appropriate $HC+NO_X$ ($NMHC+NO_X$) standard, then the subject bench aging cycle can be used to generate emissions data for adjustment to represent field aged emissions.

(c) (1) Nothing in this section shall be construed to prohibit different manufacturers from jointly demonstrating that a particular bench aging cycle, approved by the Administrator for adjustment factor testing, may be used to represent the field aged emissions of engines of a particular technology subgroup when they each agree to use the same bench aging cycle, when they each contribute field and bench aged test engines for testing of that technology subgroup under § 90.1208, and when they each provide justification satisfactory to the Administrator that the engines can be expected to have similar emission deterioration characteristics and that a reasonable basis exists for such joint testing.

(2) Unless otherwise approved by the Administrator, a manufacturer participating or desiring to participate in a joint adjustment factor testing program may not enter or drop out of the joint program for that technology subgroup after the adjustment factor derived from the program has been used one or more times for certification of nonhandheld engines or in-use testing of handheld engines. When a manufacturer does drop out, the adjustment factor must be recalculated without that manufacturer's data. When an additional manufacturer is allowed to join, the adjustment factor must be recalculated to reflect the data generated by the new manufacturer's engines.

(d) Field aging of engines shall be performed in representative equipment in the hands of residential customers, or professional users or in manufacturers' fleets, except that a minimum of one third of the field aged engines but not less than one engine for a given engine family or technology subgroup, shall be aged in individual customer usage or in fleets where the engine manufacturer does not carry out or exercise control over the engines' maintenance or limit their usage such that the engines are not used in a way that is representative of typical in-use engines.

(e) For each engine family or technology subgroup for which a manufacturer desires to use bench aging, the manufacturer or group of manufacturers, as applicable, shall propose to the Administrator the bench aging cycle and an engine aging plan it intends or they intend to use to demonstrate the appropriateness of such cycle to represent field aged engines. Such proposals may be made up to 48 months prior to the start of a given model year. EPA shall reject such proposed aging cycles and/or engine aging plans in writing, within 90 days of receipt, or they shall be considered approved for adjustment factor testing pursuant to this section and § 90.1208. Such proposals shall include:

(1) A detailed description of the engine families a cycle is intended to cover, a justification satisfactory to the Administrator that the engines can be expected to have similar emission deterioration characteristics, a justification of the appropriateness of the subject cycle to represent field aging of the engines the cycle is intended to cover and data sufficient for the Administrator to ascertain whether the bench aging cycle has been previously determined to represent field aging for any other engine family under the provisions of this section and § 90.1208;

(2) A detailed description of the proposed bench aging cycle including, but not limited to, such parameters as duration at each throttle setting, sequencing of throttle changes, loading and load changes, hot starts and cold starts, idles, acceleration times, presence of accessory loads, periods of shutdown and other factors as the Administrator may require;

(3) A description of each engine to be aged in the field and on the bench, including make, model, engine family, displacement, power rating, rated speed and other such information as the Administrator may require to enable the Administrator to determine whether such engines are appropriate for evaluating the bench aging cycle for the engine families or technology subgroup described in paragraph (e)(1) of this section;

(4) A description of the way in which individual engines will be selected, uniquely identified and tracked for both bench and field aging and for subsequent emission testing;

(5) A description of the method by which each engine selected for field aging will be aged, the procedures for determining and carrying out appropriate engine maintenance during field aging and bench aging, a description and rationale for any maintenance the manufacturer proposes to perform additional to routine maintenance described in the maintenance schedule provided to the purchaser, and a description of records that will be kept of both bench and field engine operation and maintenance; and

(6) The location(s) of the facilities or sites at which each bench and field aged engine will be aged and tested.

(f) Upon approval by the Administrator of the bench aging cycle for evaluation testing and the engine aging plan, the manufacturer shall conduct hour accumulation to the full regulatory useful life of the engines according to the approved engine aging plan using the approved bench aging cycle. Such aging shall be followed by emission testing pursuant to the requirements of subpart E of this part. At its option, the manufacturer may age handheld commercial engines to 75% of their regulatory useful life for bench aging adjustment testing.

(g) Handheld engines aged for adjustment factor testing pursuant to the requirements of this section may not be used in the Manufacturer In-use Test Program required under § 90.1203.

(h) The Administrator may require that testing under this section and the evaluation of the appropriateness of a bench aging cycle to represent field aging under § 90.1208, be repeated for a particular engine family or technology subgroup as often as every five years; except that the Administrator may require that such testing be repeated more frequently in model years prior to the 2006 model year.

(1) The Administrator shall notify a manufacturer or group of manufacturers of the requirement to conduct a bench aging adjustment factor program for a particular engine family or technology subgroup and the period for completion of the program. The time period for completion shall be no less than one year for engines having 500 or 1000 hour useful lives.

(2) Within sixty days of the date of the Administrator's notice, the manufacturer or group of manufacturers shall provide a plan for the

Administrator's review and approval meeting the requirements of paragraph (e) of this section including a proposed bench aging cycle and an engine aging plan.

(i) Upon completion of engine aging and testing pursuant to the requirements of this section, engine manufacturers wishing to use bench aging and the adjustment factors calculated pursuant to § 90.1208 for in-use emission testing of handheld engines or for certification of nonhandheld sidevalve engines or nonhandheld engines with aftertreatment, as applicable, shall provide a report to the Administrator describing the aging and testing conducted under this section and § 90.1208. Such report shall be submitted no less than 90 days before the initiation of any such bench aging for in-use or certification testing on the engines and engine families covered by the plan approved under this section. The Administrator shall disapprove the report within 30 days of the date of receipt, or the report shall be automatically approved and the manufacturer may use the bench aging cycle and adjustment factors described in the report for its bench aging activities of the subject families. Such report shall contain the following information about the field/bench adjustment program conducted under this section and § 90.1208:

(1) An identifying description of the bench aging cycle sufficient for the Administrator to ascertain which cycle proposed pursuant to this section has been evaluated;

(2) A description of all engines selected for bench aging and field aging for this engine family or technology subgroup, as applicable. Such description shall include the make, model, engine family, displacement, power rating, rated speed, unique identifying description, and other such information as the Administrator may require;

(3) A description of all maintenance performed on each engine during hour accumulation, including a detailed explanation of the need for any maintenance not contained in the maintenance schedule for that model engine provided to engine owners;

(4) A description of how each engine was aged (e.g., bench cycle, field aged-manufacturer fleet, or field aged-individual customer);

(5) A description of any engine selected for aging pursuant to paragraph (i)(2) of this section that was deleted from aging or testing. Include a full explanation of the rationale for deletion;

(6) Tabulations of all emission test results and all inputs and outcomes of the equations found in § 90.1208; and

(7) A statement signed by an appropriate official of the manufacturer responsible for compliance of engines with Federal emission requirements that clearly states that all engine selection, aging, maintenance, testing, results calculation, and data evaluation was performed in full accordance with the requirements under this part.

**§ 90.1208 Bench aging adjustment; criterion for usage, calculation of adjustment factor, reporting requirements.**

(a) Manufacturers desiring to use bench aging prior to performing in-use emission tests on handheld engines or prior to performing certification testing on nonhandheld sidevalve engines or nonhandheld engines with aftertreatment, must first demonstrate that the chosen bench aging cycle appropriately represents field aging as determined under this section and § 90.1207. Where a bench aging cycle is shown to appropriately represent field aging under this section and § 90.1207, manufacturers shall calculate separate multiplicative bench aging adjustment factors as described in this section to adjust the $HC+NO_X$ ($NMHC+NO_X$) and CO emissions of bench aged engines.

(b) A minimum of six engines from each technology subgroup shall be aged and tested. Three of these engines must be aged on the bench and three must be aged in the field.

(c) Separate 90% confidence intervals shall be calculated around the $HC+NO_X$ ($NMHC+NO_X$) mean of the bench aged engines and the $HC+NO_X$ ($NMHC+NO_X$) mean of the field aged engines. The confidence intervals are independent of each other and are calculated according to the following equations:

(1)(i) For the 90% confidence interval about the mean of the group of bench aged engines, $B_{90}$:

$B_{90=}\bar{x}_b \pm IW_b$

Where:

$B_{90}$=The 90% confidence interval about the mean of the group of bench aged engines.

$\bar{x}_b$=The $HC+NO_X$ ($NMHC+NO_X$) sample mean of the group of bench aged engines.

$IW_b$=The confidence interval width for the group of bench aged engines as defined by the equation in paragraph (c)(1)(ii) of this section.

(ii) $IW_b$ is defined by the following equation:

$$IW_b = t_{90} * \left(s_b / \sqrt{n_b}\right)$$

Where:

$t_{90}$=The appropriate 90% critical point from Student's t table for 90% confidence and $n_b - 1$ observations; this value will decrease as $n_b$ increases.

$S_b$=The $HC+NO_X$ ($NMHC+NO_X$) sample standard deviation of the group of bench aged engines, where:

$$s_b^2 = 1/(n-1)\sum\left(X - \bar{x}_b\right)^2$$

$n_b$=The number of bench aged engines tested.

(2)(i) For the 90% confidence interval about the mean of the group of field aged engines, $F_{90}$:

$F_{90}=\bar{x}_f \pm IW_f$

Where:

$F_{90}$=The 90% confidence interval about the mean of the group of field aged engines.

$\bar{x}_f$=The $HC+NO_X$ ($NMHC+NO_X$) sample mean of the group of field aged engines.

$IW_f$=The confidence interval width for the group of field aged engines as defined by the equation in paragraph (c)(2)(ii) of this section.

(ii) $IW_f$ is defined by the following equation:

$$IW_f = t_{90} * \left(s_f / \sqrt{n_f}\right)$$

Where:

$t_{90}$=The appropriate 90% critical point from Student's t table for 90% confidence and $n_b - 1$ observations; this value will decrease as $n_b$ increases.

$S_f$=The $HC+NO_X$ ($NMHC+NO_X$) sample standard deviation of the group of field aged engines, where:

$$s_f^2 = 1/(n-1)\sum\left(X - \bar{x}_f\right)^2$$

$n_f$=The number of field aged engines tested.

(d) Both $IW_b$ and $IW_f$ must be rounded to the same number of significant digits as contained in the appropriate standard.

(e) If *both* $IW_b$ and $IW_f$ are less than or equal to 20% of the appropriate $HC+NO_X$ (NMHC+NOX) standard as defined by § 90.103, then separate Bench Aging Adjustment factors, AFs, can be calculated for HC+NOX ($NMHC+NO_X$) and CO as follows:

AF=the maximum of [($\bar{x}_f$ / $\bar{x}_b$) or 1.0]

(f) If either or both confidence interval widths $IW_b$ or $IW_f$ is/are greater than 20% of the appropriate standard as defined by § 90.103, then the manufacturer may elect to test additional engines included and described in the plan approved under § 90.1207 and recalculate the relevant

statistics. Additional testing need only be done for the group that exceeds 20% of the appropriate standard. After each additional test, $B_{90}$, $F_{90}$, $IW_b$ and $IW_f$ shall be recalculated according to paragraph (c) of this section. Additional engines may be added until such time as the newly calculated confidence interval width ($IW_b$ or $IW_f$, or both) are less than or equal to 20% of the appropriate $HC+NO_X$ ($NMHC+NO_X$) standard as defined by § 90.103. When both $IW_b$ or $IW_f$ are less than or equal to 20% of the appropriate standard as defined by § 90.103, then separate Bench Aging Adjustment Factors, AFs, may be calculated for each regulated pollutant according to paragraph (e) of this section.

(g) The adjustment factors calculated under paragraph (e) of this section shall be multiplicatively applied to the appropriate full useful life bench-aged handheld in-use test results or to the appropriate full useful life certification test results of nonhandheld sidevalve engines or nonhandheld engines with aftertreatment for that engine family or technology subgroup for all manufacturers whose engines were tested in the test program for that technology subgroup, until another bench aging adjustment program is conducted for that family or technology subgroup.

**§ 90.1209 Entry and access.**

(a) To allow the Administrator to determine whether a manufacturer is complying with the provisions under this subpart, EPA enforcement officers or their authorized representatives, upon presentation of credentials, shall be permitted entry, during operating hours, into any of the following places:

(1) Any facility where engines undergo or are undergoing bench aging, field aging, maintenance, repair, preparation for aging, selection for aging or emission testing.

(2) Any facility where records or documents related to any of activities described in paragraph (a)(1) of this section are kept.

(3) Any facility where any engine that is being tested or aged, was tested or aged or will be tested or aged is present.

(b) Upon admission to any facility referred to in paragraph (a) of this section, EPA enforcement officers or EPA authorized representatives are authorized to perform those activities set forth in § 90.705 (b) and also to inspect and make copies of records related to engine aging (service accumulation) and maintenance.

(c) The provisions of § 90.705(c), (d), (e), (f) and (g) also apply to entry and access under this subpart.

**§§ 90.1210—90.1249 [Reserved.]**

**§ 90.1250 Field durability and in-use emission performance demonstration program for nonhandheld engines using overhead valve technology.**

The testing required pursuant to this section shall be for the purpose of validating the appropriateness of assigned deterioration factors (dfs) or manufacturer determined dfs used pursuant to § 90.104 to represent the field aged deterioration of overhead valve technology engine families. For brevity, such testing is referred to as df validation testing.

(a) Unless otherwise approved by the Administrator, at the time of the first certification for each model year of Phase 2 engines, each manufacturer shall submit a schedule to the Administrator of the overhead valve technology engine families it intends to produce over the subsequent four year period (the model year now being certified plus the next three model years) including their useful lives, their design characteristics (i.e.; catalyst or noncatalyst, carbureted or fuel injected, etc.), and their anticipated eligible sales.

(b) In the schedule submitted under paragraph (a) of this section, and for the same time period, the manufacturer shall specify the engine families for which it intends to conduct field/bench adjustment testing under §§ 90.1207 and 90.1208 and shall also specify the engine families for which it intends to compute its own dfs pursuant to § 90.104(h)(2). Such schedule shall include an estimate of the number of field aged engines that will be emission tested each calendar year for the programs referenced in this paragraph.

(c) At the time the manufacturer submits the schedule required under paragraph (a) of this section, the manufacturer may include a proposed plan for the Administrator's review and approval of the overhead valve engine families, configurations and associated quantities of engines it plans to field age to full useful life and in-use test during those four years to determine the field aged dfs for engine families for which assigned dfs were used in certification. In such plans, the manufacturer:

(1) May consider the number of field aged engines it plans to test in each calendar year from paragraph (b) of this section and the limit on additional testing of field aged engines that can be assigned by EPA pursuant to paragraph (c) of this section.

(2) Shall include a discussion of the rationale for the choice of each family and configuration sufficient to enable the Administrator to determine whether the manufacturer's plan meets the objective of generating in-use data sufficient to validate the appropriateness of the assigned dfs on a substantial portion of a manufacturer's engines within a reasonable time period, and providing for periodic revalidation of the assigned dfs.

(d) If no plan submitted pursuant to paragraph (c) of this section is approved by the Administrator, then, based upon the schedule submitted pursuant to paragraph (a) of this section and other available information, and considering the field aging requirements of §§ 90.1207, 90.1208 and 90.104(h)(2), and any requests from manufacturers to work jointly, the Administrator may provide a schedule of the overhead valve engine families and associated quantities of engines that must be field aged to full useful life and in-use tested during those four years to validate dfs.

(e) EPA shall not require any nonhandheld engine manufacturer to conduct df validation emission testing such that df validation emission testing when added to that testing of field aged engines proposed by the manufacturer under paragraph (b) of this section would require the manufacturer to emission test more than 24 total field aged engines in one calendar year for bench aged field adjustment testing pursuant to §§ 90.1207 and 90.1208, df generation testing pursuant to § 90.104(h)(2), and df validation testing pursuant to this section.

(f) The Administrator may provide a schedule for engine testing to validate dfs pursuant to this section by approving the plan submitted by the manufacturer under paragraph (c) of this section, or by a written directive to the manufacturer under paragraph (d) of this section. Unless otherwise approved by the Administrator, for each test engine tested to fulfill the testing schedule provided by the Administrator under paragraph (c) or (d) of this section, the manufacturer shall conduct a baseline emission test at a number of hours equal to that on the corresponding certification engine followed by field aging to the certified useful life. Each engine shall then be emission tested using the applicable test procedures described in this part measuring all regulated pollutants. Field aging shall be performed in representative equipment in the hands of residential customers, or professional users or in manufacturers' fleets, under usage and conditions representative of typical use.

(1) Unless otherwise approved by the Administrator, equipment shall be considered to be representative if it is of the type (e.g., walk behind lawnmowers or concrete saws) of equipment into which at least one third of the engines

are installed. If no one application of the engine constitutes one third of sales, then equipment shall be representative if it is taken from either or both of the two types of applications having the largest U.S. sales volumes.

(2) Unless otherwise approved by the Administrator, test engines that receive maintenance additional to that recommended to the purchaser in the owner's manual shall not be considered representative of typical use.

(g) No later than 90 days following the end of each model year, each manufacturer subject to this section shall provide a tabulation, by engine family, of all engines undergoing hour accumulation under this regulation, the number of hours accumulated on each engine, the equipment application for each engine and the basis for that choice of equipment. Such tabulation shall include the engine family, the engine identification number assigned for tracking purposes, the type of application, the projected test date and the geographic location (city and state) where hour accumulation is occurring. Such tabulation, or a separate tabulation submitted at the same time, shall contain all in-use test results that have been generated during the preceding model year. Such tabulation shall include the engine family, the engine identification number assigned for tracking purposes, the type of application, the applicable certification deterioration factor and the calculated $HC+NO_X$ deterioration factor determined from the testing required in this subpart.

45. Subpart N is added to part 90 to read as follows:

## Subpart N—In-Use Credit Program for New Handheld Engines

Sec.



## Subpart N—In-Use Credit Program for New Handheld Engines

### § 90.1301 Applicability.

Phase 2 handheld engines subject to the provisions of subpart A of this part are eligible to participate in the in-use credit program described in this subpart for HC $+NO_X$ ($NMHC+NO_X$) and CO emissions.

### § 90.1302 Definitions.

The definitions in subpart A of this part and the definition of ''point of first retail sale'' from subpart C of this part apply to this subpart. The following definitions shall also apply to this subpart:

*Averaging* means the exchange of handheld engine in-use emission credits between engine families within a given manufacturer's product line.

*Banked credits* refer to positive emission credits based on actual applicable production/sales volume as contained in the end of model year in-use testing reports submitted to EPA. Some or all of these banked credits may be revoked if EPA review of the end of model year in-use testing reports or any subsequent audit action(s) uncovers problems or errors.

*Banking* means the retention of handheld engine in-use emission credits by the manufacturer generating the emission credits or obtaining such credits through trading, for use in future model year averaging or trading as permitted by these regulations.

*Carry-over engine family* means an engine family which undergoes certification using carryover test data from previous model years.

*Compliance level* for an engine family is determined by averaging the in-use test results from each test engine of the family. The compliance level for an individual configuration may be determined in cases where the Administrator directs the testing of an individual configuration.

*Emission credits or in-use credits* represent the amount of emission reduction or exceedance, for each regulated pollutant, by a handheld engine family below or above, respectively, the applicable certification standard to which the engine family is certified. Emission reductions below the standard are considered ''positive credits,'' while emission exceedences above the standard are considered ''negative or required credits.''

*Trading* means the exchange of handheld engine in-use emission credits between manufacturers and/or brokers.

### § 90.1303 General provisions.

(a) The in-use credit program for eligible Phase 2 handheld engines is described in this subpart. Participation in this program is voluntary.

(b) Any handheld Phase 2 engine family subject to the provisions of subpart A of this part is eligible to participate in the in-use credit program described in this subpart.

(c) Credits generated and used in the nonhandheld engine certification averaging, banking, and trading program pursuant to the provisions of subpart C of this part are not interchangeable with credits generated and used in the handheld engine in-use credit program. In-use credits under this subpart may not be used to address the emissions of any nonhandheld engine. Nor may nonhandheld certification credits be used to address any in-use credit need determined under this subpart.

(d) An engine family with a compliance level, as determined by in-use testing pursuant to subpart M of this part and paragraph (h) of this section, below the applicable standard to which the engine family is certified may generate emission credits for averaging, banking, or trading in the in-use credit program.

(e) Positive credits generated in a given model year may be used in that model year and/or in any subsequent model year during the Phase 2 program.

(f) A manufacturer of an engine family with a compliance level exceeding the applicable standard to which the engine family is certified, may, prior to the date of the report required under paragraph (i) of this section, use previously banked credits, purchase credits from another manufacturer, or perform additional testing pursuant to paragraph (h) of this section to address (as calculated elsewhere in this subpart) the associated credit deficit (negative credits or a need for credits).

(g) In the case of in-use testing of engine families that were certified using carry-over data, and in the absence of other applicable test data acceptable to the Administrator, the test results from one model year's testing shall apply to up to four years of production of that family: the model year tested, the next model year (if carried over to that year), and one or two previous model years (if carried over from the previous year or the two previous years, respectively). In-use credits shall be generated or used, as appropriate.

(h) A manufacturer must notify EPA of plans to test additional engine families beyond those identified by EPA pursuant to regulations in subpart M of this part for the in-use testing program. Such notice must be submitted 30 days prior to initiation of service accumulation. If the additional testing discovers an engine family to be in noncompliance with the applicable standard, the testing must be treated as if it were a failure of the normal in-use testing requirement of an engine family. If the additional testing shows the engine family to be in compliance with the applicable standard, in-use credits may be generated subject to the provisions of this subpart.

(i) Manufacturers must demonstrate a zero or positive credit balance under the in-use credit program for all regulated pollutants for a particular model year within 90 days of the end of the in-use testing of that model year's engine families. At that time manufacturers must file a report with EPA pursuant to § 90.1309.

(j) Manufacturers shall maintain separate balances for $HC+NO_X$ ($NMHC+NO_X$) and CO credits. $HC+NO_X$ and $NMHC+NO_X$ credits are interchangeable with each other but not with CO credits.

**§ 90.1304 Averaging.**

(a) A manufacturer may use averaging across engine families to demonstrate a zero or positive credit balance for a model year. Positive credits to be used in averaging may be obtained from credits generated by another engine family of the same model year, credits banked in previous model years, or credits obtained through trading.

(b) Credits used to demonstrate a zero or positive credit balance must be used at a rate of 1.1 to 1.

**§ 90.1305 Banking.**

(a) A manufacturer of a handheld engine family with an in-use compliance level below the standard to which the engine family is certified for a given model year may bank positive in-use credits for that model year for use in in-use averaging and trading.

(b) A manufacturer may consider credits to be banked, for use in future averaging or trading, 30 days after the submission of the report required by § 90.1309(a). During the 30 day period EPA will work with the manufacturer to correct any error in calculating banked credits, if necessary.

**§ 90.1306 Trading.**

(a) A handheld engine manufacturer may exchange positive in-use emission credits with other handheld engine manufacturers through trading.

(b) In-use credits for trading can be obtained from credits banked for model years prior to the model year of the engine family requiring in-use credits.

(c) Traded in-use credits can be used for averaging, banking, or further trading transactions.

(d) Unless otherwise approved by EPA, a manufacturer that generates positive in-use credits must wait 30 days after it has both completed in-use testing for the model year for which the credits were generated and submitted the report required by § 90.1309(a) before it may transfer credits to another manufacturer or broker.

(e) In the event of a negative credit balance resulting from a transaction, both the buyer and the seller are liable, except in cases involving fraud. Engine families participating in a trade that leads to a negative credit balance may be subject to recall under subparts I and M of this part if the engine manufacturer having the negative credit balance is unable or unwilling to obtain sufficient credits in the time allowed under § 90.1303(i).

**§ 90.1307 Credit calculation.**

For each participating engine family, and for each regulated pollutant ($HC+NO_X$ ($NMHC+NO_X$) and CO) emission credits (positive or negative) are to be calculated according to the following equation and rounded to the nearest gram. Consistent units are to be used throughout the equation:

Credits = Sales × (Standard—CL) × Power × Useful life × AF × LF

Where:

Useful Life = the useful life in hours corresponding to the useful life category for which the engine family was certified.

Power = the sales weighted maximum modal power, in kilowatts, as calculated from the applicable federal test procedure as described in this part. This is determined by multiplying the maximum modal power of each configuration within the family by its eligible sales, summing across all configurations and dividing by the eligible sales of the entire family. Where testing is limited to certain configurations designated by the Administrator, the maximum modal power for the individual configuration(s) shall be used.

Sales = the number of eligible U.S. sales, as defined in subpart A of this part, for the engine family or configuration as applicable.

Standard = The applicable emission standard to which the engine family was certified under subpart B of this part.

CL = compliance level of the in-use testing for the subject pollutant in g/kW-hr.

AF = adjustment factor for the number of tests conducted as determined from the following table, except that when a manufacturer concedes failure before completion of testing as permitted under § 90.1203(f), the adjustment factor shall be 1.0:

| No. Engines tested | 1–5 | 6–7 | 8–9 | 10 or more. |
|---|---|---|---|---|
| Adjustment factor | 0.5 | 0.75 | 0.9 | 1.0 |

LF = Load Factor of 0.85 for test cycle C. For manufacturers using alternative or special test cycles approved by the Administrator, the Load Factor is calculated using the Load Factor formula for nonhandheld engines found in § 90.207.

**§ 90.1308 Maintenance of records.**

(a) Any manufacturer that is participating in the in-use credit program set forth in this subpart shall establish, maintain, and retain the records required by § 90.209 with respect to its participation in the in-use credit program.

(b) EPA may void *ab initio* a certificate of conformity for an engine family for which the manufacturer fails to retain the records required under this section or to provide such information to the Administrator upon request.

**§ 90.1309 Reporting requirements.**

(a) Any manufacturer who participates in the in-use credit program is required to submit an in-use credit report with the end of the model year in-use testing report required under § 90.1205 within 90 days of the end of the in-use testing of a given model year's engine families. This report must show the calculation of credits from all the in-use testing conducted by the manufacturer for a given model year's engines. Such report shall show the applications of credits, the trading of credits, the discounting of credits that are used and the final credit balance. Such report shall calculate credit generation or usage for past model years and estimate credit generation or usage for the next model year when carry over families are tested pursuant to § 90.1303(g). The manufacturer may submit corrections to such end of model year reports in a final report for a period of up to 270 days after the end of the in-use testing of a given model year's engine families.

(b) The calculation of eligible sales for end-of-year and final reports must be based on the location of the point of first retail sale (for example, retail customer or dealer) also called the final product purchase location. Upon advance

written request, the Administrator will consider other methods to track engines for credit calculation purposes that provide high levels of confidence that eligible sales are accurately counted.

(c) Reports shall be submitted to: Manager, Engine Compliance Programs Group (6403–J), U.S. Environmental Protection Agency, SW., Washington, DC 20460.

(d) A manufacturer that fails to submit a timely end of year report as required in paragraph (a) of this section will be considered ineligible to have participated in the in-use credit program.

(e) If EPA or the manufacturer determines that a reporting error occurred on an end of model year report previously submitted to EPA under this subpart, or an engine family in-use testing report submitted to EPA under subpart I of this part, the manufacturer's credits and credit calculations will be recalculated. Erroneous positive credits will be void. Erroneous negative credits may be adjusted by EPA. An update of previously submitted ''point of first retail sale'' information is not considered an error and no increase in the number of credits will be allowed unless an actual error occurred in the calculation of credits due to an error in the ''point of first retail sale'' information from the time of the original end of model year report.

**§ 90.1310 Request for hearing.**

An engine manufacturer may request a hearing on the Administrator's voiding of an engine family's certificate of conformity under § 90.1308(b). The administrative procedures for a public hearing requested under this subpart shall be those procedures set forth in §§ 90.512, 90.513, 90.514 and 90.515.

[FR Doc. 98–941 Filed 1–26–98; 8:45 am]

BILLING CODE 6560–50–P