ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 89, 90, 91, 94, 1048, 1051, 1065, and 1068

[AMS–FRL–7058–8]

RIN 2060–AI11

Control of Emissions From Nonroad Large Spark Ignition Engines and Recreational Engines (Marine and Land-Based)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of proposed rulemaking.

SUMMARY: In this action, we are proposing emission standards for several groups of nonroad engines that cause or contribute to air pollution but that have yet to be regulated by EPA. These engines include large spark-ignition engines such as those used in forklifts and airport tugs; recreational vehicles using spark-ignition engines such as off-highway motorcycles, all-terrain vehicles, and snowmobiles; and recreational marine diesel engines. Nationwide, engines and vehicles in these various categories contribute to ozone, CO, and PM nonattainment. These pollutants cause a range of adverse health effects, especially in terms of respiratory impairment and related illnesses. The proposed standards will help states achieve air quality standards. In addition, the proposed standards will help reduce acute exposure to CO, air toxics, and PM for operators and other people close to the emission source. They will also help address other environmental problems, such as visibility impairment in our national parks.

We expect that manufacturers will be able to maintain or even improve the performance of their products when producing engines and equipment meeting the proposed standards. In fact, many engines will substantially reduce their fuel consumption, partially or completely offsetting any costs associated with the emission standards. Overall, we estimate the gasoline-equivalent fuel savings associated with the anticipated changes in technology resulting from this rule would be about 730 million gallons per year once the program is fully phased in. The proposal also has several provisions to address the unique limitations of small-volume manufacturers.

DATES: *Comments:* Send written comments on this proposed rule by December 19, 2001. See Section X.B for more information about written comments.

Hearings: We will hold a public hearing in the Washington, DC area on October 24. We will hold a second public hearing on October 30 in Denver, CO. See Section X.B for more information about public hearings.

ADDRESSES: *Comments:* You may send written comments in paper form or by e-mail. We must receive them by the date indicated under **DATES** above. Send paper copies of written comments (in duplicate if possible) to the contact person listed below. You may also submit comments via e-mail to *''NRANPRM@epa.gov.''* In your correspondence, refer to Docket A–2000–01. See Section X.B for more information on comment procedures.

Docket: EPA's Air Docket makes materials related to this rulemaking available for review in Public Docket No. A–2000–01 at the following address: U.S. Environmental Protection Agency (EPA), Air Docket (6102), Room M–1500 (on the ground floor in Waterside Mall), 401 M Street, SW., Washington, DC 20460 between 8 a.m. to 5:30 p.m., Monday through Friday, except on government holidays. You can reach the Air Docket by telephone at (202) 260–7548, and by facsimile (202) 260–4400. We may charge a reasonable fee for copying docket materials, as provided in 40 CFR part 2.

Hearings: We will hold a public hearing on October 24, 2001 at Washington Dulles Airport Marriott, Dulles, VA 20166 (703–471–9500). We will hold a second public hearing October 30, 2001 at Doubletree Hotel, 3203 Quebec Street, Denver, CO 80207 (303–321–3333). If you want to testify at a hearing, notify the contact person listed below at least ten days before the date of the hearing. See Section X.B for more information on the public-hearing procedures.

FOR FURTHER INFORMATION CONTACT: Margaret Borushko, U.S. EPA, National Vehicle and Fuels Emission Laboratory, 2000 Traverwood, Ann Arbor, MI 48105; Telephone (734) 214–4334; Fax: (734) 214–4816; E-mail: borushko.margaret@epa.gov.

SUPPLEMENTARY INFORMATION:

Regulated Entities

This proposed action would affect companies that manufacture or introduce into commerce any of the engines or vehicles that would be subject to the proposed standards. These include: spark-ignition industrial engines such as those used in forklifts and airport tugs; recreational vehicles such as off-highway motorcycles, all-terrain vehicles, and snowmobiles; and recreational marine diesel engines. This proposed action would also affect companies buying engines for installation in nonroad equipment. There are also proposed requirements that apply to those who rebuild any of the affected nonroad engines. Regulated categories and entities include:

Category	NAICS codes [a]	SIC codes [b]	Examples of potentially regulated entities
Industry	333618	3519	Manufacturers of new nonroad SI engines, new marine engines.
Do	333111	3523	Manufacturers of farm equipment.
Do	333112	3531	Manufacturers of construction equipment, recreational marine vessels.
Do	333924	3537	Manufacturers of industrial trucks.
Do	811310	7699	Engine repair and maintenance.
Do	336991	.....	Motorcycles and motorcycle parts manufacturers.
Do	336999	.....	Snowmobiles and all-terrain vehicle manufacturers.
Do	421110	.....	Independent Commercial Importers of Vehicles and Parts.

[a] North American Industry Classification System (NAICS).
[b] Standard Industrial Classification (SIC) system code.

This list is not intended to be exhaustive, but rather provides a guide regarding entities likely to be regulated by this action. To determine whether particular activities may be regulated by this action, you should carefully examine the proposed regulations. You may direct questions regarding the applicability of this action to the person listed in **FOR FURTHER INFORMATION CONTACT.**

Obtaining Electronic Copies of the Regulatory Documents

The preamble, regulatory language, Draft Regulatory Support Document, and other rule documents are also available electronically from the EPA Internet Web site. This service is free of charge, except for any cost incurred for internet connectivity. The electronic version of this proposed rule is made available on the day of publication on the primary web site listed below. The EPA Office of Transportation and Air Quality also publishes **Federal Register** notices and related documents on the secondary web site listed below.

1. *http://www.epa.gov/docs/fedrgstr/EPA-AIR/* (either select desired date or use Search feature)
2. *http://www.epa.gov/otaq/* (look in What's New or under the specific rulemaking topic)

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

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I. Introduction

A. Overview

Air pollution is a serious threat to the health and well-being of millions of Americans and imposes a large burden on the U.S. economy. Ground-level ozone, carbon monoxide, and particulate matter are linked to potentially serious respiratory health problems, especially respiratory effects and environmental degradation, including visibility impairment in our precious national parks. Over the past quarter century, state and federal representatives have established emission-control programs that significantly reduce emissions from individual sources. Many of these sources now pollute at only a small fraction of their precontrol rates. This proposal further addresses these air-pollution concerns by proposing national emission standards for several types of nonroad engines and vehicles that are currently unregulated. These include industrial spark-ignition engines such as those used in forklifts and airport tugs; recreational vehicles such as off-highway motorcycles, all-terrain vehicles, and snowmobiles; and recreational marine diesel engines.[1] The proposed standards are a continuation of the process of establishing standards for nonroad engines and vehicles, as required by Clean Air Act section 213(a)(3). All the nonroad engines subject to this proposal are still unregulated emission sources.

Nationwide, these engines are a significant source of mobile-source air pollution. They currently account for about 13 percent of mobile-source hydrocarbon (HC) emissions, 6 percent of mobile-source carbon monoxide (CO) emissions, 3 percent of mobile-source oxides of nitrogen (NO_X) emissions, and 1 percent of mobile-source particulate matter (PM) emissions.[2] The proposed standards will reduce exposure to these emissions and help avoid a range of adverse health effects associated with ambient ozone, CO, and PM levels, especially in terms of respiratory impairment and related illnesses. In addition, the proposed standards will help reduce acute exposure to CO, air toxics, and PM for persons who operate or who work with or are otherwise active in close proximity to these engines. They will also help address other environmental problems associated with these engines, such as visibility impairment in our national parks and other wilderness areas where recreational vehicles and marine engines are often used.

This proposal follows a final finding published on December 7, 2000 (65 FR 76790). Under this finding, EPA found that industrial spark-ignition (SI) engines rated above 19 kilowatts (kW), as well as all land-based recreational nonroad spark-ignition engines, cause or contribute to air quality nonattainment in more than one ozone or carbon monoxide (CO) nonattainment area. We also found that particulate matter (PM) emissions from these engines cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare.

This proposal also follows EPA's Advance Notice of Proposed

[1] Diesel-cycle engines, referred to simply as ''diesel engines'' in this document, may also be referred to as compression-ignition (or CI) engines. These engines typically operate on diesel fuel, but other fuels may also be used. Otto-cycle engines (referred to here as spark-ignition or SI engines) typically operate on gasoline, liquefied petroleum gas, or natural gas.

[2] While we characterize emissions of hydrocarbons, this can be used as a surrogate for volatile organic compounds (VOC), which is a broader group of compounds.

Rulemaking (ANRPM) published on December 7, 2000 (65 FR 76797). In that Advance Notice, we provided an initial overview of possible regulatory strategies for the nonroad vehicles and engines and invited early input to the process of developing standards. We received comments on the Advance Notice from a wide variety of stakeholders, including the engine industry, the equipment industry, various governmental bodies, environmental groups, and the general public. The Advance Notice, the related comments, and other new information provide the framework for this proposal.

B. How Is This Document Organized?

This proposal covers engines and vehicles that vary in design and use, and many readers may be interested in only one or two of the applications. For the purpose of this proposal, we have chosen to group engines by common application (e.g., recreational land-based engines, marine engines, large spark-ignition engines used in commercial applications). We have attempted to organize the document in a way that allows each reader to focus on the applications of particular interest. The Air Quality discussion in Section II is general in nature, however, and applies to all the categories covered by this proposal.

The next four sections contain our proposal for the nonroad engines that are the subject of this action. Sections III contains some general concepts that are relevant to all of the nonroad engines covered by this proposal. Section IV through VI present information specific to each of the nonroad applications covered by the proposal, including standards, effective dates, testing information, and other specific requirements.

Sections VII and VIII describe a wide range of compliance and testing provisions that apply generally to engines and vehicles from all the nonroad engine and vehicle categories included in this proposal. Several of these provisions apply not only to manufacturers, but also to equipment manufacturers installing certified engines, remanufacturing facilities, operators, and others. Therefore, all affected parties should read the information contained in this section.

Section IX summarizes the projected impacts and a discussion of the benefits of this proposal. Finally, Sections X and XI contain information about public participation, how we satisfied our administrative requirements, and the statutory provisions and legal authority for this proposal.

The remainder of this Section I summarizes important background information about this proposal, including the engines covered, the proposed standards, and why we are proposing them.

C. What Categories of Vehicles and Engines Are Covered in This Proposal?

This proposal presents regulatory strategies for new nonroad vehicles and engines that have yet to be regulated under EPA's nonroad engine programs. This proposal covers the following engines:

- Land-based spark-ignition recreational engines, including those used in snowmobiles, off-highway motorcycles, and all-terrain vehicles. For the purpose of this proposal, we are calling this group of engines ''recreational vehicles,'' even though all-terrain vehicles can be used for commercial purposes.
- Land-based spark-ignition engines rated over 19 kW, including engines used in forklifts, generators, airport tugs, and various farm, construction, and industrial equipment. This category also includes auxiliary marine engines, but does not include engines used in recreational vehicles. For the purpose of this proposal, we are calling this group of engines ''Large SI engines.''
- Recreational marine diesel engines.

This proposal covers new engines that are used in the United States, whether they are made domestically or imported.[3] A more detailed discussion of the meaning of the terms ''new,'' ''imported,'' as well as other terms that help define the scope of application of this proposal, is contained in Section III of this preamble.

We intended to include in this proposal emission standards for two additional vehicle categories: new exhaust emission standards for highway motorcycles and new evaporative emission standards for marine vessels powered by spark-ignition engines. Proposals for these two categories are not included in the September 14 deadline mandated by the courts, as is the case for the remaining contents that appear in today's proposed rule. We are committed to issue proposals regarding these categories within the next two to three months. Interested parties will have an opportunity to comment on issues associated with the proposed standards for these two categories during the public review period that will begin after a subsequent proposal or proposals are issued.

D. What Requirements Are We Proposing?

The fundamental requirement for engines under Clean Air Act section 213 is to meet EPA's emission standards. The Act requires that standards achieve the greatest degree of emission reduction achievable through the application of technology that will be available, giving appropriate consideration to cost, noise, energy, and safety factors. Other requirements such as applying for certification, labeling engines, and meeting warranty requirements define a process for implementing the proposed program in an effective way.

With regard to Large SI engines, we are proposing a two-phase program. The first phase of the standards, to go into effect in 2004, are the same as those recently adopted by the California Air Resources Board. These standards will reduce combined HC and NO_X emissions by nearly 75 percent, based on a steady-state test. In 2007, we propose to supplement these standards by setting limits that would require optimizing the same technologies but would be based on a transient test cycle. New requirements for evaporative emissions and engine diagnostics would also start in 2007.

For recreational vehicles, we are proposing emission standards for snowmobiles separately from off-highway motorcycles and all-terrain vehicles. For snowmobiles, we are proposing a first phase of standards for HC and CO emissions based on the use of clean carburetion or 2-stroke electronic fuel injection (EFI) technology, and a second phase of emission standards for snowmobiles that would involve significant use of direct fuel injection 2-stroke technology, as well as possible limited conversion to 4-stroke engines. For off highway motorcycles and all-terrain vehicles, we are proposing standards that would result in a 50-percent reduction and is based mainly on moving these engines from 2-stroke to 4-stroke technology. In addition, we are proposing a second phase of standards for all-terrain vehicles that would require some catalyst use.

We are also proposing voluntary Blue Sky Series emission standards for recreational marine diesel engines and industrial spark-ignition engines. Blue Sky Series emission standards are intended to encourage the introduction and more widespread use of low-emission technologies. Manufacturers could be motivated to exceed emission

[3] For this proposal, we consider the United States to include the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

requirements either to gain early experience with certain technologies or as a response to market demand or local government programs. For recreational vehicles, we are proposing separate voluntary standards based more on providing consumers with an option of buying low-emission models.

E. Why Is EPA Taking This Action?

There are important public health and welfare reasons supporting the standards proposed in this document. As described in Section II.B, these engines contribute to air pollution which causes public health and welfare problems. Emissions from these engines contribute to ground level ozone and ambient CO and PM levels. Exposure to ground level ozone, CO, and PM can cause serious respiratory problems. These emissions also contribute to other serious environmental problems, including visibility impairment.

We believe existing technology that can be applied to these engines would reduce emissions of these harmful pollutants. Manufacturers can reduce 2-stroke engine emissions by improving fuel management and calibration. In addition, many of the existing 2-stroke engines in these categories can be converted to 4-stroke technology. Finally, there are modifications that can be made to 4-stroke engines, often short of requiring catalysts, that can reduce emissions even further.

F. Putting This Proposal Into Perspective

This proposal should be considered in the broader context of EPA's nonroad emission-control programs; state-level programs, particularly in California; and international efforts. Each of these are described in more detail below.

1. EPA's Nonroad Emission-Control Programs

a. EPA's nonroad process. Clean Air Act section 213(a)(1) directs us to study emissions from nonroad engines and vehicles to determine, among other things, whether these emissions ''cause, or significantly contribute to, air pollution that may reasonably be anticipated to endanger public health or welfare.'' Section 213(a)(2) further required us to determine whether emissions of CO, VOC, and NO_X from all nonroad engines significantly contribute to ozone or CO emissions in more than one nonattainment area. If we determine that emissions from all nonroad engines were significant contributors, section 213(a)(3) then requires us to establish emission standards for classes or categories of new nonroad engines and vehicles that in our judgment cause or contribute to such pollution. We may also set emission standards under section 213(a)(4) regulating any other emissions from nonroad engines that we find contribute significantly to air pollution.

We completed the Nonroad Engine and Vehicle Emission Study, required by Clean Air Act section 213(a)(1), in November 1991.[4] On June 17, 1994, we made an affirmative determination under section 213(a)(2) that nonroad emissions are significant contributors to ozone or CO in more than one nonattainment area. We also determined that these engines make a significant contribution to PM and smoke emissions that may reasonably be anticipated to endanger public health or welfare. In the same document, we set a first phase of emission standards (now referred to as Tier 1 standards) for land-based nonroad diesel engines rated at or above 37 kW. We recently added a more stringent set of Tier 2 and Tier 3 emission levels for new land-based nonroad diesel engines at or above 37 kW and adopted Tier 1 standards for land-based nonroad diesel engines less than 37 kW. Our other emission-control programs for nonroad engines are listed in Table I.F–1. This proposal takes another step toward the comprehensive nonroad engine emission-control strategy envisioned in the Act by proposing an emission-control program for the remaining unregulated nonroad engines.

TABLE I.F–1.—EPA'S NONROAD EMISSION-CONTROL PROGRAMS

Engine category	Final rulemaking	Date
Land-based diesel engines ≥ 37 kW—Tier 1	56 FR 31306	June 17, 1994.
Spark-ignition engines ≤ 19 kW—Phase 1	60 FR 34581	July 3, 1995.
Spark-ignition marine	61 FR 52088	October 4, 1996.
Locomotives	63 FR 18978	April 16, 1998.
Land-based diesel engines—Tier 1 and Tier 2 for engines < 37 kW —Tier 2 and Tier 3 for engines ≥ 37 kW	63 FR 56968	October 23, 1998.
Commercial marine diesel	64 FR 73300	December 29, 1999.
Spark-ignition engines ≤ 19 kW (Non-handheld)—Phase 2	64 FR 15208	March 30, 1999.
Spark-ignition engines ≤ 19 kW (Handheld)—Phase 2	65 FR 24268	April 25, 2000.

b. National standards for marine engines. In the October 1996 final rule for spark-ignition marine engines, we set standards only for outboard and personal watercraft engines. We decided not to finalize emission standards for sterndrive or inboard marine engines at that time. Uncontrolled emission levels from sterndrive and inboard marine engines were already significantly lower than the outboard and personal watercraft engines. We did, however, leave open the possibility of revisiting the need for emission standards for sterndrive and inboard engines in the future.

In December 1999, we published emission standards for commercial marine diesel engines. To allow more time to evaluate the potential impact of the proposed emission limits on the recreational vessel industry, we did not include recreational propulsion marine diesel engines in that rulemaking.

c. National standards for land-based spark-ignition engines. The standards we have set to date for land-based, spark-ignition nonroad engines apply to engines typically used in lawn and garden applications. In adopting these emission standards, we decided not to include engines rated over 19 kW or any engines used in recreational vehicles. The proposed emission-control program in this document addresses these remaining unregulated engines.

2. State Initiatives

Under Clean Air Act section 209, California has the authority to regulate emissions from new motor vehicles and new motor vehicle engines. California may also regulate emissions from nonroad engines, with the exception of

[4] This study is available in docket A–92–28.

new engines used in locomotives and new engines used in farm and construction equipment rated under 130 kW.[5] So far, the California Air Resources Board (California ARB) has adopted requirements for four groups of nonroad engines: (1) Diesel- and Otto-cycle small off-road engines rated under 19 kW; (2) new land-based nonroad diesel engines rated over 130 kW; (3) land-based nonroad recreational engines, including all-terrain vehicles, snowmobiles, off-highway motorcycles, go-carts, and other similar vehicles; and (4) new nonroad SI engines rated over 19 kW. They have approved a voluntary registration and control program for existing portable equipment.

Other states may adopt emission standards set by California ARB, but are otherwise preempted from setting emission standards for new engines or vehicles. In contrast, there is generally no federal preemption of state initiatives related to the way individuals use individual engines or vehicles.

a. Industrial SI engines. California ARB in 1998 adopted requirements that apply to new nonroad engines rated over 25 hp produced for California starting in 2001. These standards phase in over three years, during which manufacturers show only that engines meet the standards before they start in service. Beginning in 2004, the standards apply to 100 percent of engines sold in California, including a requirement to show that an engine meets emission standards throughout its useful life. As described above, these standards do not apply to engines under 130 kW used in farm or construction equipment. Texas has adopted the California ARB emission standards statewide starting in 2004.

b. Off-highway motorcycles and all-terrain vehicles. California established standards for off-highway motorcycles and all-terrain vehicles which took effect in January 1997 (1999 for vehicles with engines of 90 cc or less). The standards are 1.2 g/km HC and 15.0 g/km CO and are based on the highway motorcycle chassis test procedures. Manufacturers may certify all-terrain vehicles to optional standards, which are based on the utility engine test procedure.[6] These standards are 12 g/hp-hr HC+NO_X and 300 g/hp-hr CO, for all-terrain vehicles with engine displacements less than 225 cubic centimeters (cc) and 10 g/hp-hr NC+NO_X and 300 g/hp-hr CO, for all-terrain vehicles with engine displacement greater than 225 cc. The utility engine test procedure is the procedure over which Small SI engines are tested. The stringency level of the standards was based on the emissions performance of 4-stroke engines and advanced 2-stroke engines equipped with a catalytic converter. California anticipated that the standards would be met initially through the use of high performance 4-stroke engines.

California revisited the program in the 1997 time frame because a lack of certified product from manufacturers was reportedly creating economic hardship for dealerships. The number of certified off-highway motorcycle models was particularly inadequate.[7] In 1998, California revised the program, allowing the use of uncertified products in off-highway vehicle recreation areas with regional/seasonal use restrictions. Currently, noncomplying vehicles can be legally sold in California and used in attainment areas year-round and in nonattainment areas during months when exceedances of the state ozone standard are not expected. For enforcement purposes, certified and uncertified products are identified respectively with green and red stickers. Only about one-third of off-highway motorcycles sold in California are certified.

3. Actions in Other Countries

a. European action—Recreational Marine Engines. The European Commission has proposed emission standards for recreational marine engines, including both diesel and gasoline engines. These requirements would apply to all new engines sold in member countries. The numerical emission standards for recreational diesel marine engines, shown in Table I.F–2, consist of the Annex VI NO_X standard for small marine diesel engines, the rough equivalent of Nonroad Diesel Tier 1 emission standards for HC and CO. Emission testing is to be conducted using the ISO D2 duty cycle for constant-speed engines and the ISO E5 duty cycle for all other engines. Table I.F–2 also presents average baseline emissions based on data that we have collected. These data are presented in Chapter 4 of the Draft Regulatory Support Document. We have received comment that we should apply these standards in the U.S., but the proposed European emission standards for recreational marine diesel engines may not result in a decrease in emissions, and may even allow an increase in emissions from engines operated in the U.S.

TABLE I.F–2.—PROPOSED EUROPEAN EMISSION STANDARDS FOR RECREATIONAL MARINE DIESEL ENGINES

Pollutant	Emission standard (g/k W-hr)	Baseline emissions (g/k W-hr)
NO_X	9.8	8.9
PM	1.4	0.2
HC	[a] 1.5	0.3
CO	5.0	1.3

[a] Increases slightly with increasing engine power rating.

b. International Maritime Organization—CI Marine Engines. In response to growing international concern about air pollution and in recognition of the highly international nature of maritime transportation, the International Maritime Organization developed a program to reduce NO_X and SOx emissions from marine vessels. No restrictions on PM, HC, or CO emissions were considered. The NO_X provisions, contained in Regulation 13 of Annex VI to the International Convention on the Prevention of Pollution from Ships (MARPOL 73/78), specify that each diesel engine with a power output of more than 130 kW installed on a ship constructed on or after January 1, 2000, or that undergoes a major conversion on or after January 1, 2000, must meet the NO_X emission standards in Table I.F–3.[8] The Annex does not distinguish between marine diesel engines installed on recreational or commercial vessels; all marine diesel engines above 130 kW would be subject to the standards regardless of their use.

TABLE I.F–3.—MARPOL ANNEX VI NO_X STANDARDS

Engine speed (n = engine speed, rpm)	NO_X (g/kW-hr)
n <130 rpm	17.0
130 rpm≤n<2000 rpm	$45*n^{(-0.2)}$

[5] The Clean Air Act limits the role states may play in regulating emissions from new motor vehicles and nonroad engines. California is permitted to establish emission standards for new motor vehicles and most nonroad engines; other states may adopt California's programs (sections 209 and 177 of the Act).

[6] Notice to Off-Highway Recreational Vehicle Manufacturers and All Other Interested Parties Regarding Alternate Emission Standards for All-Terrain Vehicles, Mail Out #95–16, April 28, 1995, California ARB (Docket A–2000–01, document II–D–06).

[7] Initial Statement of Reasons, Public Hearing to Consider Amendments to the California Regulations for New 1997 and Later Off-highway Recreational Vehicles and Engines, California ARB, October 23, 1998 (Docket A–2000–01, II–D–08).

[8] Additional information about the MARPOL Annex VI NO_X standards can be found in the documents for our commercial marine diesel standards, which can be found on our website (*http://www.epa.gov/otaq/marine.htm*). That website also contains facts sheets and other information about the Annex.

TABLE I.F–3.—MARPOL ANNEX VI NO_X STANDARDS—Continued

Engine speed (n = engine speed, rpm)	NO_X (g/kW-hr)
n ≥ 2000	9.8

After several years of negotiation, the Member States of the International Maritime Organization adopted a final version of Annex VI on September 26, 1997. As stipulated in Article 6 of the Agreement, the Annex will go into force when fifteen States, the combined merchant fleets of which constitute not less than 50 percent of the gross tonnage of the world's merchant shipping, have ratified it. As of today, three countries have ratified the Annex (Norway, Sweden, Singapore), representing about 7 percent of the world fleet.

Pending entry into force, ship owners and vessel manufacturers are expected to install compliant engines on relevant ships beginning with the date specified in Regulation 13, January 1, 2000. In addition, ship owners are expected to bring existing engines into compliance if the engines undergo a major conversion on or after that date.[9] As defined in Regulation 13 of Annex VI, a major conversion is defined to include those situations when the engine is replaced by a new engine, it is substantially modified, or its maximum continuous rating is increased by more than 10 percent. To facilitate this process, and to allow engine manufacturers to certify their engines before the Annex goes into force, we set up a process for manufacturers to obtain a Statement of Voluntary Compliance.[10] This document will be exchangeable for an Engine International Air Pollution Prevention (EIAPP) certificate once the Annex goes into effect for the United States.

II. Public Health and Welfare Effects of Emissions From Covered Engines

A. Background

This proposal contains regulatory strategies for three sets of new nonroad vehicles and engines that cause or contribute to air pollution but that have not been regulated under EPA's nonroad engine programs. The three sets of nonroad vehicles and engines are:

- Large Industrial Spark Ignition Engines. These are spark-ignition nonroad engines rated over 19 kW used in commercial applications. These include engines used in forklifts, electric generators, airport tugs, and a variety of other construction, farm, and industrial equipment. Many of these engines, such as those used in farm and construction equipment, are operated outdoors, predominantly during warmer weather and often in or near heavily-populated urban areas where they contribute to ozone formation and ambient CO and PM levels. These engines are also often operated in factories, warehouses, and large retail outlets throughout the year, where they contribute to high exposure levels to personnel who work with or near this equipment as well as to ozone formation and ambient CO and PM levels. For the purpose of this proposal, we are calling these ''Large SI engines.''
- Nonroad Spark-Ignition Recreational Engines. These are spark-ignition nonroad engines used primarily in recreational applications. These include off-highway motorcycles, all-terrain-vehicles and snowmobiles. Some of these engines, particularly those used on all-terrain vehicles, are increasingly used for commercial purposes within urban areas, especially for mowing lawns and hauling loads. These vehicles are typically used in suburban and rural areas, where they contribute to ozone formation and ambient CO, and PM levels. All these vehicles, and snowmobiles in particular, contribute to visibility impairment problems in our national and state parks. For the purpose of this proposal, we are calling this group of engines ''recreational vehicles.''
- Marine Engines. These are marine diesel engines that are used on recreational vessels such as yachts, cruisers, and other types of pleasure craft. Recreational marine engines are primarily used in warm weather and therefore contribute to ozone formation and PM levels, especially in marinas, which are often located in nonattainment areas.

Nationwide, these engines and vehicles are a significant source of mobile-source air pollution. As described in Section II.C, below, they currently account for about 13 percent of national mobile-source HC emissions, 6 percent of mobile-source CO emissions, 3 percent of mobile-source NO_X emissions, and 1 percent of mobile-source PM emissions. Recreational vehicles by themselves account for nearly 10 percent of national mobile-source HC emissions and about 3 percent of national mobile-source CO emissions. Within national parks, snowmobiles are significant contributors to ambient concentrations of fine particulate matter, a leading component of visibility impairment. By reducing these emissions, the proposed standards would provide assistance to states facing ozone and CO air quality problems, which can cause a range of adverse health effects, especially in terms of respiratory impairment and related illnesses. States are required to develop plans to address visibility impairment in national parks, and the reductions proposed in this rule would assist states in those efforts.

In addition, the proposed standards would help reduce acute exposure to CO and air toxics for forklift operators, snowmobile users, national and state park attendants, and other people who may be at particular risk because they operate or work or are otherwise active for long periods of time in close proximity to this equipment. Emissions from these vehicles and equipment can be very high on a per engine basis. In addition, the equipment (e.g., forklifts) is often used in enclosed areas. Similarly, exposure can be intensified for snowmobile riders who follow a group of other rides along a trail, since those riders are exposed to the emissions of all the other snowmobiles riding ahead. As summarized below and explained in greater detail in the Draft Regulatory Support Document for this proposal, CO emissions have been directly associated with cardisvascular and other health problems, and many types of hydrocarbons are also air toxics.

The standards proposed in this document would require the use of cleaner emission-control technologies. For Large SI engines, we are proposing a two-phase program that will take fuel effects into account. The first phase consists of one set of standards that would apply to all engines regardless of fuel (i.e., gasoline, LPG, CNG). These standards are identical to those recently adopted by California Air Resources Board (CARB) and are based on a steady-state test. The second phase of standards is more stringent than the California standards. The numerical limits differ depending on fuel type and would require optimizing the same emission-control technologies used in Phase 1 but would be based on a transient duty test cycle. These standards would also include new requirements for evaporative emissions and engine diagnostics.

For marine engines, we are proposing to set new standards that would require recreational diesel marine engines to adopt the emission-control technology

[9] As defined in Regulation 13 of Annex VI, a major conversion means the engine is replaced by a new engine, it is substantially modified, or its maximum continuous rating is increased by more than 10 percent.

[10] For more information about our voluntary certification program, see ''guidance for Certifying to MARPOL Annex VI,'' VPCD–99–02. This letter is available on our website: *http://www.epa.gov/otaq/regs/nonroad/marine/ci/imolettr.pdf.*

that will be in use on commercial diesel marine engines.

For nonroad recreational vehicles, we are proposing standards that would require snowmobiles to use cleaner 2-stroke technologies (e.g., clean carburetion, electronic fuel injection). For off-highway motorcycles and all-terrain vehicles, we are proposing standards that would effectively require manufacturers to use more 4-stroke technology for most engines. A second phase of proposed standards for all-terrain vehicles is based on catalyst technology.

When the proposed emission standards are fully implemented in 2020, we expect a 79 percent reduction in HC emissions, 75 percent reduction in NO_X emissions, and 56 percent reduction in CO emissions from these engines, equipment, and vehicles (see Section IX below for more details). These emission reductions will reduce ambient concentrations of ozone, CO, and PM fine, which is a health concern and contributes to visibility impairment. The standards will also reduce personal exposure for people who operate or who work with or are otherwise in close proximity to these engines and vehicles.

For the nonroad engines covered by this proposal, the Agency has already established in several previous actions that they cause or contribute to ozone or carbon monoxide pollution in more than one nonattainment area. In three actions in 1996, 1999, and 2000, we made separate determinations that each category of nonroad engines covered by this proposal specifically contributes to ozone and CO nonattainment, and to adverse health effects associated with ambient concentrations of PM. These actions are summarized in Table II.A–1. In addition, pursuant to Section 213(a)(4) of the Act, we are proposing to find that nonroad engines, including construction equipment, farm tractors, boats, planes, locomotives, marine engines, and recreational vehicles (e.g., off-highway motorcycles, all-terrain-vehicles, and snowmobiles), significantly contribute to regional haze, and that these engines, particularly snowmobiles, are significant emitters of pollutants that are known to impair visibility in federal Class I areas. The discussion pertaining to this proposed finding is in Section II.D.1, below.

TABLE II.A–1.—SUMMARY OF NONROAD AIR QUALITY FINDINGS

Source	Date of finding	Pollutants covered	Emissions determined to contribute
CI Marine	December 29, 1999, 64 FR 73300 ..	Ozone, PM	$HC+NO_X$, PM, CO.
Large SI	December 7, 2000, 65 FR 76790	Ozone, CO, PM	$HC+NO_X$, CO, PM.
Recreational Vehicles	December 7, 2000, 65 FR 76790	Ozone, CO, PM	$HC+NO_X$, CO, PM.

B. What Are the Public Health and Welfare Effects Associated With Emissions From Nonroad Engines Subject to the Proposed Standards?

The engines and vehicles that would be subject to the proposed standards generate emissions of HC, CO, PM and air toxics that contribute to ozone and CO nonattainment as well as adverse health effects associated with ambient concentrations of PM and air toxics. Elevated emissions from those recreational vehicles that operate in national parks (e.g., snowmobiles) contribute to visibility impairment. This section summarizes the general health effects of these substances. National inventory estimates are set out in Section II.B, and estimates of the expected impact of the proposed control programs are described in Section IX. Interested readers are encouraged to refer to the Draft Regulatory Support Document for this proposal for more in-depth discussions.

1. Health and Welfare Effects Associated With Ground Level Ozone and Its Precursors

Volatile organic compounds (VOC) and NO_X are precursors in the photochemical reaction which forms tropospheric ozone. Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of VOCs and NO_X in the presence of heat and sunlight. Hydrocarbons (HC) are a large subset of VOC, and to reduce mobile-source VOC levels we set maximum emissions limits for hydrocarbon and particulate matter emissions.

A large body of evidence shows that ozone can cause harmful respiratory effects including chest pain, coughing, and shortness of breath, which affect people with compromised respiratory systems most severely. When inhaled, ozone can cause acute respiratory problems; aggravate asthma; cause significant temporary decreases in lung function of 15 to over 20 percent in some healthy adults; cause inflammation of lung tissue; produce changes in lung tissue and structure; may increase hospital admissions and emergency room visits; and impair the body's immune system defenses, making people more susceptible to respiratory illnesses. Children and outdoor workers are likely to be exposed to elevated ambient levels of ozone during exercise and, therefore, are at a greater risk of experiencing adverse health effects. Beyond its human health effects, ozone has been shown to injure plants, which has the effect of reducing crop yields and reducing productivity in forest ecosystems.

There is strong and convincing evidence that exposure to ozone is associated with exacerbation of asthma-related symptoms. Increases in ozone concentrations in the air have been associated with increases in hospitalization for respiratory causes for individuals with asthma, worsening of symptoms, decrements in lung function, and increased medication use, and chronic exposure may cause permanent lung damage. The risk of suffering these effects is particularly high for children and for people with compromised respiratory systems.

Ground level ozone today remains a pervasive pollution problem in the United States. In 1999, 90.8 million people (1990 census) lived in 31 areas designated nonattainment under the 1-hour ozone NAAQS.[73] This sharp decline from the 101 nonattainment areas originally identified under the Clean Air Act Amendments of 1990 demonstrates the effectiveness of the last decade's worth of emission-control programs. However, elevated ozone concentrations remain a serious public health concern throughout the nation.

Over the last decade, declines in ozone levels were found mostly in urban areas, where emissions are heavily influenced by controls on mobile sources and their fuels. Twenty-three metropolitan areas have realized a decline in ozone levels since 1989, but at the same time ozone levels in 11 metropolitan areas with 7 million

[73] National Air Quality and Emissions Trends Report, 1999, EPA, 2001, at Table A–19. This document is available at *http://www.epa.gov/oar/aqtrnd99/*. The data from the Trends report are the most recent EPA air quality data that have been quality assured. A copy of this table can also be found in Docket No. A–2000–01, Document No. II–A–64.

people have increased.[74] Regionally, California and the Northeast have recorded significant reductions in peak ozone levels, while four other regions (the Mid-Atlantic, the Southeast, the Central and Pacific Northwest) have seen ozone levels increase.

The highest ambient concentrations are currently found in suburban areas, consistent with downwind transport of emissions from urban centers. Concentrations in rural areas have risen to the levels previously found only in cities. Particularly relevant to this proposal, ozone levels at 17 of our National Parks have increased, and in 1998, ozone levels in two parks, Shenandoah National Park and the Great Smoky Mountains National Park, were 30 to 40 percent higher than the ozone NAAQS over part of the last decade.[75]

To estimate future ozone levels, we refer to the modeling performed in conjunction with the final rule for our most recent heavy-duty highway engine and fuel standards.[76] We performed ozone air quality modeling for the entire Eastern U.S. covering metropolitan areas from Texas to the Northeast.[77] This ozone air quality model was based upon the same modeling system as was used in the Tier 2 air quality analysis, with the addition of updated inventory estimates for 2007 and 2030. The results of this modeling were examined for those 37 areas in the East for which EPA's modeling predicted exceedances in 2007, 2020, and/or 2030 and the current 1-hour design values are above the standard or within 10 percent of the standard. This photochemical ozone modeling for 2020 predicts exceedances of the 1-hour ozone standard in 32 areas with a total of 89 million people (1999 census) after accounting for light- and heavy-duty on-highway control programs.[78] We expect the NO_X and HC control strategies contained in this proposal for nonroad engines will further assist state efforts already underway to attain and maintain the 1-hour ozone standard.

In addition to the health effects described above, there exists a large body of scientific literature that shows that harmful effects can occur from sustained levels of ozone exposure much lower than 0.125 ppm.[79] Studies of prolonged exposures, those lasting about 7 hours, show health effects from prolonged and repeated exposures at moderate levels of exertion to ozone concentrations as low as 0.08 ppm. The health effects at these levels of exposure include transient pulmonary function responses, transient respiratory symptoms, effects on exercise performance, increased airway responsiveness, increased susceptibility to respiratory infection, increased hospital and emergency room visits, and transient pulmonary respiratory inflammation.

Prolonged and repeated ozone concentrations at these levels are common in areas throughout the country, and are found both in areas that are exceeding, and areas that are not exceeding, the 1-hour ozone standard. Areas with these high concentrations are more widespread than those in nonattainment for that 1-hour ozone standard. Monitoring data indicate that 333 counties in 33 states exceed these levels in 1997–99.[80] The Agency's most recent photochemical ozone modeling forecast that 111 million people are predicted to live in areas that are at risk of exceeding these moderate ozone levels for prolonged periods of time in 2020 after accounting for expected inventory reductions due to controls on light- and heavy-duty on-highway vehicles.[81]

2. Health Effects Associated With Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless gas produced through the incomplete combustion of carbon-based fuels. Carbon monoxide enters the bloodstream through the lungs and reduces the delivery of oxygen to the body's organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Healthy individuals also are affected, but only at higher CO levels. Exposure to elevated CO levels is associated with impairment of visual perception, work capacity, manual dexterity, learning ability and performance of complex tasks.

High concentrations of CO generally occur in areas with elevated mobile-source emissions. Peak concentrations typically occur during the colder months of the year when mobile-source CO emissions are greater and nighttime inversion conditions are more frequent. This is due to the enhanced stability in the atmospheric boundary layer, which inhibits vertical mixing of emissions from the surface.

The current primary NAAQS for CO are 35 parts per million for the one-hour average and 9 parts per million for the eight-hour average. These values are not to be exceeded more than once per year. Air quality carbon monoxide value is estimated using EPA guidance for calculating design values. In 1999, 30.5 million people (1990 census) lived in 17 areas designated nonattainment under the CO NAAQS.[82]

Snowmobiles, which have relatively high per engine CO emissions, can be a significant source of ambient CO levels in CO nonattainment areas. Several states that contain CO nonattainment areas also have large populations of registered snowmobiles. This is shown in Table II.B–1. A review of snowmobile trail maps indicates that snowmobiles are used in these CO nonattainment

[74] National Air Quality and Emissions Trends Report, 1998, March, 2000, at 28. This document is available at *http://www.epa.gov/oar/aqtrnd98/.* Relevant pages of this report can be found in Memorandum to Air Docket A–2000–01 from Jean Marie Revelt, September 5, 2001, Document No. II–A–63.

[75] National Air Quality and Emissions Trends Report, 1998, March, 2000, at 32. This document is available at *http://www.epa.gov/oar/aqtrnd98/.* Relevant pages of this report can be found in Memorandum to Air Docket A–2000–01 from Jean Marie Revelt, September 5, 2001, Document No. II–A–63.

[76] Additional information about this modeling can be found in our Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, document EPA420–R–00–026, December 2000. Docket No. 1–2000–01, Document No. II–A–13. This document is also available at *http://www.epa.gov/otaq/diesel.htm#documents.*

[77] We also performed ozone air quality modeling for the western United States but, as described further in the air quality technical support document, model predictions were well below corresponding ambient concentrations for out heavy-duty engine standards and fuel sulfur control rulemaking. Because of poor model performance for this region of the country, the results of the Western ozone modeling were not relied on for that rule.

[78] Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, US EPA, EPA420–R–00–026, December 2000, at II–14, Table II.A–2. Docket No. A–2000–01, Document Number II–A–13. This document is also available at *http://www.epa.gov/otaq/diesel.htm#documents.*

[79] Additional information about these studies can be found in Chapter 2 of ''Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements,'' December 2000, EPA420–R–00–026. Docket No. A–2000–01, Document Number II–A–13. This document is also available at *http://www.epa.gov/otaq/diesel.htm#documents.*

[80] A copy of these data can be found in Air Docket A–2000–01, Document No. II–A–80.

[81] Memorandum to Docket A–99–06 from Eric Ginsburg, EPA, ''Summary of Model-Adjusted Ambient Concentrations for Certain Levels of Ground-Level Ozone over Prolonged Periods,'' November 22, 2000, at Table C, Control Scenario—2020 Populations in Eastern Metropolitan Counties with Predicted Daily 8-Hour Ozone greater than or equal to 0.080 ppm. Docket A–2000–01, Document Number II–B–13.

[82] National Air Quality and Emissions Trends Report, 1999, EPA, 2001, at Table A–19. This document is available at *http://www.epa.gov/oar/aqtrnd99/.* The data from the Trends report are the most recent EPA air quality data that have been quality assured. A copy of this table can also be found in Docket No. A–2000–01, Document No. II–A–64.

areas or in adjoining counties.[83] These include the Mt. Spokane and Riverside trails near the Spokane, Washington CO nonattainment area; the Larimer trails near the Fort Collins, Colorado CO nonattainment area; and the Hyatt Lake, Lake of the Woods, and Cold Springs trails near the Klamath Falls and Medford, Oregon CO nonattainment area. There are also trails in Missoula County, Montana that demonstrate snowmobile use in the Missoula, Montana CO nonattainment area. While Colorado has a large snowmobile population, the snowmobile trails are fairly distant from the Colorado Springs CO nonattainment areas. EPA requests comment on the volume and nature of snowmobile use in these and other CO nonattainment areas. Of particular interest is information about the number of trails in and around CO nonattainment areas, the magnitude of snowmobile use on those trails, and the extent to which snowmobiles are used off-trail.[84]

TABLE II.B–1.—SNOWMOBILE USE IN SELECTED CO NONATTAINMENT AREAS

City and State	CO nonattainment classification	1998 State snowmobile population [a]
Fairbanks, AK	Serious	12,997
Spokane, WA	Serious	32,274
Colorado Springs, CO	Moderate	28,000
Fort Collins, CO	Moderate	
Klamath Falls, OR	Moderate	13,426
Medford, OR	Moderate	
Missoula, MT	Moderate	14,361

[a] Source: Letter from International Snowmobile Manufacturers Association to US–EPA, July 8, 1999, Docket A–2000–01, Document No. II–G.

Exceedances of the 8-hour CO standard were recorded in three of these seven CO nonattainment areas located in the northern portion of the country over the five year period from 1994 to 1999: Fairbanks, AK; Medford, OR; and Spokane, WA.[85] Given the variability in CO ambient concentrations due to weather patterns such as inversions, the absence of recent exceedances for some of these nonattainment areas should not be viewed as eliminating the need for further reductions to consistently attain and maintain the standard. A review of CO monitor data in Fairbanks from 1986 to 1995 shows that while median concentrations have declined steadily, unusual combinations of weather and emissions have resulted in elevated ambient CO concentrations well above the 8-hour standard of 9 ppm. Specifically, a Fairbanks monitor recorded average 8-hour ambient concentrations at 16 ppm in 1988, around 9 ppm from 1990 to 1992, and then a steady increase in CO ambient concentrations at 12, 14 and 16 ppm during some extreme cases in 1993, 1994 and 1995, respectively.[86]

Nationally, significant progress has been made over the last decade to reduce CO emissions and ambient CO concentrations. Total CO emissions from all sources have decreased 16 percent from 1989 to 1998, and ambient CO concentrations decreased by 39 percent. During that time, while the mobile source CO contribution of the inventory remained steady at about 77 percent, the highway portion decreased from 62 percent of total CO emissions to 56 percent while the nonroad portion increased from 17 percent to 22 percent.[87] Over the next decade, we would expect there to be a minor decreasing trend from the highway segment due primarily to the more stringent standards for certain light-duty trucks (LDT2s).[88] CO standards for passenger cars and other light-duty trucks and heavy-duty vehicles did not change as a result of other recent rulemakings). As described in Section II.C, below, the engines subject to this rule currently account for about 7 percent of the mobile source CO inventory; this is expected to increase to 10 percent by 2020 without the emission controls proposed in this action.

The state of Alaska recently submitted draft CO attainment SIPs to the Agency for the Fairbanks CO nonattainment area. Fairbanks is located in a mountain valley with a much higher potential for air stagnation than cities within the contiguous United States. Nocturnal inversions that give rise to elevated CO concentrations can persist 24-hours a day due to the low solar elevation, particularly in December and January. These inversions typically last from 2 to 4 days (Bradley et al., 1992), and thus inversions may continue during hours of maximum CO emissions from mobile sources. Despite the fact that snowmobiles are largely banned in CO nonattainment areas by the state, the state estimated that snowmobiles contributed 0.3 tons/day in 1995 to Fairbanks' CO nonattainment area or 1.2 percent of a total inventory of 23.3 tons per day in 2001.[89] While Fairbanks has made significant progress in reducing ambient CO concentrations, existing climate conditions make achieving and maintaining attainment challenging. Fairbanks failed to attain the CO NAAQS by the applicable deadline of

[83] St. Paul, Minnesota was recently reclassified as being in attainment but is still considered a maintenance area. There is also a significant population of snowmobiles in Minnesota, with snowmobile trails in Washington County.

[84] The trail maps consulted for this proposal can be found in Docket No. A–2000–01, Document No. II–A–65.

[85] Technical Memorandum to Docket A–2000–01 from Drew Kodjak, Attorney-Advisor, Office of Transportation and Air Quality, ''Air Quality Information for Selected CO Nonattainment Areas,'' July 27, 2001, Docket Number A–2000–01, Document Number II–B–18.

[86] Air Quality Criteria for Carbon Monoxide, US EPA, EPA 600/P–99/001F, June 2000, at 3–38, Figure 3–32 (Federal Bldg, AIRS Site 020900002). Air Docket A–2000–01, Document Number II–A–29. This document is also available at *http://www.epa.gov/ncea/coabstract.htm.*

[87] National Air Quality and Emissions Trends Report, 1998, March, 2000; this document is available at *http://www.epa.gov/oar/aqtrnd98/.* National Air Pollutant Emission Trends, 1900–1998 (EPA–454/R–00–002), March, 2000. These documents are available at Docket No. A–2000–01, Document No. II–A–72. See also Air Quality Criteria for Carbon Monoxide, US EPA, EPA 600/P–99/001F, June 2000, at 3–10. Air Docket A–2000–01, Document Number II–A–29. This document is also available at *http://www.epa.gov/ncea/coabstract.htm.*

[88] LDT2s are light light-duty trucks greater than 3750 lbs. loaded vehicle weight, up through 6000 gross vehicle weight rating.

[89] Draft Anchorage Carbon Monoxide Emission Inventory and Year 2000 Attainment Projections, Air Quality Program, May 2001, Docket Number A–2000–01, Document II–A–40; Draft Fairbanks 1995–2001 Carbon Monoxide Emissions Inventory, June 1, 2001, Docket Number A–2000–01, Document II–A–39.

December 21, 2000, and EPA approved a one-year extension in May of 2001.[90]

In addition to the health effects that can result from exposure to carbon monoxide, this pollutant also can contribute to ground level ozone formation.[91] Recent studies in atmospheric chemistry in urban environments suggest CO can react with hydrogen-containing radicals, leaving fewer of these to combine with non-methane hydrocarbons and thus leading to increased levels of ozone. Few analyses have been performed that estimate these effects, but a study of an ozone episode in Atlanta, GA in 1988 found that CO accounted for about 17.5 percent of the ozone formed (compared to 82.5 percent for volatile organic compounds). While different cities may have different results, the effects of CO emissions on ground level ozone are not insignificant. The engines that are the subject of the proposed standards are contributors to these effects in urban areas, particularly because their per engine emissions are so high. For example, CO emissions from an off-highway motorcycle are high relative to a passenger car, (32 g/mi compared to 4.2 g/mi). The CO controls contained in this proposal will further assist state efforts already underway to attain and maintain the CO NAAQS.

3. Health and Welfare Effects Associated With Particulate Matter

Nonroad engines and vehicles that would be subject to the proposed standards contribute to ambient particulate matter (PM) levels in two ways. First, they contribute through direct emissions of particulate matter. Second, they contribute to indirect formation of PM through their emissions of organic carbon, especially HC. Organic carbon accounts for between 27 and 36 percent of fine particle mass depending on the area of the country.

Particulate matter represents a broad class of chemically and physically diverse substances. It can be principally characterized as discrete particles that exist in the condensed (liquid or solid) phase spanning several orders of magnitude in size. All particles equal to and less than 10 microns are called PM_{10}. Fine particles can be generally defined as those particles with an aerodynamic diameter of 2.5 microns or less (also known as $PM_{2.5}$), and coarse fraction particles are those particles with an aerodynamic diameter greater than 2.5 microns, but equal to or less than a nominal 10 microns.

Particulate matter, like ozone, has been linked to a range of serious respiratory health problems. Scientific studies suggest a likely causal role of ambient particulate matter (which is attributable to several sources including mobile sources) in contributing to a series of health effects.[92] The key health effects categories associated with ambient particulate matter include premature mortality, aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions and emergency room visits, school absences, work loss days, and restricted activity days), aggravated asthma, acute respiratory symptoms, including aggravated coughing and difficult or painful breathing, chronic bronchitis, and decreased lung function that can be experienced as shortness of breath. Observable human noncancer health effects associated with exposure to diesel PM include some of the same health effects reported for ambient PM such as respiratory symptoms (cough, labored breathing, chest tightness, wheezing), and chronic respiratory disease (cough, phlegm, chronic bronchitis and suggestive evidence for decreases in pulmonary function). Symptoms of immunological effects such as wheezing and increased allergenicity are also seen. Exposure to fine particles is closely associated with such health effects as premature mortality or hospital admissions for cardiopulmonary disease.

PM also causes adverse impacts to the environment. Fine PM is the major cause of reduced visibility in parts of the United States, including many of our national parks. Other environmental impacts occur when particles deposit onto soils, plants, water or materials. For example, particles containing nitrogen and sulphur that deposit on to land or water bodies may change the nutrient balance and acidity of those environments. Finally, PM causes soiling and erosion damage to materials, including culturally important objects such as carved monuments and statues. It promotes and accelerates the corrosion of metals, degrades paints, and deteriorates building materials such as concrete and limestone.

The NAAQS for PM_{10} were established in 1987. According to these standards, the short term (24-hour) standard of 150 $\mu g/m^3$ is not to be exceeded more than once per year on average over three years. The long-term standard specifies an expected annual arithmetic mean not to exceed 50 $\mu g/m^3$ over three years. The most recent PM_{10} monitoring data indicate that 14 designated PM_{10} nonattainment areas with a projected population of 23 million violated the PM_{10} NAAQS in the period 1997–99. In addition, there are 25 unclassifiable areas that have recently recorded ambient concentrations of PM_{10} above the PM_{10} NAAQS.[93]

Current 1999 $PM_{2.5}$ monitored values, which cover about a third of the nation's counties, indicate that at least 40 million people live in areas where long-term ambient fine particulate matter levels are at or above 16 $\mu g/m^3$ (37 percent of the population in the areas with monitors).[94] This 16 $\mu g/m^3$ threshold is the low end of the range of long term average $PM_{2.5}$ concentrations in cities where statistically significant associations were found with serious health effects, including premature mortality.[95] To estimate the number of people who live in areas where long-term ambient fine particulate matter levels are at or above 16 $\mu g/m^3$ but for which there are no monitors, we can use modeling. According to our national modeled predictions, there were a total of 76 million people (1996 population) living in areas with modeled annual average $PM_{2.5}$ concentrations at or above 16 $\mu g/m^3$ (29 percent of the population).[96]

To estimate future $PM_{2.5}$ levels, we refer to the modeling performed in

[90] 66 FR 28836, May 25, 2001. Clean Air Act Promulgation of Attainment Date Extension for the Fairbanks North Star Borough Carbon Monoxide Nonattainment Area, AK, Direct Final Rule.

[91] U.S. EPA, Air Quality Criteria for Carbon Monoxide, EPA 600/P–99.001F, June 2000, Section 3.2.3. Air Docket A–2000–01, Document Number II–A–29. This document is also available at *http://www.epa.gov/ncea/coabstract.htm.*

[92] EPA (1996) Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information OAQPS Staff Paper. EPA–452/R–96–013. Docket Number A–99–06, Documents Nos. II–A–18, 19, 20, and 23. The particulate matter air quality criteria documents are also available at *http://www.epa.gov/ncea/partmatt.htm.*

[93] EPA adopted a policy in 1996 that allows areas with PM_{10} exceedances that are attributable to natural events to retain their designation as unclassifiable if the State is taking all reasonable measures to safeguard public health regardless of the sources of PM_{10} emissions.

[94] Memorandum to Docket A–99–06 from Eric O. Ginsburg, Senior Program Advisor, ''Summary of 1999 Ambient Concentrations of Fine Particulate Matter,'' November 15, 2000. Air Docket A–2000–01, Document No. II–B–12.

[95] EPA (1996) Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information OAQPS Staff Paper. EPA–452/R–96–013. Docket Number A–99–06, Documents Nos. II–A–18, 19, 20, and 23. The particulate matter air quality criteria documents are also available at *http://www.epa.gov/ncea/partmatt.htm.*

[96] Memorandum to Docket A–99–06 from Eric O. Ginsburg, Senior Program Advisor, ''Summary of Absolute Modeled and Model-Adjusted Estimates of Fine Particulate Matter for Selected Years,'' December 6, 2000. Air Docket A–2000–01, Document No. II–B–14.

conjunction with the final rule for our most recent heavy-duty highway engine and fuel standards, using EPA's Regulatory Model System for Aerosols and Deposition (REMSAD).[97] The most appropriate method of making these projections relies on the model to predict changes between current and future states. Thus, we have estimated future conditions only for the areas with current $PM_{2.5}$ monitored data (which cover about a third of the nation's counties). For these counties, REMSAD predicts the current level of 37 percent of the population living in areas where fine PM levels are at or above 16 $\mu g/m^3$ to increase to 49 percent in 2030.[98]

Emissions of HCs from snowmobiles contribute to secondary formation of fine particulate matter which can cause a variety of adverse health and welfare effects, including visibility impairment discussed in Section II.D.1(b) below. For 20 counties across nine states, snowmobile trails are found within or near counties that registered ambient PM 2.5 concentrations at or above 15 $\mu g/m^3$, the level of the revised national ambient air quality standard for fine particles.[99] Fine particles may remain suspended for days or weeks and travel hundreds to thousands of kilometers, and thus fine particles emitted or created in one county may contribute to ambient concentrations in a neighboring county.[100] These counties are listed in Table II.B–2. To obtain the information about snowmobile trails contained in Table II.B–2, we consulted snowmobile trail maps that were supplied by various states.[101]

TABLE II.B–2.—COUNTIES WITH ANNUAL $PM_{2.5}$ LEVELS ABOVE 16 $\mu g/m^3$ AND SNOWMOBILE TRAILS

State and $PM_{2.5}$ exceedance county	County with snowmobile trails	Proximity to $PM_{2.5}$ exceedance county
Ohio:		
Mahoning	Mahoning.	
Trumbull	Trumbull.	
Summit	Summit.	
Montgomery	Montgomery.	
Portage	Portage.	
Franklin	Delaware	Borders North.
Marshall/Ohio (WV)	Belmont	Borders West.
Montana	Lincoln	Lincoln
California:		
Tulane	Tulane.	
Butte	Butte.	
Fresno	Fresno.	
Kern	Kern.	
Minnesota:		
Washington	Washington.	
Wright	Wright.	
Wisconsin:		
Waukesha	Waukesha.	
Milwaukee	Milwaukee.	
Oregon:		
Jackson	Douglas	Borders NNE.
Klamath	Douglas	Borders North.
Pennsylvania: Washington	Layette	Borders East.
	Somerset.	
Illinois: Rock Island	Rock Island	
	Henry	Borders East.
Iowa: Rock Island (IL)	Dubuque	Borders West.

We expect the PM control strategies contained in this proposal would further assist state efforts already underway to attain and maintain the PM NAAQS.

4. Health Effects Associated With Air Toxics

In addition to the human health and welfare impacts described above, emissions from the engines covered by this proposal also contain several other substances that are known or suspected human or animal carcinogens, or have serious noncancer health effects. These include benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and acrolein. The health effects of these air toxics are described in more detail in Chapter 1 of the Draft Regulatory Support Document for this rule. Additional information can also be found in the Technical Support

[97] Additional information about the Regulatory Model System for Aerosols and Deposition (REMSAD) and our modeling protocols can be found in our Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, document EPA420–R–00–026, December 2000. Docket No. A–2000–01, Document No. A–II–13. This document is also available at *http://www.epa.gov/otaq/disel.htm#documents.*

[98] Technical Memorandum, EPA Air Docket A–99–06, Eric O. Ginsburg, Senior Program Advisor, Emissions Monitoring and Analysis Division, OAQPS, Summary of Absolute Modeled and Model-Adjusted Estimates of Fine Particulate Matter for Selected Years, December 6, 2000, Table P–2. Docket Number 2000–01, Document Number II–B–14.

[99] Memo to file from Terence Fitz-Simons, OAQPS, Scott Mathias, OAQPS, Mike Rizzo, Region 5, ''Analyses of 1999 PM Data for the PM NAAQS Review,'' November 17, 2000, with attachment B, 1999 PM2.5 Annual Mean and 98th Percentile 24-Hour Average Concentrations. Docket No. A–2000–01, Document No. II–B–17.

[100] Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment for Scientific and Technical Information, OAQPS Staff Paper, EPA–452/R–96–013, July, 1996, at IV–7.

[101] The trail maps consulted for this proposal can be found in Docket No. A–2000–01, Document No. II–A–65.

Document for our final Mobile Source Air Toxics rule.[102]

The hydrocarbon controls contained in this proposal are expected to reduce exposure to air toxics and therefore may help reduce the impact of these engines on cancer and noncancer health effects.

C. What Is the Inventory Contribution From the Nonroad Engines and Vehicles That Would Be Subject to This Proposal?

The contribution of emissions from the nonroad engines and vehicles that would be subject to the proposed standards to the national inventories of pollutants that are associated with the health and public welfare effects described in Section II.B are considerable. To estimate nonroad engine and vehicle emission contributions, we used the latest version of our NONROAD emissions model. This model computes nationwide, state, and county emission levels for a wide variety of nonroad engines, and uses information on emission rates, operating data, and population to determine annual emission levels of various pollutants. A more detailed description of the model and our estimation methodology can be found in the Chapter 6 of the Draft Regulatory Support Document.

Baseline emission inventory estimates for the year 2000 for the categories of engines and vehicles covered by this proposal are summarized in Table II.C–1. This table shows the relative contributions of the different mobile-source categories to the overall national mobile-source inventory. Of the total emissions from mobile sources, the categories of engines and vehicles covered by this proposal contribute about 13 percent, 3 percent, 6 percent, and 1 percent of HC, NO_X, CO, and PM emissions, respectively, in the year 2000. The results for industrial SI engines indicate they contribute approximately 3 percent to HC, NO_X, and CO emissions from mobile sources. The results for land-based recreational engines reflect the impact of the significantly different emissions characteristics of two-stroke engines. These engines are estimated to contribute 10 percent of HC emissions and 3 percent of CO from mobile sources. Recreational CI marine contribute less than 1 percent to NO_X mobile source inventories. When only nonroad emissions are considered, the engines and vehicles that would be subject to the proposed standards would account for a larger share.

Our draft emission projections for 2020 for the nonroad engines and vehicles subject to this proposal show that emissions from these categories are expected to increase over time if left uncontrolled. The projections for 2020 are summarized in Table II.C–2 and indicate that the categories of engines and vehicles covered by this proposal are expected to contribute 33 percent, 9 percent, 9 percent, and 2 percent of HC, NO_X, CO, and PM emissions in the year 2020. Population growth and the effects of other regulatory control programs are factored into these projections. The relative importance of uncontrolled nonroad engines is higher than the projections for 2000 because there are already emission control programs in place for the other categories of mobile sources which are expected to reduce their emission levels. The effectiveness of all control programs is offset by the anticipated growth in engine populations.

TABLE II.C–1.—MODELED ANNUAL EMISSION LEVELS FOR MOBILE-SOURCE CATEGORIES IN 2000

[Thousand short tons]

Category	NO_X		HC		CO		PM	
	Tons	Percent of mobile source	Tons	Percent of mobile source	Tons	Percent of mobile source	Tons	Percent of mobile source
Total for engines subject to proposed standards	343	2.6	985	12.9	4,870	6.3	8.3	1.2
Highway Motorcycles	8	0.1	84	1.1	329	0.4	0.4	0.1
Nonroad Industrial SI > 19 kW	306	2.3	247	3.2	2,294	3.0	1.6	0.2
Recreational SI	13	0.1	737	9.7	2,572	3.3	5.7	0.8
Recreation Marine CI	24	0.2	1	0.0	4	0.0	1	0.1
Marine SI Evap	0	0.0	89	1.2	0	0.0	0	0.0
Marine SI Exhaust	32	0.2	708	9.3	2,144	2.8	38	5.4
Nonroad SI < 19 kW	106	0.8	1,460	19.1	18,359	23.6	50	7.2
Nonroad CI	2,625	19.5	316	4.1	1,217	1.6	253	36.2
Commercial Marine CI	977	7.3	30	0.4	129	0.2	41	5.9
Locomotive	1,192	8.9	47	0.6	119	0.2	30	4.3
Total Nonroad	5,275	39	3,635	48	26,838	35	420	60
Total Highway	7,981	59	3,811	50	49,811	64	240	34
Aircraft	178	1	183	2	1,017	1	39	6
Total Mobile Sources	13,434	100	7,629	100	77,666	100	699	100
Total Man-Made Sources	24,538	.....	18,575	.....	99,745	.....	3,095	.....
Mobile Source percent of Total Man-Made Sources	55	.....	41	.....	78	.....	23	.....

[102] See our Mobile Source Air Toxics final rulemaking, 66 FR 17230, March 29, 2001, and the Technical Support Document for that rulemaking. Docket No. A–2000–01, Documents Nos. II–A–42 and II–A–30.

TABLE II.C–2.—MODELED ANNUAL EMISSION LEVELS FOR MOBILE-SOURCE CATEGORIES IN 2020

[Thousand short tons]

Category	NO_x		HC		CO		PM	
	Tons	Percent of mobile source	Tons	Percent of mobile source	Tons	Percent of mobile source	Tons	Percent of mobile source
Total for engines subject to proposed standards	552	8.9	2,055	33.4	8,404	9.4	11.4	1.8
Highway Motorcyles	14	0.2	144	2.3	569	0.6	0.8	0.1
Nonroad Industrial SI > 19 kW	486	7.8	348	5.7	2,991	3.3	2.4	0.4
Recreational SI	27	0.4	1,706	27.7	5,407	3.3	7.5	1.2
Recreation Marine CI	39	0.6	1	0.0	6	0.0	1.5	0.2
Marine SI Evap	0	0.0	102	1.4	0	0.0	0	0.0
Marine SI Exhaust	58	0.9	284	4.6	1,985	2.2	28	4.4
Nonroad SI < 19 kW	106	1.7	986	16.0	27,352	30.5	77	12.2
Nonroad CI	1,791	28.8	142	2.3	1,462	1.6	261	41.3
Commercial Marine CI	819	13.2	35	0.6	160	0.2	46	7.3
Locomotive	611	9.8	35	0.6	119	0.1	21	3.3
Total Nonroad	3,937	63	3,639	59	39,482	44	444	70
Total Highway	2,050	33	2,278	37	48,903	54	145	23
Aircraft	232	4	238	4	1,387	2	43	7
Total Mobile Sources	6,219	100	6,155	100	89,772	100	632	100
Total Man-Made Sources	16,195	.....	16,215	.....	113,440	.....	3,016	.....
Mobile Source percent of Total Man-Made Sources	38	.....	38	.....	79	.....	21	.....

D. Regional and Local-Scale Public Health and Welfare Effects

The previous section describes national-scale adverse public health effects associated with the nonroad engines and vehicles covered by this proposal. This section describes significant adverse health and welfare effects arising from the usage patterns of snowmobiles, Large SI engines, and gasoline marine engines on the regional and local scale. Studies suggest that emissions from these engines can be concentrated in specific areas, leading to elevated ambient concentrations of particular pollutants and associated elevated personal exposures to operators and by-standers. Recreational vehicles, and particularly snowmobiles, are typically operating in rural areas such as national parks and wilderness areas, and emissions from these vehicles contribute to ambient particulate matter which is a leading component of visibility impairment.

1. Health and Welfare Effects Related to Snowmobiles

In this section, we describe more localized human health and welfare effects associated with snowmobile emissions: visibility impairment and personal exposure to air toxics and CO. We describe the contribution of snowmobile HC emissions to secondary formation of fine particles, which are the leading component of visibility impairment and adverse health effects related to ambient PM2.5 concentrations greater than 16 ug/m3. We also discuss personal exposure to CO emissions and air toxics. Gaseous air toxics are components of hydrocarbons, and CO personal exposure measurements suggest that snowmobile riders and bystanders are exposed to unhealthy levels of gaseous air toxics (e.g., benzene) and CO.

a. Nonroad Engines and Regional Haze. The Clean Air Act established special goals for improving visibility in many national parks, wilderness areas, and international parks. In the 1977 amendments to the Clean Air Act, Congress set as a national goal for visibility the ''prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution'' (CAA section 169A(a)(1)). The Amendments called for EPA to issue regulations requiring States to develop implementation plans that assure ''reasonable progress'' toward meeting the national goal (CAA Section 169A(a)(4)). EPA issued regulations in 1980 to address visibility problems that are ''reasonably attributable'' to a single source or small group of sources, but deferred action on regulations related to regional haze, a type of visibility impairment that is caused by the emission of air pollutants by numerous emission sources located across a broad geographic region. At that time, EPA acknowledged that the regulations were only the first phase for addressing visibility impairment. Regulations dealing with regional haze were deferred until improved techniques were developed for monitoring, for air quality modeling, and for understanding the specific pollutants contributing to regional haze.

In the 1990 Clean Air Act amendments, Congress provided additional emphasis on regional haze issues (see CAA section 169B). In 1999 EPA finalized a rule that calls for States to establish goals and emission reduction strategies for improving visibility in all 156 mandatory Class I national parks and wilderness areas. In that rule, EPA also encouraged the States to work together in developing and implementing their air quality plans. The regional haze program is designed to improve visibility and air quality in our most treasured natural areas. At the same time, control strategies designed to improve visibility in the national parks and wilderness areas will improve visibility over broad geographic areas.

Regional haze is caused by the emission from numerous sources located over a wide geographic area. Such sources include, but are not limited to, major and minor stationary sources, mobile sources, and area sources. Visibility impairment is caused by pollutants (mostly fine particles and precursor gases) directly emitted to the

atmosphere by several activities (such as electric power generation, various industry and manufacturing processes, truck and auto emissions, construction activities, etc.). These gases and particles scatter and absorb light, removing it from the sight path and creating a hazy condition.

Some fine particles are formed when gases emitted to the air form particles as they are carried downwind (examples include sulfates, formed from sulfur dioxide, and nitrates, formed from nitrogen oxides). These activities generally span broad geographic areas and fine particles can be transported great distances, sometimes hundreds or thousands of miles. Consequently, visibility impairment is a national problem. Without the effects of pollution a natural visual range is approximately 140 miles in the West and 90 miles in the East. However, fine particles have significantly reduced the range that people can see and in the West the current range is 33–90 miles and in the East it is only 14 to 24 miles.

Because of evidence that fine particles are frequently transported hundreds of miles, all 50 states, including those that do not have Class I areas, will have to participate in planning, analysis and, in many cases, emission control programs under the regional haze regulations. Even though a given State may not have any Class I areas, pollution that occurs in that State may contribute to impairment in Class I areas elsewhere. The rule encourages states to work together to determine whether or how much emissions from sources in a given state affect visibility in a downwind Class I area.

The regional haze program calls for states to establish goals for improving visibility in national parks and wilderness areas to improve visibility on the haziest 20 percent of days and to ensure that no degradation occurs on the clearest 20 percent of days. The rule requires states to develop long-term strategies including enforceable measures designed to meet reasonable progress goals. Under the regional haze program, States can take credit for improvements in air quality achieved as a result of other Clean Air Act programs, including national mobile-source programs.

Nonroad engines (including construction equipment, farm tractors, boats, planes, locomotives, recreational vehicles, and marine engines) contribute significantly to regional haze. This is because there are nonroad engines in all of the states, and their emissions contain precursors of fine PM and organic carbon that are transported and contribute to the formation of regional haze throughout the country and in Class I areas specifically. As illustrated in Table II.D–1, nonroad engines are expected to contribute 15 percent of national VOC emissions, 23 percent of national NO_X emissions, 6 percent of national SOx emissions, and 14 percent of national PM10 emissions. Snowmobiles alone are estimated to emit 208,926 tons of total hydrocarbons (THC), 1,461 tons of NO_X, 2,145 tons of SOx, and 5,082 tons of PM in 2007.

TABLE II.D–1.—NATIONAL EMISSIONS OF VARIOUS POLLUTANTS—2007

[Thousands short tons]

Source	VOC		NO_X		SO_X		PM_{10}	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Heavy-Duty Highway	413	3	2,969	14	24	0	115	4
Light-Duty Highway	2,596	18	2,948	14	24	0	82	3
Nonroad	2,115	15	4,710	23	1,027	6	407	14
Electric General	35	0	4,254	21	10,780	63	328	12
Point	1,639	11	3,147	15	3,796	22	1,007	36
Area	7,466	52	2,487	12	1,368	8	874	31
Total	14,265		20,516		17,019		2,814	

b. Snowmobiles and Visibility Impairment. As noted above, EPA issued regulations in 1980 to address Class I area visibility impairment that is ''reasonably attributable'' to a single source or small group of sources. In 40 CFR Part 51.301 of the visibility regulations, visibility impairment is defined as ''any humanly perceptible change in visibility (light extinction, visual range, contrast, coloration) from that which would have existed under natural conditions.'' States are required to develop implementation plans that include long-term strategies for improving visibility in each class I area. The long-term strategies under the 1980 regulations should consist of measures to reduce impacts from local sources and groups of sources that contribute to poor air quality days in the class I area. Types of impairment covered by these regulations includes layered hazes and visible plumes. While these kinds of visibility impairment can be caused by the same pollutants and processes as those that cause regional haze, they generally are attributed to a smaller number of sources located across a smaller area. The Clean Air Act and associated regulations call for protection of visibility impairment in class I areas from localized impacts as well as broader impacts associated with regional haze.

Visibility and particle monitoring data are available for 8 Class I areas where snowmobiles are commonly used. These are: Acadia, Boundary Waters, Denali, Mount Rainier, Rocky Mountain, Sequoia and Kings Canyon, Voyageurs, and Yellowstone.[103] Visibility and fine particle data for these parks are set out in Table II.D–2. This table shows the number of monitored days in the winter that fell within the 20-percent haziest days for each of these eight parks. Monitors collect data two days a week for a total of about 104 days of monitored values. Thus, for a particular site, a maximum of 21 worst possible days of these 104 days with monitored values constitute the set of 20-percent haziest days during a year which are tracked as the primary focus of regulatory efforts.[104] With the exception of Denali in Alaska, we defined the snowmobile season as January 1 through March 15 and December 15 through December 31 of the same calendar year, consistent with the methodology used in the Regional Haze Rule, which is calendar-year based. For Denali in

[103] No data were available at five additional parks where snowmobiles are also commonly used: Black Canyon of the Gunnison, CO, Grant Teton, WY, Northern Cascades, WA, Theodore Roosevelt, ND, and Zion, UT.

[104] Letter from Debra C. Miller, Data Analyst, National Park Service, to Drew Kodjak, August 22, 2001. Docket No. A–2000–01, Document Number. II–B–28.

Alaska, the snowmobile season is October 1 to April 30. The Agency would be interested in comments from the public on the start and end dates for the typical snowmobile season at each of these national parks.

TABLE II.D–2.—WINTER DAYS THAT FALL WITHIN THE 20 PERCENT HAZIEST DAYS AT NATIONAL PARKS USED BY SNOWMOBILES

NPS Unit	State(s)	Number of sampled wintertime days within 20 percent haziest days (maximum of 21 sampled days)			
		1996	1997	1998	1999
Acadia NP	ME	4	4	2	1
Denali NP and Preserve	AK	10	10	12	9
Mount Rainier NP	WA	1	3	1	1
Rocky Mountain NP	CO	2	1	2	1
Sequoia and Kings Canyon NP	CA	4	9	1	8
Voyageurs NP (1989–1992)	MN	*1989*	*1990*	*1991*	*1992*
		3	4	6	8
—Boundary Waters USFS Wilderness Area (close to Voyaguers with recent data).	MN	2	5	1	5
Yellowstone NP	ID, MT, WY	0	2	0	0

Source: Letter from Debra C. Miller, Data Analyst, National Park Service, to Drew Kodjak, August 22, 2001. Docket No. A–2000–01, Document Number. II–B–28.

The information presented in Table II.D–2 shows that visibility data support a conclusion that there are at least eight Class I Areas (7 in National Parks and one in a Wilderness Area) frequented by snowmobiles with one or more wintertime days within the 20-percent haziest days of the year. For example, Rocky Mountain National Park in Colorado was frequented by about 27,000 snowmobiles during the 1998–1999 winter. Of the monitored days characterized as within the 20-percent haziest monitored days, two (2) of those days occurred during the wintertime when snowmobile emissions such as hydrocarbons contributed to visibility impairment. According to the National Park Service, ''[s]ignificant differences in haziness occur at all eight sites between the averages of the clearest and haziest days. Differences in mean standard visual range on the clearest and haziest days fall in the approximate range of 115–170 km.'' [105]

Ambient concentrations of fine particles are the primary pollutant responsible for visibility impairment. Five pollutants are largely responsible for the chemical composition of fine particles: sulfates, nitrates, organic carbon particles, elemental carbon, and crustal material. Hydrocarbon emissions from automobiles, trucks, snowmobiles, and other industrial processes are common sources of organic carbon. The organic carbon fraction of fine particles ranges from 47 percent in Western areas such as Denali National Park, to 28 percent in Rocky Mountain National Park, to 13 percent in Acadia National Park.[106]

The contribution of snowmobiles to elemental carbon and nitrates is small. Their contribution to sulfates is a function of fuel sulfur and is small and will decrease even more as the sulfur content of their fuel decreases due to our recently finalized fuel sulfur requirements. In the winter months, however, hydrocarbon emissions from snowmobiles can be significant, as indicated in Table II.D–3, and these HC emissions can contribute significantly to the organic carbon fraction of fine particles which are largely responsible for visibility impairment. This is because they are typically powered by two-stroke engines that emit large amounts of hydrocarbons. In Yellowstone, a park with high snowmobile usage during the winter months, snowmobile hydrocarbon emissions can exceed 500 tons per year, as much as several large stationary sources. Other parks with less snowmobile traffic are less impacted by these hydrocarbon emissions.[107]

Table II.D–3 shows modeled tons of four pollutants during the winter season in five Class I national parks for which we have estimates of snowmobile use. The national park areas outside of Denali in Alaska are open to snowmobile operation in accordance with special regulations (36 CFR Part 7). Denali National Park permits snowmobile operation by local rural residents engaged in subsistence uses (36 CFR Part 13). Emission calculations are based on an assumed 2 hours of use per snowmobile visit at 16 hp with the exception of Yellowstone where 4 hours of use at 16 hp was assumed. The emission factors used to estimate these emissions are identical to those used by the NONROAD model. Two-stroke snowmobile emission factors are: 111 g/hp-hr HC, 296 g/hp-hr CO, 0.86 g/hp-hr NO_X, and 2.7 g/hp-hr PM. These emission factors are based on several engine tests performed by the International Snowmobile Manufacturers Association (ISMA) and the Southwest Research Institute (SwRI). These emission factors are still under review, and the emissions estimates may change pending the outcome of that review.

[105] Letter from Debra C. Miller, Data Analyst, National Park Service, to Drew Kodjak, August 22, 2001. Docket No. A–2000–01, Document Number. II–B–28.

[106] Letter from Debra C. Miller, Data Analyst, National Park Service, to Drew Kodjak, August 22, 2001. Docket No. A–2000–01, Document Number. II–B–28.

[107] Technical Memorandum, Aaron Worstell, Environmental Engineer, National Park Service, Air Resources Division, Denver, Colorado, particularly Table 1. Docket No. A–2000–01, Document Number II–G–178.

TABLE II.D–3.—WINTER SEASON SNOWMOBILE EMISSIONS

[Tons; 1999 Winter Season]

NPS unit	HC	CO	NO_X	PM
Denali NP & Preserve	>9.8	>26.1	>0.08	>0.24
Grand Teton NP	13.7	36.6	0.1	0.3
Rocky Mountain NP	106.7	284.7	0.8	2.6
Voyageurs NP	138.5	369.4	1.1	3.4
Yellowstone NP	492.0	1,311.9	3.8	12.0

Source: Letter from Aaron J. Worstell, Environmental Engineer, National Park Service, Air Resources Division, to Drew Kodjak, August 21, 2001, particularly Table 1. Docket No. A–2000–01, Document No. II–G–178.

Inventory analysis performed by the National Park Service for Yellowstone National Park suggests that snowmobile emissions can be a significant source of total annual mobile source emissions for the park year round. Table II.D–4 shows that in the 1998 winter season snowmobiles contributed 64 percent, 39 percent, and 30 percent of HC, CO, and PM emissions.[108] It should be noted that the snowmobile emission factors used to estimate these contributions are currently under review, and the snowmobile emissions may be revised down. However, when the emission factors used by EPA in its NONROAD model are used, the contribution of snowmobiles to total emissions in Yellowstone remains significant: 59 percent, 33 percent, and 45 percent of HC, CO and PM emissions. The University of Denver used remote-sensing equipment to estimate snowmobile HC emissions at Yellowstone during the winter of 1998–1999, and estimated that snowmobiles contribute 77% of annual hydrocarbon emissions at the park.[109] The portion of wintertime emissions attributable to snowmobiles is even higher, since all snowmobile emissions occur during the winter months.

TABLE II.D–4.—1998 ANNUAL HC EMISSIONS (TPY), YELLOWSTONE NATIONAL PARK

	HC		CO		NO_X		PM	
Source:								
Coaches	2.69	0%	24.29	1%	0.42	0%	0.01	0%
Autos	307.17	33%	2,242.12	54%	285.51	88%	12.20	60%
RVs	15.37	2%	269.61	6%	24.33	7%	0.90	4%
Snowmobiles	596.22	64%	1,636.44	39%	1.79	1%	6.07	30%
Buses	4.96	1%	18.00	0%	13.03	4%	1.07	5%
Total	926.4		4,190.46		325.08		20.25	

Source: National Park Service, February 2000. Air Quality Concerns Related to Snowmobile Usage in National Parks. Air Docket A–2000–01, Document No. II–A–44.

The information presented in this discussion indicates that snowmobiles are significant emitters of pollutants that are known to contribute to visibility impairment in some Class I areas. Annual and particularly wintertime hydrocarbon emissions from snowmobiles are high in the five parks considered in Table II.D–4, with two parks having HC emissions nearly as high as Yellowstone (Rocky Mountain and Voyageurs). The proportion of snowmobile emissions to emissions from other sources affecting air quality in these parks is likely to be similar to that in Yellowstone.

c. Snowmobiles and personal exposure to air toxics and CO. Snowmobile users can be exposed to high air toxic and CO emissions, both because they sit very close to the vehicle's exhaust port and because it is common for them to ride their vehicles on groomed trails where they travel fairly close behind other snowmobiles. Because of these riding patterns, snowmobilers breathe exhaust emissions from their own vehicle, the vehicle directly in front, as well as those farther up the trail. This can lead to relatively high personal exposure levels of harmful pollutants. A study of snowmobile rider CO exposure conducted at Grand Teton National Park showed that a snowmobiler riding at distances of 25 to 125 feet behind another snowmobiler and traveling at speeds from 10 to 40 mph can be exposed to average CO levels ranging from 0.5 to 23 ppm, depending on speed and distance. The highest CO level measured in this study was 45 ppm, as compared to the current 1-hour NAAQS for CO of 35 ppm.[110] While exposure levels can be less if a snowmobile drives 15 feet off the centerline of the lead snowmobile, the exposure levels are still of concern. This study led to the development of an empirical model for predicting CO exposures from riding behind snowmobiles.

Hydrocarbon speciation for snowmobile emissions was performed for the State of Montana in a 1997 report.[111] Using the empirical model for CO from the Grand Teton exposure study with benzene emission rates from the State of Montana's emission study, benzene exposures for riders driving behind a single snowmobile were predicted to range from 1.2E+02 to 1.4E+03 µg/m3. Using the same model to predict exposures when riding at the end of a line of six snowmobiles spaced 25 feet apart yielded exposure predictions of 3.5E+03, 1.9E+03,

[108] National Park Service, February 2000. Air Quality Concerns Related to Snowmobile Usage in National Parks. Air Docket A–2000–01, Document No. II–A–44.

[109] G. Bishop, et al., Snowmobile Contributions to Mobile Source Emissions in Yellowstone National Park, Environmental Science and Technology, Vol. 35, No. 14, at 2873. Docket No. A–2000–01, Document No. II–A–47.

[110] Snook and Davis, 1997, ''An Investigation of Driver Exposure to Carbon Monoxide While Traveling Behind Another Snowmobile.'' Docket No. A–2000–01, Document Number II–A–35.

[111] Emissions from Snowmobile Engines Using Bio-based Fuels and Lubricants, Southwest Research Institute, August, 1997, at 22. Docket No. A–2000–01, Document Number II–A–50.

1.3E+03, and 1.2E+03 µg/m3 benzene. at 10, 20, 30, and 40 mph, respectively.

The cancer risk posed to those exposed to benzene emissions from snowmobiles must be viewed within the broader context of expected lifetime benzene exposure. Observed monitoring data and predicted modeled values demonstrate that a significant cancer risk already exists from ambient concentrations of benzene for a large portion of the US population. The Agency's 1996 National-Scale Air Toxics Assessment of personal exposure to ambient concentrations of air toxic compounds emitted by outside sources (e.g. cars and trucks, power plants) found that benzene was among the five air toxics that appear to pose the greatest risk to people nationwide. This national assessment found that for approximately 50% of the US population in 1996, the inhalation cancer risks associated with benzene exceeded 10 in one million. Modeled predictions for ambient benzene from this assessment correlated well with observed monitored concentrations of benzene ambient concentrations.

Specifically, the draft National-Scale Assessment predicted nationwide annual average benzene exposures from outdoor sources to be 1.4 µg/m3.[112] In comparison, snowmobile riders and those directly exposed to snowmobile exhaust emissions had predicted benzene levels two to three orders of magnitude greater than the 1996 national average benzene concentrations.[113] These elevated levels are also known as air toxic ''hot spots,'' which are of particular concern to the Agency. Thus, total annual average exposures to typical ambient benzene concentrations combined with elevated short-term exposures to benzene from snowmobiles may pose a significant risk of adverse public health effects to snowmobile riders and those exposed on a frequent basis to exhaust benzene emissions from snowmobiles. We request comment on this issue.

Since snowmobile riders often travel in large groups, the riders towards the back of the group are exposed to the accumulated exhaust of those riding ahead. These exposure levels can continue for hours at a time. An additional consideration is that the risk to health from CO exposure increases with altitude, especially for unacclimated individuals. Therefore, a park visitor who lives at sea level and then rides his or her snowmobile on trails at high-altitude is more susceptible to the effects of CO than local residents.

In addition to snowmobilers themselves, people who are active in proximity to the areas where snowmobilers congregate may also be exposed to high CO levels. An OSHA industrial hygiene survey reported a peak CO exposure of 268 ppm for a Yellowstone employee working at an entrance kiosk where snowmobiles enter the park. This level is greater than the NIOSH peak recommended exposure limit of 200 ppm. OSHA's survey also measured employees' exposures to several air toxics. Benzene exposures in Yellowstone employees ranged from 67–600 µg/m3, with the same individual experiencing highest CO and benzene exposures. The highest benzene exposure concentrations exceeded the NIOSH Recommended Exposure Limit of 0.1 ppm for 8-hour exposures.[114]

d. Summary. For all of the reasons described in this section, we continue to believe it is appropriate to set emission standards for snowmobiles. At the national level, these engines contribute to CO levels in several nonattainment areas. Snowmobiles contribute significantly to hydrocarbon emissions that are known to contribute to visibility impairment in Class I areas. In addition, snowmobilers riding in a trail formation, as well as park attendants and other bystanders can experience very high levels of CO and benzene for relatively long periods of time. The proposed standards will help reduce these emissions and help alleviate these concerns.

2. Recreational Marine

As with snowmobiles, the usage patterns of recreational marine engine can lead to high personal exposure levels, particularly for CO emissions. The U.S. Coast Guard reported cases of CO poisoning caused by recreational boat usage.[115] These Coast Guard investigations into recreational boating accident reports between 1989 to1998 show that 57 accidents were reported, totaling 87 injuries and 32 fatalities, that involved CO poisoning. An article in the Journal of the American Medical Association also discusses CO poisoning among recreational boat users.[116] This study reports 21 incidences of CO poisoning from sterndrive and inboard engines; two-thirds of these incidences occurred when the boat was cruising.

The CO exposure to boaters comes from three general sources. First, CO may enter the engine compartment and cabin spaces from leaks in the exhaust system. Second, boaters may be exposed to CO if they are near the engine when it is idling such as swimming behind the boat. Third, CO may be drawn into the boat when it is cruising due to a back draft of air into the boat known as the ''station wagon effect.'' [117]

3. Large SI Engines

Exhaust emissions from applications with significant indoor use can expose individual operators or bystanders to dangerous levels of pollution. Forklifts, ice-surfacing machines, sweepers, and carpet cleaning equipment are examples of large industrial spark-ignition engines that often operate indoors or in other confined spaces. Forklifts alone account for over half of the engines in this category. Indoor use may include extensive operation in a temperature-controlled environment where ventilation is kept to a minimum (for example, for storing, processing, and shipping produce).

The principal concern for human exposure relates to CO emissions. One study showed several forklifts operating on liquefied petroleum gas (LPG) with measured CO emissions ranging from 10,000 to 90,000 ppm (1 to 9 percent).[118] The threshold limit value for a time-weighted average 8-hour workplace exposure set by the American Conference of Governmental Industrial Hygienists is 25 ppm. The recommended limit adopted by the National Institute for Occupational Safety and Health is 35 ppm for 8-hour exposure and maximum instantaneous exposure of 200 ppm. While these lower numbers refer to ambient concentrations, the very high documented exhaust concentrations

[112] National-Scale Air Toxics Assessment for 1996, EPA–453/R–01–003, Draft, January 2001.

[113] Technical Memorandum, Chad Bailey, Predicted benzene exposures and ambient concentrations on and near snowmobile trails, August 17, 2001. Air Docket A–2000–01, Document No. II–B–27.

[114] U.S. Department of Labor, OSHA, Billings Area Office, ''Industrial Hygiene Survey of Park Employee Exposures During Winter Use at Yellowstone National Park,'' February 19 through February 24, 2000. Docket No. A–2000–01, Document Number II–A–37; see also Industrial Hygiene Consultation Report prepared for Yellowstone National Park by Tim Radtke, CIH, Industrial Hygienist, June 1997. Docket A–2000–01, Document No. A–II–41.

[115] Summarized in an e-mail from Phil Cappel of the U.S. Coast Guard to Mike Samulski of the U.S. Environmental Protection Agency, October 19, 2000. Docket A–2000–01, Document No. II–A–46.

[116] Silvers, S., Hampton, N., ''Carbon Monoxide Poisoning Among Recreational Boaters,'' JAM, November 22/29, 1995, Vol 274, No. 20. Docket A–2000–01, Document No. 11–A–45.

[117] United States Coast Guard, ''Boating Safety Circular 64,'' December 1986. Docket A–2000–01, Document No. II–A–43.

[118] ''Warehouse Workers' Headache, Carbon Monoxide Poisoning from Propane-Fueled Forklifts,'' Thomas A. Fawcett, et al, Journal of Occupational Medicine, January 1992, p.12. Docket A–2000–01, Document No. II–A–36.

would quickly exceed the ambient levels in any operation in enclosed areas without extraordinary ventilation.

Large SI engines operating on any fuel can have very high CO emission levels. While our emission modeling estimates a significantly lower emission rate for engines fueled by LPG relative to gasoline, the study described above shows clearly that individual engines that should have low CO emissions can, through maladjustment or normal degradation, reach dangerous emission levels.

Additional exposure concerns occur at ice rinks. Numerous papers have identified ice-surfacing machines with spark-ignition engines as the source of dangerous levels of CO and NO_2, both for skaters and for spectators.[119] This is especially problematic for skaters, who breathe air in the area where pollutant concentration is highest, with higher respiration rates resulting from their high level of physical activity. This problem has received significant attention from the medical community.

In addition to CO emissions, HC emissions from all Large SI engines can lead to increased exposure to harmful pollutants, particularly air toxic emissions. Since many gasoline or dual-fuel engines are in forklifts that operate indoors, reducing evaporative emissions could have additional health benefits to operators and other personnel. Fuel vapors can also cause odor problems.

III. Nonroad: General Concepts

This section describes general concepts concerning the proposed emission standards and the ways in which a manufacturer would show compliance with these standards. Clean Air Act Section 213 requires us to set standards that achieve the greatest degree of emission reduction achievable through the application of technology that will be available, giving appropriate consideration to cost, noise, energy, and safety factors. In addition to emission standards, this document describes a variety of proposed requirements such as applying for certification, labeling engines, and meeting warranty requirements to define a process for implementing the proposed emission-control program in an effective way.

The discussions in this section are general and are meant to cover all the nonroad engines and vehicles that would be subject to the proposed standards. Refer to the discussions of specific engine programs, contained in Sections IV through VI, for more information about specific requirements for different categories of nonroad engines and vehicles. We request comment on all aspects of these general program provisions.

This section describes general nonroad provisions related to certification prior to sale or introduction into commerce. Section VII describes several proposed compliance provisions that apply generally to nonroad engines, and Section VIII similarly describes general testing provisions.

A. Scope of Application

As noted in Section I.C.1, this proposal covers recreational marine diesel engines, nonroad industrial SI engines rated over 19 kW, and recreational vehicles introduced into commerce in the United States. The following sections describe generally when emission standards apply to these products. Refer to the specific program discussion below for more information about the scope of application and timing of the proposed standards.

1. Do the Standards Apply to All Engines and Vehicles or Only to New Engines and Vehicles?

The scope of this proposal is broadly set by Clean Air Act section 213(a)(3), which instructs us to set emission standards for new nonroad engines and new nonroad vehicles. Generally speaking, the proposed rule is intended to cover all new engines and vehicles in the categories listed above (including any associated equipment or vessels).[120] Once the emission standards apply to a group of engines or vehicles, manufacturers must get a certificate of conformity from us before selling them in the United States.[121] This includes importation and any other means of introducing engines and vehicles into commerce. We also require equipment manufacturers that install engines from other companies to install only certified engines once emission standards apply. The certificate of conformity (and corresponding engine label) provide assurance that manufacturers have met their obligation to make engines that meet emission standards over the useful life we specify in the regulations.

2. How Do I Know if My Engine or Equipment Is New?

We are proposing to define ''new'' consistent with previous rulemakings. Under the proposed definition, a nonroad engine (or nonroad equipment) is considered new until its title has been transferred to the ultimate purchaser or the engine has been placed into service. This proposed definition would apply to both engines and equipment, so the nonroad equipment using these engines, including all-terrain vehicles, snowmobiles, off-highway motorcycles, and other land-based nonroad equipment would be considered new until their title has been transferred to an ultimate buyer. In Section III.B.1 we describe how to determine the model year of individual engines and vehicles.

To further clarify the proposed definition of new nonroad engine, we are proposing to specify that a nonroad engine, vehicle, or equipment is placed into service when it is used for its intended purpose. We are therefore proposing that an engine subject to the proposed standards is used for its functional purpose when it is installed on an all-terrain vehicle, snowmobile, off-highway motorcycle, marine vessel, or other piece of nonroad equipment. We need to make this clarification because some engines are made by modifying a highway or land-based nonroad engine that has already been installed on a vehicle or other piece of equipment. For example, someone can install an engine in a recreational marine vessel after it has been used for its functional purpose as a land-based highway or nonroad engine. We believe this is a reasonable approach because the practice of adapting used highway or land-based nonroad engines may become more common if these engines are not subject to the standards in this proposal.

In summary, an engine would be subject to the proposed standards if it is:

- Freshly manufactured, whether domestic or imported; this may include engines produced from engine block cores
- Installed for the first time in nonroad equipment after having powered a car or a category of nonroad equipment subject to different emission standards
- Installed in new nonroad equipment, regardless of the age of the engine
- Imported (new or used)

3. When Do Imported Engines Need To Meet Emission Standards?

The proposed emission standards would apply to all new engines that are used in the United States. According to

[119] ''Summary of Medical Papers Related to Exhaust Emission Exposure at Ice Rinks,'' EPA Memorandum from Alan Stout to Docket A–2000–01. Docket A–2000–01, Document No. II–A–38.

[120] For some categories, we are proposing vehicle-based or vessel-based standards. In these cases, the term ''engine'' in this document applies equally to the vehicles or vessels.

[121] The term ''manufacturer'' includes any individual or company introducing engines into commerce in the United States.

Clean Air Act section 216, ''new'' includes engines that are imported by any person, whether freshly manufactured or used. Thus, the proposed program would include engines that are imported for use in the United States, whether they are imported as loose engines or if they are already installed on a marine vessel, recreational vehicle, or other piece of nonroad equipment, built elsewhere. All imported engines would need an EPA-issued certificate of conformity to clear customs, with limited exemptions (as described below).

If an engine or marine vessel, recreational vehicle, or other piece of nonroad equipment that was built after emission standards take effect is imported without a currently valid certificate of conformity, we would still consider it to be a new engine, vehicle, or vessel. This means it would need to comply with the applicable emission standards. Thus, for example, a marine vessel manufactured in a foreign country in 2007, then imported into the United States in 2010, would be considered ''new.'' The engines on that piece of equipment would have to comply with the requirements for the 2007 model year, assuming no other exemptions apply. This provision is important to prevent manufacturers from avoiding emission standards by building vessels abroad, transferring their title, and then importing them as used vessels.

With regard to recreational vehicles, the United States Customs Service currently allows foreign nationals traveling with their personal automobiles, trailers, aircraft, motorcycles, or boats to import such vehicles without having to pay a tariff, so long as they are used in the United States only for the transportation of such person.[122] We propose to use this approach in our regulation of emissions from recreational vehicles (snowmobiles, off-highway motorcycles, and all-terrain vehicles). We propose to allow noncompliant recreational vehicles that are the personal property of foreign nationals to be imported into the United States as long as the foreign national bringing them into the country intends to use them only for his or her recreational purposes and they are not left here when the person leaves the country (they are either taken back or destroyed). In other words, such recreational vehicles would not be considered ''new'' for the purpose of determining whether they must comply with the proposed emission limits. We propose that a time limit of one year on this exemption so that recreational vehicles imported for more than that period of time would be considered imported, and therefore ''new'' and subject to the proposed emission limits. We are also proposing that this time period cannot be extended. This time limit is designed to prevent a person from using the exemption to effectively circumvent the standards.

This exemption generally would not apply to any commercial engines that would be subject to emission standards. To import noncomplying engines for commercial applications, the importer would have to meet the requirements for a different exemption, as described in Section VII.

4. Do the Standards Apply to Exported Engines or Vehicles?

Engines or vehicles intended for export would generally not be subject to the requirements of the proposed emission-control program. However, engines that are exported and subsequently re-imported into the United States would need to be certified. For example, this would be the case when a foreign company purchases engines manufactured in the United States for installation on a marine vessel, recreational vehicle, or other nonroad equipment for export back to the United States. Those engines would be subject to the emission standards that apply on the date the engine was originally manufactured. If the engine is later modified and certified (or recertified), the engine is subject to emission standards that apply on the date of the modification. So, for example, foreign boat builders buying U.S.-made engines without recertifying the engines will need to make sure they purchase complying engines for the products they sell in the U.S.

5. Are There Any New Engines or Vehicles That Would Not Be Covered?

We are proposing to extend our basic nonroad exemptions to the engines and vehicles covered by this proposal. These include the testing exemption, the manufacturer-owned exemption, the display exemption, and the national security exemption. These exemptions are described in more detail in Section VII.C.

In addition, the Clean Air Act does not consider stationary engines or engines used solely for competition to be nonroad engines, so the proposed emission standards do not apply to them. Refer to the program discussions below for a discussion of how these exclusions apply for different categories of engines.

B. Emission Standards and Testing

1. How Does EPA Determine the Emission Standards?

Our general goal in designing the proposed standards is to develop a program that will achieve significant emission reductions. We are guided by Clean Air Act section 213(a)(3), which instructs us to ''achieve the greatest degree of emission reduction achievable through the application of technology the Administrator determines will be available for the engines or vehicles to which such standards apply, giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers and to noise, energy, and safety factors associated with the application of such technology.'' The Act also instructs us to first consider standards equivalent in stringency to standards for comparable motor vehicles or engines (if any) regulated under section 202, taking into consideration technological feasibility, costs, and other factors.

Engines subject to the proposed exhaust emission standards would have to meet the standards based on measured emissions of specified pollutants such as NO_X, HC, or CO, though not all engines will have standards for each pollutant. Diesel engines generally must also meet a PM emission standard. In addition, there may be requirements for crankcase or evaporative emissions, as described below.

The proposed emission standards would be effective on a model-year basis. We are proposing to define model year much like we do for passenger cars. It would generally mean either the calendar year or some other annual production period based on the manufacturer's production practices. For example, manufacturers could start selling 2006 model year engines as early as January 2, 2005, as long as the production period extends until at least January 1, 2006. All of a manufacturer's engines from a given model year would have to meet emission standards for that model year. For example, manufacturers producing new engines in the 2006 model year would need to comply with the 2006 standards. Refer to the individual program discussions below or the regulations for additional information about model year periods, including how to define what model year means in less common scenarios, such as installing used engines in new equipment.

[122] Harmonized Tariff Schedule of the United States (2001) (Rev. 1), subheading 9804.00.35. A copy of this document is included in Air Docket A–2000–01, at Document No. II–A–82.

2. What Standards Would Apply to Crankcase and Evaporative Emissions?

Due to blow-by of combustion gases and the reciprocating action of the piston, exhaust emissions can accumulate in the crankcase of four-stroke engines. Uncontrolled engine designs route these vapors directly to the atmosphere, where they contribute to ambient levels of these pollutants. We have long required that automotive engines prevent emissions from their crankcases. Manufacturers generally do this by routing crankcase vapors through a valve into the engine's air intake system. We are proposing to require that engines prevent crankcase emissions. We request comment on this proposed requirement for individual types of engines, as described in those sections below.

For industrial spark-ignition engines, we are proposing standards to limit evaporative emissions. Evaporative emissions result from heating gasoline (or other volatile fuels) in a tank that is vented to the atmosphere. See Section IV for additional information.

3. What Duty Cycles Is EPA Proposing for Emission Testing?

Testing an engine for exhaust emissions typically consists of exercising it over a prescribed duty cycle of speeds and loads, typically using an engine or chassis dynamometer. The duty cycle used to measure emissions for certification, which simulates operation in the field, is critical in evaluating the likely emissions performance of engines designed to emission standards.

Steady-state testing consists of engine operation for an extended period at several speed-load combinations. Associated with these test points are weighting factors that allow calculation of a single weighted-average steady-state emission level in g/kW. Transient testing involves a continuous trace of specified engine or vehicle operation; emissions are collected over the whole testing period for a single mass measurement.

See Section VIII.C for a discussion of how we define maximum test speed and intermediate speed for engine testing. Refer to the program discussions below for more information about the type of duty cycle required for testing the various engines and vehicles.

4. How Do Adjustable Engine Parameters Affect Emission Testing?

Many engines are designed with components that can be adjusted for optimum performance under changing conditions, such as varying fuel quality, high altitude, or engine wear. Examples of adjustable parameters include spark timing, idle speed setting, and fuel injection timing. While we recognize the need for this practice, we are also concerned that engines maintain a consistent level of emission control for the whole range of adjustability. We are therefore proposing to require manufacturers to show that their engines meet emission standards over the full adjustment range.

Manufacturers would also have to provide a physical stop to prevent adjustment outside the established range. Operators would then be prohibited by the anti-tampering provisions from adjusting engines outside this range. Refer to the proposed regulatory text for more information about adjustable engine parameters. See especially the proposed sections 40 CFR 1048.115 for industrial SI engines and 40 CFR 1051.115 for recreational vehicles.

5. What Are Voluntary Low-Emission Engines and Blue Sky Standards?

Several state and environmental groups and manufacturers of emission controls have supported our efforts to develop incentive programs to encourage the use of engine technologies that go beyond federal emission standards. Some companies have already significantly developed these technologies. In the final rule for land-based nonroad diesel engines, we included a program of voluntary standards for low-emitting engines, referring to these as ''Blue Sky Series'' engines (63 FR 56967, October 23, 1998). We included similar programs in several of our other nonroad rules, including commercial marine diesel. The general purposes of such programs are to provide incentives to manfuacturers to produce clean products as well as create market choices and opportunities for environmental information for consumers regarding such products. The voluntary aspects of these programs, which in part provides an incentive for manufacturers willing to certify their products to more stringent standards than necessary, is an important part of the overall application of ''Blue Sky Series'' programs.

We are proposing voluntary Blue Sky Series standards for many of the engines subject to this proposal. Creating a program of voluntary standards for low-emitting engines, including testing and durability provisions to help ensure adequate in-use performance, will be a step forward in advancing emission-control technologies. While these are voluntary standards, they become binding once a manufacturer chooses to participate. EPA certification will therefore provide protection against false claims of environmentally beneficial products. For the program to be most effective, however, incentives should be in place to motivate the production and sale of these engines. We solicit ideas that could encourage the creation of these incentive programs by users and state and local governments. We also request comment on additional measures we could take to encourage development and introduction of these engines. Finally, we request comment on the Blue Sky Series approach in general as it would apply to the engines covered by this proposed rule.

C. Demonstrating Compliance

We are proposing a compliance program to accompany emission standards. This consists first of a process for certifying engine models. In addition to certification testing, we are proposing several provisions to ensure that emission-control systems continue to function over long-term operation in the field. Most of these certification and durability provisions are consistent with previous rulemakings for other nonroad engines. Refer to the discussion of the specific programs below for additional information about these requirements for each engine category.

1. How Would I Certify My Engines?

We are proposing a certification process similar to that already adopted for other engines. Manufacturers generally test representative prototype engines and submit the emission data along with other information to EPA in an application for a Certificate of Conformity. If we approve the application, then the manufacturer's Certificate of Conformity allows the manufacturer to produce and sell the engines described in the application in the U.S.

We are proposing that manufacturers certify their engine models by grouping them into engine families. Under this approach, engines expected to have similar emission characteristics would be classified in the same engine family. The engine family definition is fundamental to the certification process and to a large degree determines the amount of testing required for certification. The proposed regulations include specific engine characteristics for grouping engine families for each category of engines. To address a manufacturer's unique product mix, we may approve using broader or narrower engine families.

Engine manufacturers are generally responsible to build engines that meet the emission standards over each engine's useful life. The useful life we adopt by regulation is intended to reflect the period during which engines are designed to properly function without being remanufactured. Useful life values, which are expressed in terms of years or amount of operation (in hours or kilometers), vary by engine category, as described in the following sections. Consistent with other recent EPA programs, we would generally consider this useful life value in amount of operation to be a minimum value and would require manufacturers to comply for a longer period in those cases where they design their engines to operate longer than the minimum useful life. As proposed, manufacturers would be required to estimate the rate of deterioration for each engine family over its useful life. Manufacturers would show that each engine family meets the emission standards after incorporating the estimated deterioration in emission control.

The emission-data engine is the engine from an engine family that will be used for certification testing. To ensure that all engines in the family meet the standards, we are proposing that manufacturers select the engine most likely to exceed emission standards in a family for certification testing. In selecting this ''worst-case'' engine, the manufacturer uses good engineering judgment. Manufacturers would consider, for example, all engine configurations and power ratings within the engine family and the range of installed options allowed). Requiring the worst-case engine to be tested ensures that all engines within the engine family are complying with emission standards.

We are proposing to require manufacturers to include in their application for certification the results of all emission tests from their emission-data engines, including any diagnostic-type measurements (such as ppm testing) and invalidated tests. This complete set of test data ensures that the valid tests that form the basis of the manufacturer's application are a robust indicator of emission-control performance, rather than a spurious or incidental test result. We request comment on these data-reporting requirements.

Clean Air Act section 206(h) specifies that test procedures for certifying engines (including the test fuel) should adequately represent in-use operation. We are proposing test fuel specifications intended to represent in-use fuels. Engines would have to meet the standards on fuels with properties anywhere in the range of proposed test fuel specifications. The test fuel is generally to be used for all testing associated with the regulations proposed in this document, including certification, production-line testing, and in-use testing. Refer to the program discussions below for a discussion of the test fuel proposed for different categories of engines.

We are proposing to require engine manufacturers to give engine buyers instructions for properly maintaining their engines. We are including limitations on the frequency of scheduled maintenance that a manufacturer may specify for emission-related components to help ensure that emission-control systems don't depend on an unreasonable expectation of maintenance in the field. These maintenance limits would also apply during any service accumulation that a manufacturer may do to establish deterioration factors. This approach is common to all our engine programs. It is important to note, however, that these provisions would not limit the maintenance an operator could perform. It would merely limit the maintenance that operators would be expected to perform on a regularly scheduled basis. Refer to the discussion of the specific programs below for additional information about the allowable maintenance intervals for each category of engines.

Once an engine family is certified, we would require every engine a manufacturer produces from the engine family to have an engine label with basic identifying information. We request comment on the proposed requirements for the design and content of engine labels, which are detailed in § 1048.135 and § 1051.135 of the proposed regulation text.

2. What Warranty Requirements Apply to Certified Engines?

Consistent with our current emission-control programs, we are proposing that manufacturers provide a design and defect warranty covering emission-related components. As required by the Clean Air Act, the proposed regulations would require that the warranty period must be longer than the minimum period we specify if the manufacturer offers a longer mechanical warranty for the engine or any of its components; this includes extended warranties that are available for an extra price. See the proposed regulation language for a description of which components are emission-related.

If an operator makes a valid warranty claim for an emission-related component during the warranty period, the engine manufacturer is generally obligated to replace the component at no charge to the operator. The engine manufacturer may deny warranty claims if the operator failed to do prescribed maintenance that contributed to the warranty claim.

We are also proposing a defect reporting requirement that applies separate from the emission-related warranty (see Section VII.F). In general, defect reporting applies when a manufacturer discovers a pattern of component failures, whether that information comes from warranty claims, voluntary investigation of product quality, or other sources.

3. Can I Meet Standards With Emission Credits?

Many of our emission-control programs have a voluntary emission-credit program to facilitate implementation of emission controls. An emission-credit program is an important factor we take into consideration in setting emission standards that are appropriate under Clean Air Act section 213. An emission-credit program can reduce the cost and improve the technological feasibility of achieving standards, helping to ensure the attainment of the standards earlier than would otherwise be possible. Manufacturers gain flexibility in product planning and the opportunity for a more cost-effective introduction of product lines meeting a new standard. Emission-credit programs also create an incentive for the early introduction of new technology, which allows certain engine families to act as trailblazers for new technology. This can help provide valuable information to manufacturers on the technology before they apply the technology throughout their product line. This early introduction of clean technology improves the feasibility of achieving the standards and can provide valuable information for use in other regulatory programs that may benefit from similar technologies.

Emission-credit programs may involve averaging, banking, or trading. Averaging would allow a manufacturer to certify one or more engine families at emission levels above the applicable emission standards, as long as the increased emissions are offset by one or more engine families certified below the applicable standards. The over-complying engines generate credits that are used by the under-complying engines. Compliance is determined on a total mass emissions basis to account for differences in production volume, power and useful life among engine families. The average of all emissions

for a particular manufacturer's production must be at or below that level of the applicable emission standards. This calculation generally factors in sales-weighted average power, production volume, useful life, and load factor. Banking and trading would allow a manufacturer to generate emission credits and bank them for future use in its own averaging program in later years or sell them to another company.

In general, a manufacturer choosing to participate in an emission-credit program would certify each participating engine family to a Family Emission Limit. In its certification application, a manufacturer would determine a separate Family Emission Limit for each pollutant included in the emission-credit program. The Family Emission Limit selected by the manufacturer becomes the emission standard for that engine family. Emission credits are based on the difference between the emission standard that applies and the Family Emission Limit. We would expect the manufacturer to meet the Family Emission Limit for all emission testing. At the end of the model year, manufacturers would generally need to show that the net effect of all their engine families participating in the emission-credit program is a zero balance or a net positive balance of credits. A manufacturer could generally choose to include only a single pollutant from an engine family in the emission-credit program or, alternatively, to establish a Family Emission Limit for each of the regulated pollutants.

An alternative approach to requiring manufacturers to choose Family Emission Limits would be for us to create a discrete number of emission levels or ''bins'' above and below the proposed standard that manufacturers could certify to. These bin levels would then replace the Family Emission Levels in the credit calculations. We request comment on whether we should consider this approach for the engines covered by this proposal. The advantage of bins are that they can be defined by step changes in technology, which gives more assurance of emission reduction than Family Emission Limits which can change slightly with only marginal changes to the engine.

Refer to the program discussions below for more information about emission-credit provisions for individual engine categories. We request comment on all aspects of the emission-credit programs discussed in this proposal. In particular, we request comment on the structure of the proposed emission-credit programs and how the various provisions may affect manufacturers' ability to utilize averaging, banking, or trading to achieve the desired emission-reductions in the most efficient and economical way.

4. What Are the Proposed Production-Line Testing Requirements?

We are proposing production-line testing for recreational marine diesel engines, recreational vehicles, and Large SI engines. According to these requirements, manufacturers would routinely test production-line engines to help ensure that newly assembled engines control emissions at least as well as the emission-data engines tested for certification. Production-line testing serves as a quality-control step, providing information to allow early detection of any problems with the design or assembly of freshly manufactured engines. This is different than selective enforcement auditing, in which we would give a test order for more rigorous testing for production-line engines in a particular engine family (see Section VII.E). Production-line testing requirements are already common to several categories of engines as part of their emission-control program.

A manufacturer's liability under the production-line testing program is limited to the test engine and any future production. If an engine fails to meet an emission standard, the manufacturer must modify it to bring that specific engine into compliance. If too many engines exceed emission standards, the engine family is determined to be in noncompliance and the manufacturer will need to correct the problem for future production. This correction may involve changes to assembly procedures or engine design, but the manufacturer must, in any case, do sufficient testing to show that the engine family complies with emission standards.

The proposed production-line testing programs would depend on the Cumulative Sum (CumSum) statistical process for determining the number of engines a manufacturer needs to test (see the proposed regulations for the specific calculation methodology). Each manufacturer selects engines randomly at the beginning of a new sampling period. If engines must be tested at a facility where final assembly is not yet completed, manufacturers must randomly select engine components and assemble the test engine according to their established assembly instructions. A sampling period may be a quarter or a calendar year, depending generally on the size of the engine family. The Cumulative Sum program uses the emission results to calculate the number of tests required for the remainder of the sampling period to reach a pass or fail determination. If tested engines have relatively high emissions, the statistical sampling method calls for an increased number of tests to show that the engine family meets emission standards. The remaining number of tests is recalculated after the manufacturer tests each engine. Engines selected should cover the broadest range of production configurations possible. Tests should also be distributed evenly throughout the sampling period to the extent possible.

Under the Cumulative Sum approach, individual engines can exceed the emission standards without bringing the whole engine family into noncompliance. Note, however, that we propose to require manufacturers to adjust or repair every failing engine and retest it to show that it meets the emission standards. Note also that all production-line emission measurements must be included in the periodic reports to us. This includes any type of screening or surveillance tests (including ppm measurements), all data points for evaluating whether an engine controls emissions ''off-cycle,'' and any engine tests that exceed the minimum required level of testing.

We are proposing to further reduce the testing requirements for engine families that consistently meet emission standards. For engine families with no production-line tests exceeding emission standards for two consecutive years, the manufacturer may request a reduced testing rate. The minimum testing rate is one test per engine family for one year. Our approval for a reduced testing rate would apply only for a single model year.

As we have concluded in other engine programs, some manufacturers may have unique circumstances that call for different methods to show that production engines comply with emission standards. We therefore propose to allow a manufacturer to suggest an alternate plan for testing production-line engines, as long as the alternate program is as effective at ensuring that the engines will comply. A manufacturer's petition to use an alternate plan should address the need for the alternative and should justify any changes from the regular testing program. The petition must also describe in detail the equivalent thresholds and failure rates for the alternate plan. If we approved the plan, we would use these criteria to determine when an engine family would become noncompliant. It is important to note that this allowance is intended only as a flexibility, and is not intended

to affect the stringency of the standards or the production-line testing program.

Refer to the specific program discussions below for additional information about production-line testing for different types of engines.

D. Other Concepts

1. What Are the Proposed Emission-Related Installation Instructions?

For manufacturers selling loose engines to equipment manufacturers, we are proposing to require the engine manufacturer to develop a set of emission-related installation instructions. This would include anything that the installer would need to know to ensure that the engine operates within its certified design configuration. For example, the installation instructions could specify a total capacity needed from the engine cooling system, placement of catalysts after final assembly, or specification of parts needed to control evaporative emissions. We would approve the installation instructions as part of the certification process. If equipment manufacturers fail to follow the established emission-related installation instructions, we would consider this tampering, which could subject them to significant civil penalties. Refer to the program discussions below for more information about specific provisions related to installation instructions.

2. What Is Consumer-Choice Labeling?

California ARB has recently proposed consumer/environmental label requirements for outboard and personal-watercraft engines. Under this concept, manufacturers would label their engines or vehicles based on their certified emission level. California has proposed three different labels to differentiate varying degrees of emission control—one for meeting the EPA 2006 standard, one for being 20 percent lower, and one for being 65 percent below. More detail on this concept is provided in the docket.[123]

We are considering a similar approach to labeling the engines subject to this proposal. This would apply especially to consumer products. Consumer-choice labeling would give people the opportunity to consider varying emission levels as a factor in choosing specific models. This may also give the manufacturer an incentive to produce more of their cleaner engine models. A difficulty in designing a labeling program is in creating a scheme that communicates information clearly and simply to consumers. Given the very different emission levels expected from the various engines, it would be difficult to create a consistent set of labels for different engines. Also, we are concerned that other organizations could use the labeling provisions to mandate certain levels of emission control, rather than relying on consumer choice as a market-based incentive. We request comment on this approach for recreational marine engines and vessels and for recreational vehicles.

An alternative to the promotional-type label adopted by California ARB would be an approach that simply identifies an engine's certified emission levels on the emission-control label. This ''informational label'' could be used with or without defining voluntary emission standards. This would not provide a standardized way for manufacturers to promote their cleanest products, but it would give interested consumers the ability to make informed choices based on a vehicle's certified emission levels. We are proposing this approach of requiring an engine's certified emission levels to be on the emission-control label for engines and vehicles certified to voluntary low emission or Blue Sky standards. We request comment on this approach and whether we should extend this requirement to all vehicles and engines, not just those complying with voluntary low emission standards. Also, we request comment on the relative advantages of the different approaches to consumer-choice labeling just discussed.

3. Are There Special Provisions for Small Manufacturers of These Engines and Vehicles?

The Regulatory Flexibility Act, 5 U.S.C. 601–612, was amended by the Small Business Regulatory Enforcement Act of 1996 (SBREFA), Public Law 104–121, to ensure that concerns regarding small entities are adequately considered during the development of new regulations that affect them. The scope of this proposal includes many engine and vehicle manufacturers that have not been subject to our regulations or certification process. Many of these manufacturers are small businesses for which a typical regulatory program may be very burdensome. The sections describing the proposed emission-control program include discussion of proposed special compliance provisions designed to address this for the different engine categories. Section XI.B gives an overview of the inter-agency process in which we developed these small-volume provisions.

IV. Large SI Engines

A. Overview

This section applies to most nonroad spark-ignition engines rated over 19 kW (''Large SI engines''). The companies producing Large SI engines are typically subsidiaries of automotive companies. In most cases, these companies modify car and truck engines for industrial applications. However, the Large SI industry has historically taken a much less centralized approach to designing and producing engines. Engine manufacturers often sell dressed engine blocks without manifolds or fuel systems. Fuel system suppliers have played a big role in designing and calibrating nonroad engines, sometimes participating directly in engine assembly. Several equipment manufacturers, mostly forklift producers, also play the role of an engine manufacturer by calibrating engine models and completing engine assembly.

The proposed emission standards would achieve emission reductions of about 90 percent for CO, 85 percent for NO_X, and 70 percent for HC. Since the emission standards are based on engine testing with broadly representative duty cycles, these estimated reductions apply to all types of equipment using these engines. Reducing Large SI engine emissions will be especially valuable to individuals operating these engines in enclosed areas.

The cost of applying the anticipated emission-control technology to these engines is offset by much greater cost savings from reduced fuel consumption over the engines' operating lifetime. The large estimated fuel and maintenance savings relative to the estimated incremental cost of producing low-emitting engines raise the question of why normal market forces have failed to induce manufacturers to design and sell engines with emission-control technologies on the basis of the expected performance improvements. As described in Chapter 5 of the Draft Regulatory Support Document, we believe this is largely accounted for by the difficulty of equipment purchasers to justify increased capital spending on industrial machines, even with the potential for net savings over the lifetime of the equipment. This in turn prevents manufacturers from developing or implementing technologies in light of the uncertain demand. We request comment on the market dynamics that would prevent the development of and demand for cost-saving technologies.

This section describes the proposed requirements that would apply to engine manufacturers. See Section III for

[123] ''Public Hearing to Consider Amendments to the Spark-Ignition Marine Engine Regulations,'' Mail Out #MSC 99–15, June 22, 1999 (Docket A–2000–01, Document II–A–27).

a description of our general approach to regulating nonroad engines and how manufacturers show that they meet emission standards. See Section VII for additional proposed requirements for engine manufacturers, equipment manufacturers, and others.

B. Large SI Engines Covered by This Proposal

Large SI engines covered in this section power nonroad equipment such as forklifts, sweepers, pumps, and generators. This would include marine auxiliary engines, but does not include marine propulsion engines or engines used in recreational vehicles (snowmobiles, off-highway motorcycles, and all-terrain vehicles). These other nonroad applications are addressed elsewhere in this document.

Even though some aircraft use engines similar to the Large SI engines described in this proposal, we are not proposing emission standards for aircraft. Aircraft are covered under a separate part of the Clean Air Act. EPA's current aircraft regulations define aircraft as needing airworthiness certification from the Federal Aviation Administration. However, neither ultra-light airplanes nor blimps are governed by emission standards under our aircraft regulations. Ultra-light airplanes are exempt from the airworthiness-certification requirements in 14 CFR part 91. In contrast, blimps are subject to airworthiness certification, but EPA's emission standards for aircraft do not apply to them. Blimps are very likely to be able to use conventional land-based engines for propulsion and navigation. Our proposed definition of aircraft in these regulations would exclude all aircraft from emission standards, including aircraft that do not receive an airworthiness certificate from FAA. We may address this issue in a separate **Federal Register** notice.

This proposal applies only to spark-ignition engines. Our most recent rulemaking for nonroad diesel engines finalized a definition of ''compression-ignition'' that was intended to address the status of alternative-fuel engines (63 FR 56968, October 23, 1998). We are proposing to adopt updated definitions consistent with those already established in previous rulemakings to clarify that all reciprocating internal combustion engines are either spark-ignition or compression-ignition. We request comment on whether we should revise the definitions that differentiate between these types of engines.

Several types of engines are excluded or exempted from the proposed requirements. The following sections describe the types of special provisions that apply uniquely to nonrecreational spark-ignition engines rated over 19 kW. Section VII.C covers several additional exemptions that apply generally across programs.

1. Stationary Engine Exclusion

Consistent with the Clean Air Act, we do not treat stationary engines as nonroad engines, so the proposed emission standards would not apply to engines used in stationary applications. In general, an engine is considered stationary if it will be either installed in a fixed position or if it will be a portable (or transportable) engine operating in a single location for at least one year. We are proposing a requirement that these stationary engines have an engine label identifying their excluded status. This would be especially valuable for importing excluded engines without complication from U.S. Customs officials. It would also help us ensure that such engines are legitimately excluded from the emission standards proposed in this document.

2. Exclusion for Engines Used Solely for Competition

The Clean Air Act also does not consider engines used solely for competition to be nonroad engines. We would normally include this exclusion directly in the regulations. For Large SI engines, however, it seems unlikely that there would be any need for an explicit treatment of competition engines in the regulations. Any applications involving competition with spark-ignition engines would likely fall under the proposed program for recreational vehicles, which has an extensive treatment of competition engines. We request comment on the need for more detailed consideration of Large SI engines that may be used solely for competition.

3. Motor Vehicle Engine Exemption

In some cases an engine manufacturer may want to modify a certified automotive engine for nonroad use to sell the engine without recertifying it as a Large SI engine. We propose to allow for this, as long as the manufacturer makes no changes to the engine that could affect its exhaust or evaporative emissions. We propose to require annual reporting for companies that use this exemption, including a list of engine models from each company. Manufacturers must generally meet all the requirements from 40 CFR part 86 that would apply if the engine were used in a motor vehicle. Section 1048.605 of the proposed regulations describes the qualifying criteria and responsibilities in greater detail.

In addition, a vehicle manufacturer may want to produce vehicles certified to highway emission standards for nonroad use. We propose to allow this, as long as there is no change in the vehicle's exhaust or evaporative emission-control systems.

4. Lawn and Garden Engine Exemption

Most Large SI engines have a total displacement greater than one liter. The design and application of the few Large SI engines currently being produced with displacement less than one liter are very similar to those of engines rated below 19 kW, which are typically used for lawn and garden applications. As described in the most recent rulemaking for these smaller engines, we propose that manufacturers may certify engines between 19 and 30 kW with total displacement of one liter or less to the requirements we have already adopted in 40 CFR part 90 for engines below 19 kW (see 65 FR 24268, April 25, 2000). These engines would then be exempt from the requirements proposed in this document. This approach would allow manufacturers of small air-cooled engines to certify their engines rated between 19 and 30 kW with the program adopted for the comparable engines with slightly lower power ratings. This would also be consistent with the provisions adopted by California ARB.

We are proposing the 30-kW cap to address our concern that treating all engines under one liter as Small SI engines may be inadequate. For example, lawn and garden engines generally don't use turbochargers or other technologies to achieve very high power levels. However, it may be possible for someone to design an engine under one liter with unusually high power, which would more appropriately be grouped with other Large SI engines with similar power capability rather than with Small SI engines. Motorcycles, for example, may produce 120 kW from a 750 cc (0.75 liter) engine. The 30-kW maximum power rating to qualify for treatment as Small SI engines represents a reasonable maximum power output that is possible from SI engines under one liter with technologies typical of lawn and garden engines. We request comment on the suggested power threshold and on any other approaches to addressing the issue of which standards should apply to engines in this intermediate size and power range.

We are proposing a temporary expansion of the lawn and garden exemption for small-volume manufacturers, as described in Section IV.E.

Technological, economic and environmental issues associated with the few engine models with rated power over 19 kW, but with displacement at or below 1 liter were previously analyzed in the rulemaking for Small Nonroad SI engines. This proposal therefore does not specifically address the provisions applying to them or repeat the estimated impacts of adopting emission standards.

Conversely, we are aware that some engines rated below 19 kW may be part of a larger family of engine models that includes engines rated above 19 kW. This may include, for example, three- and four-cylinder engine models that are otherwise identical. To avoid the need to separate these engines into separate engine families (certified under completely different control programs), we propose to allow any engine rated under 19 kW to certify to the more stringent Large SI emission standards. Such an engine would then be exempt from the requirements of 40 CFR part 90. Since manufacturers exercising this option would be voluntarily meeting a more stringent emission standard, this does not affect our earlier conclusions about the appropriate standards for engines rated under 19 kW.

We may also consider applying the Large SI emission standards to these smaller engines on a mandatory basis when engines above and below 19 kW share fundamental design features. We request comment on the need for, and appropriateness of, such an approach.

5. Special Provisions for Non-Integrated Engine Manufacturers

We are aware that several Large SI engine manufacturers rely on other companies to supply engine blocks or partially assembled engines that are then modified for the final application. A similar situation occurs for some marine diesel engine manufacturers. To address this for the marine engines, we defined these companies as post-manufacture marinizers and created a variety of provisions to address their particular concerns (64 FR 73300; December 29, 1999).

The most important concern for these companies is the possibility that the company supplying the base engines may discontinue production with minimal notice. Once emission standards are in place, this would leave the manufacturer with a need to quickly design and certify a different engine to meet emission standards. One company has reported that two or three months are required to apply closed-loop catalyst systems to a new engine. With some additional time to complete the certification, a manufacturer in this situation would face a possible shutdown in engine assembly until the new engine is ready for production. For marine engines, we allow post-manufacture marinizers in this situation to request permission to produce uncertified engines for up to one year. The post-manufacture marinizer must show that it is not at fault and that it would face serious economic hardship without the exemption. We request comment on the need for such a provision for Large SI engines and on how to limit such a provision to companies that rely on partially assembled engines from unrelated companies. If we adopt provisions to address this concern, they would likely be similar to those adopted for marine diesel engines (see 40 CFR 94.209(b)). We also request comment on the potential for the proposed hardship provisions to address this concern (see Section VII.C and the proposed regulatory language in 40 CFR part 1068, subpart C).

C. Proposed Standards

In October 1998, California ARB adopted emission standards for Large SI engines. We are proposing to extend requirements for these engines to the rest of the U.S. in the near term. We are also proposing to revise the emission standards and add various provisions in the long term, as described below. The near-term and the long-term emission standards are based on the use of three-way catalytic converters with electronic fueling systems to control emissions, and would differ primarily in terms of how well the controls are optimized. In addition to the anticipated emission reductions, we project that these technologies would provide large savings to operators as a result of reduced fuel consumption and other performance improvements.

An important element of the proposed control program is the attempted harmonization with the requirements adopted by California ARB. We are aware that inconsistent or conflicting requirements could lead to additional costs. Cooperation between agencies has allowed a great degree of harmonization, as reflected in this proposed rule. In addition to the common structure of the programs, the specific provisions that make up the certification requirements and compliance programs are consistent with very few exceptions. In most of the cases where individual provisions differ, the EPA language is more general than that adopted by California, rather than being incompatible. The following sections describe the proposed requirements in greater detail.

1. What Are the Proposed Standards and Compliance Dates?

We propose to adopt standards starting in the 2004 model year consistent with those adopted by California ARB. These standards, which apply to testing only with the applicable steady-state duty cycles, are 4 g/kW-hr (3 g/hp-hr) for $HC+NO_X$ emissions and 50 g/kW-hr (37 g/hp-hr) for CO emissions. See Section IV.D for further discussion of the steady-state duty cycles. We expect manufacturers to meet these standards using three-way catalytic converters and electronically controlled fuel systems. These systems would be similar to those used for many years in highway applications, but not necessarily with the same degree of sophistication.

Proposing emission standards for these engines starting in 2004 allows less than the usual lead time for meeting EPA requirements. We believe, however, that manufacturers will be able to achieve this by expanding their production of the same engines they will be selling in California at that time. We have designed our 2004 standards to require no additional development, design, or testing beyond what California ARB already requires. We request comment on manufacturers' ability to produce EPA-compliant engines nationwide in 2004. Any comments should address whether there are issues related to production capacity as opposed to additional design or testing needs. As proposed, the emission standards would allow us to set near-term requirements to introduce the low-emission technologies for substantial emission reductions with minimal lead time. We request comment on adopting these standards for 2004 model year engines.

Testing has shown that additional time to optimize designs to better control emissions will allow manufacturers to meet significantly more stringent emission standards that are based on more robust measurement procedures. Starting with the 2007 model year, we propose to apply emission standards of 3.4 g/kW-hr (2.5 g/hp-hr) for $HC+NO_X$ emissions and 3.4 g/kW-hr (2.5 g/hp-hr) for CO emissions. These standards would apply to emission measurements during duty-cycle testing under both steady-state and transient operation.[124] As described in Chapter 4 of the Draft Regulatory Support Document, we believe manufacturers can achieve these proposed emission standards by optimizing currently available three-

[124] See Section IV.D for a discussion of duty cycles.

way catalysts and electronically controlled fuel systems. As described in Section IV.D.5, we propose to apply field-testing standards of 4.7 g/kW-hr (3.5 g/hp-hr) for HC+NO_X emissions and 5.0 g/kW-hr (3.8 g/hp-hr) for CO emissions for 2007 and later model year engines.

The proposed 2007 standards described above reflect the importance of adopting standards that protect human health when regulating engines that often operate in enclosed areas, but also include numerous applications that operate predominantly outdoors. Emission-control technologies for Large SI engines generally pose a tradeoff between controlling NO_X and CO emissions. Chapter 4 of the Regulatory Support Document presents multiple scenarios of emission standards with a comparison of calculated ambient NO, NO_2, and CO levels. We request comment on a combination of emission standards that would shift to increase or decrease the emphasis on controlling CO emissions. To increase the relative control of CO emissions, we would consider emission standards of 4.0 g/kW-hr (3.0 g/hp-hr) HC+NO_X and 2.5 g/kW-hr (1.9 g/hp-hr). To focus more on reducing HC+NO_X emissions, we would consider emission standards of 2.6 g/kW-hr (2.0 g/hp-hr) HC+NO_X and 4.4 g/kW-hr (3.3 g/hp-hr) CO. We have narrowed this range of alternative standards to a relatively narrow range to account for the concern for individuals who may be exposed to exhaust emissions in enclosed spaces or other areas with limited airflow. We request comment on the appropriate emission standards for Large SI engines and our analysis of CO vs. HC+NO_X tradeoffs found in the RIA. We also request comment on the potential for manufacturers to take further steps to adopt automotive-type technologies that would reduce emissions beyond than the levels proposed in this document, either starting in 2007 or in a subsequent phase of standards.

Gasoline-fueled engines, which must generally operate with rich air-fuel ratios at heavy loads to avoid premature engine wear from overheating components, are further constrained in their ability to simultaneously control CO and HC+NO_X emissions. Furthermore, these engines are more likely to be used outdoors, where there is less concern for elevated exposure levels. We are therefore proposing to adopt alternate 2007 standards of 1.3 g/kW-hr (1.0 g/hp-hr) for HC+NO_X emissions and 27 g/kW-hr (20 g/hp-hr) for CO emissions. These alternate standards are based on preliminary emission measurements with optimized gasoline-fueled engines showing the tradeoff of increasing CO emissions at very low NC+NO_X levels. We are not proposing any restriction on manufacturers' use of the alternate standards (for example, for specific fuels or applications). Rather, we expect the marketplace to ensure that low-CO engines are selected for applications involving significant operation in enclosed or partially enclosed areas. We believe this approach will maximize HC+NO emission reductions from engines where that is the most important emission contribution.

Except for these alternate standards, the proposed emission standards would apply uniformly to all Large SI engines. As described in the Draft Regulatory Support Document, based on our current information, we do not believe variations among engines significantly affect their potential to reduce emissions or their cost of meeting emission standards. We request comment on whether it is appropriate to differentiate between subclasses of engines to more closely tailor emission standards to the capabilities of individual engines or based on other relevant criteria, including cost. Also, Large SI engines power a wide range of equipment. We request comment on the ability of Large SI engines in various applications to incorporate emission-control technologies and maintain control of emissions over the full useful life. We currently have no information indicating that application-specific emission standards are appropriate for this class of engines, but we request comment on whether there are relevant distinctions with respect to different applications. We further request comment on whether application-specific standards may be relevant for Large SI engines and, if so, what those standards should be. Commenters should suggest an appropriate way of addressing any such distinctions in the regulations. Finally, we have developed this proposal based on the view that it is appropriate to set standards without regard to fuel type to prevent incentives for manufacturers to design engines to be fueled by fuels subject to less stringent standards. We have proposed standards based on this approach, but request comment on whether there are advantages to setting separate emission standards for engines powered by different fuels, and in particular, on the appropriate levels for such standards. A further discussion of the feasibility, estimated cost, and emission reductions are in the Draft Regulatory Support Document.

We believe that three years between phases of emission standards allows manufacturers enough lead time to meet the more stringent emission standards. The projected emission-control technologies for the proposed 2004 emission standards should be capable of meeting the proposed 2007 emission levels with additional optimization and testing. In fact, manufacturers may be able to apply their optimization efforts before 2004, leaving only the additional testing demonstration for complying with the proposed 2007 standards. The biggest part of the optimization effort may be related to gaining assurance that engines will meet field-testing emission standards described in Section IV.D.5, since engines will not be following a prescribed duty cycle. EPA requests comment on the timing of the second phase of emission standards. Commenters should address the need to design and certify engines, distinguishing between time needed for developing new technology, recalibration of existing technology, development of test facilities, and the time needed to conduct testing. We also request comment on the air quality implications of adjusting the date of the long-term standards.

For gasoline and LPG engines, we are proposing the emission standard based on total hydrocarbon measurements, while California ARB standards are based on nonmethane hydrocarbons. We believe that switching to measurement based on total hydrocarbons should simplify testing, especially for field testing of in-use engines with portable devices (See Section IV.D.5). To maintain consistency with California ARB standards in the near term, we propose to allow manufacturers to base their certification through 2006 on either nonmethane or total hydrocarbons (see 40 CFR 1048.145 of the proposed regulations). Methane emissions from controlled engines operating on gasoline or LPG are about 0.1 g/kW&-hr. We request comment on this approach.

Most of the emission data on which we base the proposed emission standards were generated from engines using liquefied petroleum gas (LPG). Operation of natural gas engines is very similar to that of LPG engines, with one noteworthy exception. Since natural gas consists primarily of methane, these engines have a much higher level of methane in the exhaust. Methane generally does not contribute to ozone formation, so it is often excluded from emission measurements. We therefore propose to use nonmethane hydrocarbon emissions for comparison with the standard for natural gas engines. While the proposed emission standards based on measuring emissions

in the field depend on total hydrocarbons, this is inconsistent with the nonmethane hydrocarbon measurements for certifying natural gas engines. We therefore propose to set a NO_X-only field-testing standard for natural gas engines instead of a NO_X+HC standard. Since control of NO_X emissions poses a significantly greater challenge for natural gas engines, certification testing should provide adequate assurance that these engines have sufficiently low nonmethane hydrocarbon emissions. We request comment on this proposed arrangement of emission standards and testing requirements to account for methane.

2. Could I Average, Bank, or Trade Emission Credits?

As described in Section III, we often give manufacturers the option of showing they meet emission standards using an emission-credit program that allows them to introduce a mix of technologies with average emission levels below the standards. The emission standards for Large SI engines proposed above are based on full compliance by all engine families without averaging, banking and trading at certification. (Note the separate discussion of averaging, banking, and trading that applies to testing in-use engines in Section IV.D.4.) In determining whether we should adopt an averaging, banking, and trading program in connection with promulgating a standard, we need to consider whether the adoption of such a program would affect the determination of what emission standards would ''achieve the greatest degree of emission reduction achievable through [available technology] . . . giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers and to noise, energy, and safety factors associated with the application of such technology''. The standards we are proposing for Large SI engines reflect our assessment of these statutory factors in the absence of an ABT program for these engines. If, after notice and comment, we decide that an ABT program is appropriate, we will need to reassess the appropriate level of these standards considering the statutory factors. The emission data described in the Draft Regulatory Support Document show that while all engines in this category are likely to be able to meet the proposed standard, some engines in this category are likely to be capable of operating at a level below the level of the proposed emission standards. Incorporating an emission-credit program without adjusting the emission standards would allow manufacturers to produce some engines that have emissions that are higher than the levels we believe are capable of being met by all engines in the category. Given the emission data supporting the proposed emission standards, we believe that we would therefore need to set more stringent emission standards with averaging, banking, and trading provisions to achieve the ''greatest degree of emission reduction'' from these engines.

We request comment on including provisions to average, bank, and trade emission credits. We believe the appropriate standards with an emission-credit program would be 2.7 g/kW-hr (2.0 g/hp-hr) for HC+NO_X emissions and 2.7 g/kW-hr (2.0 g/hp-hr) for CO emissions. See the Draft Regulatory Support Document for further discussion of this issue. Making the comparable adjustments to the field-testing measurements described in Section IV.D.5 leads to field-testing standards under an emission-credit program of 3.8 g/kW-hr (2.8 g/hp-hr) for HC+NO_X emissions and 4.0 g/kW-hr (3.0 g/hp-hr) for CO emissions.

In addition, considering the frequent use of Large SI engines in enclosed areas, we may need to cap Family Emission Levels sufficiently to address concerns for exposure to elevated concentrations of CO, NO, and NO2 emissions. The Draft Regulatory Support Document shows that emission levels of 3.4 g/kW-hr for HC+ NO_X and for CO appear to be appropriate limits related to a scenario of exposure in enclosed or other limited-air flow areas. We also believe that there is no type of engine or application in the Large SI field that cannot accommodate the basic technologies associated with these emission levels, so this emission level would serve as an appropriate cap on Family Emission Levels in an emission-credit program for both HC+NO_X and CO emissions. We request comment on these issues.

For additional, general provisions of an emission-credit program, see the proposed regulation language in part 1051, subpart H for recreational vehicles. We request comment on all aspects of averaging, banking, and trading for Large SI engines. Commenters should address appropriate emission levels for the potential mix of technologies under consideration. This should include a discussion of any technology or market constraints (or incentives) that would lead manufacturers to differentiate their engines with varying degrees of emission control. In addition, we request comment on the possibility that small-volume manufacturers with a limited product offering will be disadvantaged by an emission-credit program that may give larger companies a competitive advantage in selected markets.

As an alternative to a program of calculating emission credits for averaging, banking, and trading, we are proposing a simpler approach to help manufacturers transition to the proposed 2007 emission standards (see 40 CFR 1048.145 of the proposed regulations). Under this ''family banking'' concept, we would allow manufacturers to certify an engine family early. For each year of certifying an engine family early, the manufacturer would be able to delay certification of a smaller engine family by one year. This would be based on the actual sales of the early family and the projected sales volumes of the late family; this would require no calculation or accounting of emission credits. The manufacturer would verify that actual sales are consistent with projected sales at the end of the model year.

3. Is EPA Proposing Blue Sky Standards for These Engines?

We are proposing a staggered Blue Sky approach aligned with the introduction of new emission standards. In the 2003 model year, manufacturers could certify their engines to the requirements that apply starting in 2004 to qualify for the Blue Sky designation. Since manufacturers are producing engines with emission-control technologies starting in 2001, these engines would be available to customers outside of California desiring emission reductions or fuel-economy improvements. We request comment on whether we should make this available to 2002 model year engines. Similarly, for 2003 through 2006 model years, manufacturers could certify their engines to the requirements that start to apply in 2007. Finally, we propose to set a target of 1.3 g/kW-hr (1.0 g/hp-hr) HC+NO_X and 3.4 g/kW-hr (2.5 g/hp-hr) CO as a qualifying level for Blue Sky Series engines for all model years. The corresponding field-testing standards for Blue Sky Series engines would be 1.8 g/kW-hr (1.4 g/hp-hr) HC+NO_X and 5.0 g/kW-hr (3.8 g/hp-hr) CO. We request comment on the level of the voluntary standards starting in 2007. We also request comment on the advantages of additional labeling provisions that would advertise or promote these low-emission products.

4. What Durability Provisions Apply?

a. Useful life. We propose to set a minimum useful life period of seven

years or until the engine accumulates at least 5,000 operating hours, whichever occurs first. This figure, which California ARB also adopted, represents an operating period that is common for Large SI engines before they undergo rebuild. This also reflects a comparable degree of operation relative to the useful life values of 100,000 to 150,000 miles that apply to automotive engines (assuming an average driving speed of 20 to 30 miles per hour).

Some engines are designed for operation in severe-duty applications with a shorter expected lifetime. Concrete saws in particular undergo accelerated wear as a result of operating in an environment with high concentrations of highly abrasive, airborne concrete dust particles. In a previous rulemaking, we adopted a provision for a manufacturer to ask us to approve a useful life shorter than the minimum period that would otherwise apply. This shortened useful life would be based on information from manufacturers showing how long their engines typically operated. Extending that provision to Large SI engines would depend on a manufacturer including only engines from severe-duty applications in a given engine family. The likely practical benefits of segregating severe-duty engines would be to shorten the period for establishing deterioration factors and to avoid in-use testing on engines that are no longer meeting emission standards. We request comment on the appropriate approach to useful life values for severe-duty and other Large SI engines. We also request comment on any other limitations on manufacturers' ability to meet the proposed requirements that may be particular to severe-duty engines.

b. Warranty. We are proposing that manufacturers provide an emission-related warranty for at least the first half of an engine's useful life (in operating hours) or 3 years, whichever comes first. These periods must be longer if the manufacturer offers a longer mechanical warranty for the engine or any of its components; this includes extended warranties that are available for an extra price. In addition, we are proposing the warranty provisions adopted by California ARB for high-cost parts. For emission-related components whose replacement cost is more than about $400, we are proposing a minimum warranty period of at least 70 percent of the engine's useful life (in operating hours) or 5 years, whichever comes first. See § 1048.120 for a description of which components are emission-related. We request comment on these proposed warranty provisions.

c. Maintenance instructions. We are proposing to apply minimum maintenance intervals much like those established by California ARB for Large SI engines. The minimum intervals define how much maintenance a manufacturer may specify to ensure that engines are properly maintained for staying within emission standards. We propose to allow manufacturers to schedule maintenance on the following components after 4,500 hours of use: catalysts, fuel injectors, electronic controls and sensors, and turbochargers.

There are two areas of maintenance for which we are especially concerned. The first is related to the durability of oxygen sensors. We recognize that if an oxygen sensor degrades or fails, emissions can increase significantly. It is important to create a strong incentive to use the most durable oxygen sensors available. That is why we are proposing to apply the 4,500-hour minimum interval to scheduled maintenance of oxygen sensors. We are also proposing diagnostic requirement to ensure that prematurely failing oxygen sensors are detected and replaced on an as-needed basis. If operators would fail to replace oxygen sensors after a fault signal, we would not consider that engine to be properly maintained. This would invalidate the emission-related warranty and make the engine ineligible for manufacturer in-use testing. We request comment on this approach.

Our second area of concern is related to the potential need to clean LPG fuel mixers. We are aware that for some existing designs, fuel mixers can become fouled to the point that they are unable to achieve proper control of air-fuel ratios. When this occurs, it can usually be remedied by simply removing the mixer and cleaning it. Chapter 4 of the Draft Regulatory Support Document describes this in further detail, including emission test data showing that fuel systems can be quite tolerant of deposits from fuel impurities. We request comment on (1) additional test data showing an effect of mixer fouling on emissions, (2) whether we should add mixer cleaning as a possible scheduled-maintenance item, and (3) how manufacturers could ensure that operators of in-use engines would do this cleaning.

d. Deterioration factors. We are proposing an approach that gives manufacturers wide discretion to establish deterioration factors for Large SI engines. The general expectation is that manufacturers will rely on emission measurements from engines have operated for an extended period, either in field service or in the laboratory. The manufacturer should do testing as needed to be confident that their engines will meet emission standards under the in-use testing program. We expect to review deterioration factors to ensure that the projected deterioration is consistent with any engine testing under in-use testing program. In the first two or three years of certification, we would rely on manufacturers' technical judgment (instead of results from in-use testing) to appropriately estimate deterioration factors to protect themselves from the risk of noncompliance.

e. In-use fuel quality. Gasoline used in industrial applications is generally the same as that used for automotive applications. Improvements that have been made to highway-grade gasoline therefore carry over directly to nonroad markets. This helps manufacturers be sure that fuel quality will not degrade an engine's emission-control performance after several years of sustained operation.

In contrast, there are no enforceable industry or government standards for fuel quality for LPG. As a result, LPG composition can vary widely. Limited testing data show that this varying fuel quality has a relatively small direct effect on emissions from a closed-loop engine with a catalyst. The greater concern is that fuel impurities and heavy-end hydrocarbons may cause an accumulation of deposits that can prevent an emission-control system from functioning properly. While an engine's feedback controls can compensate for some restriction in air- and fuel-flow, deposits may eventually prevent the engine from accurately controlling air-fuel ratios at stoichiometry. In any case, a routine cleaning step should remove deposits and restore the engine to proper functioning. We are aware of no systematic study of the effect of these deposits on in-use emissions, either from highway or from nonroad engines.

We request comment on the following things with respect to the quality of in-use LPG:

—The degree to which fuel quality affects emission durability, with supporting data.
—The ability of the proposed diagnostic requirements to alert the operator to the need for maintenance when the engine is no longer able to control air-fuel ratios at stoichiometry.
—The need for manufacturers to specify cleaning of fuel systems as part of critical emission-related maintenance, as described above.
—The possibility of applying engine technology to prevent fuel-related deposits.

—The potential to develop an industry-wide specification for in-use LPG motor fuels.
—The costs and benefits of fuel additives designed to prevent fuel-related deposits and how we could ensure that in-use fuels consistently include any appropriate additives.

5. Are There Other Requirements for Large SI Engines?

a. Crankcase emissions. Due to blowby of combustion gases and the reciprocating action of the piston, exhaust emissions can accumulate in the crankcase. Uncontrolled engine designs route these vapors directly to the atmosphere. We have long required that automotive engines prevent emissions from the engine's crankcase. Manufacturers generally do this by routing crankcase vapors through a valve into the engine's air intake system. We propose to require manufacturers to prevent crankcase emissions from Large SI engines. Since automotive engine blocks are already tooled for closed crankcases, the cost of adding a valve for positive-crankcase ventilation is very small. See the Draft Regulatory Support Document for further discussion of the costs and emission reductions associated with crankcase emissions.

b. Diagnosing malfunctions. We propose to require that Large SI engines diagnose malfunctioning emission-control systems starting with the 2007 model year (see § 1048.110). Three-way catalyst systems with closed-loop fueling control work well only when the air-fuel ratios are controlled to stay within a narrow range around stoichiometry.[125] Worn or broken components or drifting calibrations over time can prevent an engine from operating within the specified range. This increases emissions and can significantly increase fuel consumption and engine wear. The operator may or may not notice the change in the way the engine operates.

The proposed diagnostic requirement focuses solely on maintaining stoichiometric control of air-fuel ratios. This kind of design would detect problems such as broken oxygen sensors, leaking exhaust pipes, fuel deposits, and other things that would require maintenance to keep the engine at the proper air-fuel ratio.

Some companies are already producing engines with diagnostic systems that check for consistent air-fuel ratios. Their initiative supports the idea that diagnostic monitoring provides a mechanism to help keep engines tuned to operate properly, with benefits for both controlling emissions and maintaining optimal performance. There are currently no inspection and maintenance programs for nonroad engines, so the most important variable in making the emission control and diagnostic systems effective is in getting operators to repair the engine when the diagnostic light comes on. This calls for a relatively simple design to avoid false failures as much as possible. The proposed diagnostic requirements therefore focus on detecting inappropriate air-fuel ratios, which is the most likely failure mode for three-way catalyst systems. We propose to specify that the malfunction-indicator light should go on when an engine operates for a full minute without reaching a stoichiometric air-fuel ratio. If this specified time is too long, we could be allowing extended open-loop operation with increased emission levels. We request comment on whether this approach is appropriate and whether this one-minute period should be longer or shorter to provide timely detection without causing false failures. In addition, we request comment on the appropriateness of other malfunction indicators, such as a measuring the frequency of crossing stoichiometry or monitoring the voltage range of oxygen sensors.

Some natural gas engines may meet standards with lean-burn designs that never approach stoichiometric combustion. While manufacturers may design these engines to operate at specific air-fuel ratios, catalyst conversion is not as sensitive to air-fuel ratio as with stoichiometric designs. We request comment on whether these engines should show a malfunction condition when departing from a targeted air-fuel ratio, or whether some other parameters would more appropriately detect for any possible failure modes.

For cars and light-duty trucks, our diagnostic system requirements call for monitoring of misfire and reduction in catalyst conversion efficiency. We are not proposing these additional diagnostic features for nonroad Large SI engines. Requiring misfire and catalyst conversion monitoring, which are more difficult to detect, would require extensive development effort to define appropriate failure thresholds and for manufacturers to design systems to avoid false failures and false positive detection. In the context of this rulemaking, which proposes initial standards for nonroad Large SI engines, we believe it is important for manufacturers to design engines for low emissions before taking the step of designing a thorough, complex diagnostic system. We believe that monitoring air-fuel ratio will achieve the majority of the benefit available from diagnostic systems at a reasonable cost. Moreover, without a corresponding inspection-and -maintenance program, operators are most likely to respond to diagnostic warnings with a system that is clear and simple.

An example illustrates a typical scenario. One forklift operator driving an LPG-powered lift truck with three-way catalyst and closed-loop electronic controls noticed that he was able to run two hours shorter than usual on a standard tank of fuel. Since power characteristics were not noticeably affected, the operator had done no maintenance or investigation to correct the problem. Simply replacing the defective oxygen sensor restored the engine to its original level of performance (for fuel consumption and emission control). A diagnostic light would serve to alert operators that the engine needs attention and would provide help in identifying any specific parts causing the problem. Since the basic function of a three-way catalyst system is generally consistent with power and fuel-economy considerations, operators would have good reason to respond to a diagnostic light.

The automotive industry has developed a standardized protocol for diagnostic systems, including hardware specifications, and uniform trouble codes. Some of these will apply to nonroad engines, but some will not. In the proposed regulations we reference standards adopted by the International Organization for Standardization (ISO) for automotive systems. If these standards do not apply to the simpler diagnostic design proposed for Large SI engines, we encourage engine manufacturers to cooperate with each other and with other interested companies to develop new standards specific to nonroad engines.

As described in the proposed regulatory text, the malfunction light should go on when the system detects a malfunction and must stay on until the engine is serviced or until the engine returns to consistent, normal operation. Stored diagnostic trouble codes would identify as closely as possible the cause of the malfunction, which could then be read by any qualified technician.

We request comment on these proposed diagnostic system requirements.

[125] Stoichimetry is the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

c. Evaporative emissions. Evaporative emissions occur when fuel evaporates and is vented into the atmosphere. They can occur while an engine or vehicle is operating and even while it is not being operated. Among the factors that affect evaporative emissions are:

- Fuel metering (fuel injectors or carburetor).
- The degree to which fuel permeates fuel lines and fuel tanks.
- Proximity of the fuel tank to the exhaust system or other heat sources.
- Whether the fuel system is sealed and the pressure at which fuel vapors are ventilated.

In addition, some gasoline fuel tanks may be exposed to heat from the engine compartment and high-temperature surfaces such as the exhaust pipe. In extreme cases, fuel can start boiling, producing very large amounts of gasoline vapors vented directly to the atmosphere.

Evaporative emissions from Large SI engines and the associated equipment represent a significant part of their overall hydrocarbon emissions. The magnitude of evaporative emissions varies widely depending on the engine design and application. LPG-fueled equipment generally has very low evaporative emissions because of the tightly sealed fuel system. At the other extreme, carbureted gasoline-fueled equipment can have high rates of evaporation. Southwest Research Institute measured emissions from several gasoline-fueled Large SI engines and found them to vary from about 12 g/day up to almost 100 g/day.[126] This study did not take into account the possibility of unusually high fuel temperatures during engine operation, as described further below.

We are proposing to require basic measures to reduce evaporative emissions from gasoline-fueled Large SI engines. The usual approach to regulating emissions from nonroad and other mobile engines is to define a measurement procedure and adopt numerical limit values (or standards) that together determine a minimum required level of performance. Manufacturers are then free to use any kind of technology to meet these performance standards.

Since the Act directs us to first consider regulating nonroad engines with standards similar to those that apply to motor vehicles, we must consider test-based evaporative emission standards that would be comparable to those for automobiles. However, we have practical concerns with requiring that approach as the only option for manufacturers. These concerns relate primarily to the nonintegrated nature of these industries and the wide variety of applications in which the engines are used. Some manufacturers could face difficulties certifying to specific numerical emission levels because of the large variation in fuel system components needed to fit the many varied kinds of equipment. While a test-based standard may be feasible, we believe we should allow the use of other cost-effective approaches that could be more appropriate for this industry.

We propose to adopt an evaporative emission standard of 0.2 grams per gallon of fuel tank capacity for heating a fuel tank from 72° to 96° F. We further propose that manufacturers can rely on a design-based certification instead of measuring emissions by adopting one of the designs described in this paragraph. We have identified four technologies that would adequately prevent evaporative emissions to show compliance with the proposed evaporative emission standard. First, pressurized fuel tanks control evaporative emissions by suppressing vapor generation. In its standards for industrial trucks operating in certain environments, Underwriters Laboratories requires that trucks use self-closing fuel caps with tanks that stay sealed to prevent evaporative losses; venting is allowed for positive pressures above psi or for vacuum pressures of at least 1.5 psi.[127] Any Large SI engines or vehicles operating with these pressures would satisfy the certification requirements. Second, for applications where such high fuel tank pressures are undesirable, manufacturers could instead rely on an air bladder inside the fuel tank that changes in volume to keep the system in equilibrium at atmospheric pressure.[128] Third, an automotive-type system that stores fuel tank vapors for burning in the engine would be another alternative technology. Finally, collapsible bladder tanks, which change in volume to prevent generation of a vapor space or vapor emissions, are also commercially available. Also, similar to the Underwriters Laboratories' requirement, we are proposing that manufacturers must use self-closing or tethered fuel caps to ensure that fuel tanks designed to hold pressure are not inadvertently left exposed to the atmosphere. Section 1048.105 of the proposed regulations describes these design specifications in greater detail. We request comment on these approaches and on whether we should consider tank insulation as an alternative or complementary strategy for meeting the proposed requirements on a design basis.

In addition, we propose to require that engine manufacturers use (or specify that equipment manufacturers installing their engines use) fuel lines meeting the industry performance standard for permeation-resistant fuel lines developed for motor vehicles.[129] While metal fuel lines do not have problems with permeation, manufacturers should use discretion in selecting materials for grommets and valves connecting metal components to avoid high-permeation materials. Evaporative emission standards for motor vehicles have led to the development of a wide variety of permeation-resistant polymer components.

Finally, manufacturers can take steps to reduce fuel temperatures during operation. The use of fuel injection and the associated recirculating fuel lines and in-tank fuel pumps may even increase the heat load into the fuel tank, which would tend to increase emission rates generally and may increase the occurrence of fuel boiling. The Underwriters Laboratories specification for forklifts attempts to address this concern through a specified maximum fuel temperature, but the current limit does not prevent fuel boiling.[130] We are proposing a standard that prohibits fuel boiling during continuous operation at 30° C (86° F). Engine manufacturers would have to incorporate designs that reduce the heat load to the fuel tank to prevent boiling. For companies that sell loose engines, this may involve instructions to equipment manufacturers to help ensure, for example, that fuel tank surfaces are exposed to ambient air rather than to exhaust pipes or direct engine heat. Engine manufacturers may specify a maximum fuel temperature for the final installation. Such a temperature limit should be well below 53° C (128° F), the

[126] ''Measurement of Evaporative Emissions from Off-Road Equipment,'' by James N. Carroll and Jeff J. White, Southwest Research Institute (SwRI 08–1076), November 1998, Docket A–2000–01, document II–A–10.

[127] ''Industrial Trucks, Internal Combustion Engine-Powered,'' UL558, ninth edition, June 28, 1996, paragraphs 26.1 through 26.4, Docket A–2000–01, document II–A–28. See Section XI.E for our consideration of incorporating the UL requirements into our regulations by reference.

[128] ''New Evaporative Control System for Gasoline Tanks,'' EPA Memorandum from Charles Moulis to Glenn Passavant, March 1, 2001, Docket A–2000–01, document II–B–16.

[129] SAE J2260 ''Nonmetallic Fuel System Tubing with One or More Layers,'' November 1996.

[130] UL558, paragraph 19.1.1, Docket A–2000–01, document II–A–28.

temperature at which summer-grade gasoline (9 RVP) typically starts boiling.

An additional source of evaporative emissions is from carburetors. Carburetors often have high hot soak emissions (immediately after engine shutdown). We expect manufacturers to convert carbureted designs to fuel injection as a result of the proposed exhaust emission standards. While we are not proposing to mandate this technology, we believe the need to reduce exhaust emissions will cause engine manufacturers to use fuel injection on all gasoline engines. This change alone would eliminate most hot soak emissions. We request comment on whether the procedure described in the previous paragraphs would require fuel injection. In addition, we request comment on the possibility of meeting the 2007 exhaust emission standards with carbureted engines.

Engine manufacturers using design-based certification would need to describe in the application for certification the selected design measures and specifications to address evaporative losses from gasoline-fueled engines. For loose-engine sales, this would include emission-related installation instructions that the engine manufacturer would give to equipment manufacturers.

With the ready availability of automotive technology and the development effort already in place to meet Underwriters Laboratories' requirements, we believe the proposed evaporative-control provisions would not pose a major development burden in most cases. We expect manufacturers generally to meet the proposed evaporative requirements with low-cost, off-the-shelf technologies. Individual engines may need somewhat more development effort to ensure compliance, but the hardware and testing costs would be minimal. We estimate an average cost of about $10 per engine for those engines that would be subject to evaporative-emission standards. Once this program is fully phased in, we estimate over 7,500 tons of HC reductions annually. See the Draft Regulatory Support Document for further information about the estimated costs and benefits of evaporative emission controls.

Reducing evaporative losses would not only provide health and safety advantages, but would contribute to overall fuel savings from Large SI engines. We request comment on the proposed measures to control evaporative emissions, including the potential cost and effectiveness of (1) an evaporative emission standard at 0.2 g/gal of fuel, (2) the optional design standards, and (3) the proposed fuel-line and fuel-temperature requirements. We also request comment on any additional or complementary approaches.

D. Proposed Testing Requirements and Supplemental Emission Standards

1. What Duty Cycles Would Be Used To Measure Emissions?

For 2004 through 2006 model years, we are proposing to use the same steady-state duty cycles adopted by California ARB. For most engines this involves the testing based on the ISO C2 duty cycle, with a separate duty cycle for constant-speed applications based on the ISO D2 duty cycle. These duty cycles are described further below.

Starting in 2007, we are proposing an expanded set of duty cycles, again with separate treatment for variable-speed and constant-speed applications. These duty-cycles are each comprised of three segments: (1) A warm-up segment, (2) a transient segment, and (3) a steady-state segment. Each of these segments, described briefly in this section, include specifications for the speed and load of the engine as a function of time. Measured emissions during the transient and steady-state segments must meet the emission standards that apply. In general, the proposed duty-cycles are intended to include representative operation from the wide variety of in-use applications. This includes highly transient low-speed forklift operation, constant-speed operation of portable equipment, and intermediate-speed vehicle operation. Chapter 4 of the Draft Regulatory Support Document describes the duty cycles in greater detail. We request comment on the proposed duty cycles.

Ambient temperatures in the laboratory must be between 20° and 30° C (68 and 86° F) during duty-cycle testing. This improves the repeatability of emission measurements when the engine runs through its prescribed operation. We nevertheless expect manufacturers to design for controlling emissions under broader ambient conditions, as described in Section IV.D.5.

The warm-up segment begins with a cold-start. This means that the engine should be very near room temperature before the test cycle begins. Once the engine is started, it would be operated over the first 3 minutes of the specified transient duty cycle without emission measurement. The engine then idles for 30 seconds before starting the prescribed transient cycle. The purpose of the warm-up segment is to bring the engine up to normal operating temperature in a standardized way. The 3-minute warm-up period allows enough time for engine-out emissions to stabilize, for the catalyst to warm up enough to become active, and for the engine to start closed-loop operation. This serves as a defined and achievable target for the design engineer to limit cold-start emissions to a relatively short period.

The transient segment of the general duty cycle is a composite of forklift and welder operation. This duty cycle was developed by selecting segments of measured engine operation from two forklifts and a welder as they performed their normal functions. This transient segment captures the wide variety of operation from a large majority of Large SI engines. Emissions measured during this segment are averaged over the entire transient segment to give a single value in g/kW.

Steady-state testing consists of engine operation for an extended period at several discrete speed-load combinations. Associated with these test points are weighting factors that allow a single weighted-average steady-state emission level in g/kW. The principal duty cycle is based on the ISO C2 cycle, which has five modes at various intermediate speed points, plus one mode at rated speed and one idle mode. The combined intermediate-speed points at 10, 25, and 50 percent account for over 70 percent of the total modal weighting. While any steady-state duty cycle is limited in how much it can represent operation of engines that undergo transient operation, the distribution of the C2 modes and their weighting values aligns significantly with expected and measured engine operation from Large SI engines. In particular, these engines are generally not designed to operate for extended periods at high-load, rated speed conditions. Field measurement of engine operation shows, however, that forklifts operate extensively at lower speeds than those included in the C2 duty cycle. While we believe the test points of the C2 duty cycle are representative of engine operation from many applications of Large SI engines, supplementing the steady-state testing with a transient duty cycle is necessary to adequately include engine operation characteristic of what occurs in the field.

Engines such as generators, welders, compressors, and pumps are governed to operate only at a single speed with varying loads. We are proposing a combination of transient and steady-state testing that applies specifically to constant-speed engines. The transient duty-cycle segment includes 20 minutes of engine operation based on measured

welder operation. We expect to propose this same transient duty cycle for constant-speed nonroad diesel engines. Manufacturers would also test constant-speed Large SI engines with steady-state operation based on the ISO D2 duty cycle, which specifies engine operation at rated speed with five different load points. This same steady-state duty cycle applies to constant-speed, nonroad diesel engines. Emission values measured on the D2 duty cycle are treated the same as values from the C2 duty cycle; the same numerical standards apply to both cycles. Manufacturers selling engines for both constant-speed and variable-speed applications would omit the constant-speed transient test, since that operation is included in the general transient test.

We are concerned that engines certified with the C2 duty cycle may be installed in constant-speed applications; or, similarly that engines certified with the D2 duty cycle may be installed in variable-speed applications. Since the C2 cycle includes very little operation at rated speed, it is not effective in ensuring control of emissions for constant-speed engines. The D2 cycle is even less capable of predicting emission performance from variable-speed engines. To address this, we are proposing that manufacturers routinely test engines on both the C2 and D2 duty cycles.[131] Manufacturers selling only a variable-speed or only constant-speed engines in an engine family would be allowed to omit testing with the duty cycle that would not apply. With a more limited certification, however, we would require the manufacturer to add information to the engine label and any emission-related installation instructions to clarify that the engine has a limited certification. We request comment on this approach to variable- and constant-speed engines.

Some diesel-derived engines operating on natural gas with power ratings up to 1,500 or 2,000 kW may be covered by the proposed emission standards. Engine dynamometers with transient-control capabilities are generally limited to testing engines up to 500 or 600 kW. We propose at this time to waive emission standards and testing requirements related to transient duty cycles for engines above 560 kW. We would likely review this provision for Large SI engines once we have reached a conclusion on the same issue for nonroad diesel engines. We would expect to treat both types of engines the same way. Note that the field-testing emission standards still apply to engines that don't certify to transient duty-cycle standards.

[131] It would not be necessary to repeat the warm-up and transisent segments for additional steady-state duty cycles.

2. What Fuels Would Be Used During Emission Testing?

For gasoline-fueled Large SI engines, we are proposing to use the same specifications we have adopted for testing gasoline-fueled highway vehicles and engines. This includes the revised specification to cap sulfur levels at 80 ppm (65 FR 6698, February 10, 2000).

For LPG and natural gas, we are proposing to use the same specifications adopted by California ARB. We understand that in-use fuel quality for LPG and natural gas varies significantly in different parts of the country and at different times of the year. Not all in-use fuels outside California meet California ARB specifications for certification fuel, but fuels meeting the California specifications are nevertheless widely available. Test data show that LPG fuels with a much lower propane content have only slightly higher NO_X and CO emissions (see Chapter 4 of the Draft Regulatory Support Document for additional information). These data support our belief that engines certified using the specified fuel will achieve the desired emission reduction for a wide range of in-use fuels.

Unlike California ARB, we propose to apply the fuel specifications to testing only for emission measurements, not to service accumulation. We propose to allow service accumulation between emission tests with certification fuel or any commercially available fuel of the appropriate type. We would similarly allow manufacturers to choose between certification fuel and any commercial fuel for in-use measurements to show compliance with field-testing emission standards.

We request comment on appropriate fuel specifications for all types of engine testing.

3. Are There Proposed Production-Line Testing Provisions for Large SI Engines?

The provisions described in Section III.C.4 apply to Large SI engines. These proposed requirements are consistent with those adopted by California ARB. One new issue specific to Large SI engines relates to the duty cycles for measuring emissions from production-line engines.

For routine production-line testing, we propose to require emission measurements only with the steady-state duty cycles used for certification. Due to the cost of sampling equipment for transient engine operation, we are not proposing to require routine transient testing of production-line engines. We believe that steady-state emission measurements will give a good indication of manufacturers' ability to build engines consistent with the prototypes on which their certification data are based. We also propose, however, to reserve the right to direct a manufacturer to measure emissions with a transient duty cycle if we believe it is appropriate. One indication of the need for this transient testing would be if steady-state emission levels from production-line engines are significantly higher than the emission levels reported in the application for certification for that engine family. For manufacturers with the capability of measuring transient emission levels at the production line, we would recommend doing transient tests to better ensure that in-use tests will not reveal problems in controlling emissions during transient operation. Manufacturers would not need to make any measurements to show that production-line engines can meet field-testing emission standards.

We request comment on all aspects of the proposed production-line testing requirements, including engine sampling rates and options for using alternative testing methods.

4. Are There Proposed In-Use Testing Provisions for Large SI Engines?

While the certification and production-line compliance requirements are important to ensure that engines are designed and produced in compliance with established emission limits, there is also a need to confirm that manufacturers build engines with sufficient durability to meet emission limits as they age in service. Consistent with the California ARB program, we are proposing to require engine manufacturers to conduct emission tests on a small number of field-aged engines to show they meet emission standards.

Under the proposed program, we may generally select up to 25 percent of a manufacturer's engine families in a given year to be subject to in-use testing (see Table IV.D–1). Most companies would need to test at most one engine family per year. Manufacturers may conduct in-use testing on any number of additional engine families at their discretion. We request comment on this maximum rate of testing engines under the proposed in-use testing program.

TABLE IV.D–1.—MAXIMUM IN-USE TESTING RATE

Number of engine families for a manufacturer	Maximum number of families subject to in-use testing each year
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	2
9	2
10	2
11	2
12	3

We are also proposing that manufacturers in unusual circumstances have the ability to develop an alternate plan to fulfill any in-use testing obligations, consistent with a similar program we have adopted for outboard and personal watercraft marine engines. These circumstances include total sales for an engine family below 200 per year, installation only in applications where testing is not possible without irreparable damage to the vehicle or engine, or any other unique feature that prevents full emission measurements. We request comment on these provisions.

While this flexibility for alternate measurements would be available to small-volume manufacturers, we also request comment on applying in-use testing requirements to very small-volume engine families in general. While the proposed regulations would allow us to select an engine family every year from an engine manufacturer, there are several reasons why small volume manufacturers could expect a less demanding approach. These manufacturers may have only one or two engine families. If a manufacturer shows that an engine family meets emission standards in an in-use testing exercise, that could provide adequate data to show compliance for that engine family for a number of years, provided the manufacturer continues to produce those engines without significantly redesigning them in a way that could affect their in-use emissions performance and that we do not have other reason to suspect noncompliance. Also, where we had comfort that a manufacturer's engines were likely in good in-use compliance, we would generally take the approach of selecting engine families based on some degree of proportionality. To the extent that manufacturers produce a smaller than average proportion of engines, they could expect that we would select their engine families less frequently, especially if other available data pointed toward clear in-use compliance.

We are also proposing that manufacturers in unusual circumstances have the ability to develop an alternate plan to fulfill any in-use testing obligations. These include total sales for an engine family below 200 per year, installation only in applications where testing is not possible without irreparable damage, or any other unique feature that prevents full emission measurements. We request comment on these provisions. While this flexibility would be available to small-volume manufacturers, we also request comment on applying in-use testing requirements to these companies in general. While the proposed regulations would allow us select an engine family every year from an engine manufacturer, there are reasons why these companies could expect a less demanding approach. First, to avoid unfair treatment of individual manufacturers, we would generally take the approach of selecting engine families based on some degree of proportionality. To the extent that manufacturers produce a smaller than average proportion of engines, they could expect that we would select their engine families less frequently. In addition, our experience in implementing a comparable testing program for recreational marine engines provides a history of how we implement in-use testing requirements.

Engines can be tested one of two ways. First, manufacturers can remove engines from vehicles or equipment and test the engines on a laboratory dynamometer using certification procedures. For 2004 through 2006 model year engines, this would be the same steady-state duty cycle used for certification; manufacturers may optionally test engines on the dynamometer under transient operating conditions. For 2007 and later model year engines, manufacturers must test engines using both steady-state and transient duty cycles, as in certification.

Second, manufacturers may use the proposed equipment and procedures for testing engines without removing them from the equipment (referred to in this document as field-testing). See Section IV.D.5 for a more detailed description of how to measure emissions from engines during normal operation in the field. Since engines operating in the field cannot be controlled to operate on a specific duty cycle, compliance would be demonstrated by comparing the measured emission levels to the proposed field-testing emission standards, which would have higher numerical value to account for the possible effects of different engine operation. Because the engine operation can be so variable, however, engines tested to show compliance only with the field-testing emission standards would not be eligible to participate in the in-use averaging, banking, and trading program (described below).

We could give directions to include specific types of normal operation to confirm that engines are controlling emissions in real operation. For example, for testing to show compliance with field-testing emission standards, we may identify specific types of operation on specific days or times to sample emissions, as long as these fall within the range of normal operation for the application. Dynamometer testing might include operation over a torque-speed trace measured from any appropriate equipment. If we don't provide specific direction, manufacturers would use their discretion to show that engines comply with the field-testing standards, much like for certification (see Section IV.D.5).

Along with the in-use testing program, we are proposing an in-use credit program designed to reduce compliance cost without reducing environmental benefits. The program would provide manufacturers with flexibility in addressing potential in-use noncompliance in a way that we agree would avoid the need for a determination of nonconformity under Clean Air Act section 207(c), and thereby avoid a recall. Participation in this program would be voluntary.

The flexibility of the proposed in-use credit program is appropriate given the particular circumstances of the Large SI engine industry. For an engine family failing in-use testing, we believe recalling the nonconforming engines may be particularly burdensome and impractical for this industry, mainly due to the difficulty of tracking the nonconforming engines. Recalling the engines would therefore require substantial resources, yet may not be highly effective in remedying the excess emissions.

Clean Air Act section 213 requires engines to comply with emission standards throughout their regulatory useful lives, and section 207 requires a manufacturer to remedy in-use nonconformity when we determine that a substantial number of properly maintained and used engines fail to conform with the applicable emission standards (42 U.S.C. 7541). Once we make this determination, recall would be necessary to remedy the

nonconformity. However, under these circumstances, where it is expected that recall would be impractical and largely ineffective, it is appropriate not to make a determination of substantial nonconformity where a manufacturer uses emission credits to offset in-use noncompliance. Thus, under the Clean Air Act, we may choose to make no section 207(c) determination of substantial nonconformity where an engine manufacturer uses emission credits to offset any noncompliance with the statute's in-use performance requirements. Though the language of section 213(d) is silent on the issue of emission credits, it generally allows considerable discretion in determining what modifications to the highway regulatory scheme are appropriate for nonroad engines.

In-use credits would be based on in-use testing conducted by the manufacturer. For a given engine family, the in-use compliance level would be determined by averaging the results from in-use testing performed for that engine family. If the in-use compliance level is below the applicable standard, the manufacturer would generate in-use credits for that engine family. If the in-use compliance level is above the standard, the engine family would experience a credit deficit. Manufacturers calculate credits based on the measured emission levels (when compared with applicable emission standards) and several additional variables, such as rated power, useful life, and engine family population. To ensure that emission credits show a real degree of emission control relative to the emission standard, we are proposing that emission credits must be based on transient duty-cycle operation on a dynamometer. An exception would apply for averaging emission levels from 2004 through 2006 model year engines, where we would allow for emission credits based on steady-state emission testing.

While we are proposing the in-use credit program adopted by California ARB, an additional concern relates to the status of emission credits over the long term. This would be our first step in setting emission standards for this category of engines, which increases the uncertainty of setting standards requiring the ''greatest degree of emission reduction achievable,'' as called for in the Clean Air Act. If manufacturers are able to use the projected technologies to consistently achieve emission levels even lower than we require, in-use testing over several years can lead to a large pool of in-use emission credits. To avoid making the in-use testing program meaningless for some engines, especially in the context of a transition to a next tier of emission standards , we would not intend to use credits older than three model years in deciding whether to take administrative action under section 207(c). This should address the concern for accumulating credits without taking away EPA and the manufacturers' substantial flexibility to use credits to offset marginally noncompliant engines.

We request comment on all aspects of the proposed in-use testing requirements.

5. What About Field-Testing Emission Standards and Test Procedures?

To enable field-testing of Large SI engines and to address concerns for controlling emissions outside of the specific duty cycles proposed to measure emissions for certification, we are proposing procedures and standards that apply to a wider range of normal engine operation.

a. What is the field-testing concept? Measuring emissions from engines in the field as they undergo normal operation while installed in nonroad equipment addresses two broad concerns. First, this provides a low-cost method of testing in-use engines. Second, testing has shown that emissions can vary dramatically under certain modes of operation. Field-testing addresses this by including emission measurements over the broad range of normal engine operation. This may include varying engine speeds and loads according to real operation and may include a reasonable range of ambient conditions, as described below.

No engine operating in the field can follow a prescribed duty cycle for a consistent measure of emission levels. Similarly, no single test procedure can cover all real-world applications, operations, or conditions. Specifying parameters for testing engines in the field and adopting an associated emission standard provides manufacturers with a framework for showing that their engines will control emissions under the whole range of normal operation in the relevant nonroad equipment.

To ensure that emissions are controlled from Large SI engines over the full range of speed and load combinations seen in the field, we are proposing supplemental emission standards that apply more broadly than the duty-cycle standard. These standards would apply to all regulated pollutants (NO_X, HC, and CO) under all normal operation (steady-state or transient). We propose to exclude abnormal operation (such as very low average power and extended idling time), but not restrict operation to any specific combination of speeds and loads. In addition, we are proposing that the field-testing standards would apply under a broad range of in-use ambient conditions, both to ensure robust emission controls and to avoid overly restricting the times available for testing. These provisions are described in detail below.

b. What are the field-testing emission standards? Starting with the 2007 model year, we propose to apply field-testing emission standards of 4.7 g/kW-hr (3.5 g/hp-hr) for HC+NO_X emissions and 6.7 g/kW-hr (5.0 g/hp-hr) for CO emissions. As described above for the duty-cycle standards, we believe manufacturers will be able to use the additional time beyond 2004 to optimize their designs to control emissions under the full range of normal in-use operation. As described in Chapter 4 of the Draft Regulatory Support Document, we believe manufacturers can achieve these proposed emission standards using currently available three-way catalysts and electronically controlled fuel systems.

As described above, we are proposing alternate emission standards for those engines operating predominantly outdoors. The corresponding proposed field-testing standards are 1.8 g/kW-hr (1.3 g/hp-hr) for HC+NO_X emissions and 41 g/kW-hr (31 g/hp-hr) for CO emissions.

Manufacturers have expressed an interest in using field-testing procedures before the 2007 model year to show that they can meet emission standards as part of the in-use testing program. While we are not proposing specific field-testing standards for 2004 through 2006 model year engines, we are proposing to allow this as an option. In this case, manufacturers would conduct the field testing as described here to show that their engines meet the 4 g/kW-hr HC+NO_X standard and the 50 g/kW-hr CO standard. This could give manufacturers the opportunity to do testing at significantly lower cost compared with laboratory testing. Preliminary certification data from California ARB show that manufacturers are reaching steady-state emission levels well below emission standards, so we would expect any additional variability in field-testing measurements not to affect manufacturers' ability to meet the same emission standards. We request comment on the need for and appropriateness of this provision. We also request comment on whether there should be a separate field-testing standard, higher or lower than the proposed duty-cycle standards, to provide adequate assurance that the

engines operate with the required level of emission control.

These proposed field-testing standards are based on emission data measured with the same emission-control technology used to establish the duty-cycle standards. The higher numerical standard for field testing reflects the observed variation in emissions for varying engine operation, the projected effects of ambient conditions on the projected technology, and the accuracy limitations of in-use testing equipment and procedures. Conceptually, we believe that field-testing standards should primarily require manufacturers to adjust engine calibrations to effectively manage air-fuel ratios under varying conditions. The estimated cost of complying with emission standards includes an allowance for the time and resources needed for this recalibration effort (see Section IX.B. for total estimated costs per engine).

EPA generally requires manufacturers to show at certification that they are capable of meeting requirements that apply for any in-use testing. This adds a measure of assurance to both EPA and manufacturers that the engine design is sufficient for any in-use engines to pass any later testing. For Large SI engines, we are proposing that manufacturers show in their application for certification that they meet the field-testing standards. Manufacturers would submit a statement that their engines will comply with field-testing emission standards under all conditions that may reasonably be expected to occur in normal vehicle operation and use. The manufacturer would provide a detailed description of any testing, engineering analysis, and other information that forms the basis for the statement. This would likely include a variety of steady-state emission measurements not included in the prescribed duty cycle. It may also include a continuous trace showing how emissions vary during the transient test or it may include emission measurements during other segments of operation manufacturers believe is representative of the way their engines normally operate in the field.

Two additional provisions are necessary to allow emission testing without removing engines from equipment in the field. We are proposing to require manufacturers to design their engines to broadcast instantaneous speed and torque values to the onboard computer. We are also proposing a requirement to add an emission sampling port downstream of the catalyst.

The equipment and procedures for showing compliance with field-testing standards also hold promise to reduce the cost of production-line testing. Companies with production facilities that have a dynamometer but no emission measurement capability could use the field-testing equipment and procedures to get a low-cost, valid emission measurement at the production line. Manufacturers may choose to use the cost advantage of the simpler measurement to sample a greater number of production-line engines. This would provide greater assurance of consistent emissions performance, but would also provide valuable quality-control data for overall engine performance. See the discussion of alternate approaches to production-line testing in Section III.C.4 for more information.

c. What limits are placed on field testing? The field-testing standards would apply to all normal operation. This could include steady-state or transient engine operation. Given a set of field-testing standards, the goal for the design engineer is to ensure that engines are properly calibrated for controlling emissions under any reasonably expected mode of engine operation. Engines may not be able to meet the emissions limit under all conditions, however, so we are proposing several parameters that would narrow the range of engine operation that would be subject to the field-testing standards. For example, emission sampling for field testing would not include engine starting.

Engines can often operate at extreme engine conditions (summer, winter, high altitude, etc.). To narrow the range of conditions for the design engineer, we are proposing to limit emission measurements during field testing to ambient temperatures from 13° to 35° C (55° to 95° F), and to ambient pressures from 600 to 775 millimeters of mercury (which should cover almost all normal pressures from sea level to 7,000 feet above sea level). This allows testing under a wider range of conditions in addition to helping ensure that engines are able to control emissions under the whole range of conditions under which they operate.

We are proposing some additional limits to define ''normal'' operation that could be included in field testing. These restrictions are intended to provide manufacturers with some certainty about what their design targets are and to ensure that compliance with the proposed field-testing standards would be feasible. These restrictions would apply to both variable-speed and constant-speed engine applications.

First, measurements with more than 2 minutes of continuous idle would be excluded. This means that an emission measurement from a forklift while it idled for 5 minutes would not be considered valid. On the other hand, an emission measurement from a forklift that idled for 1 minute (continuous or intermittent) and otherwise operated at 40 percent power for several minutes would be considered a valid measurement. Measurements with in-use equipment in their normal service show that idle periods for Large SI engines are short, but relatively frequent. We should therefore not automatically exclude an emission sample if it includes an idling portion. At the same time, controlling emissions during extended idling poses a difficult design challenge, especially at low ambient temperatures. Exhaust and catalyst temperatures under these conditions can decrease enough that catalyst conversion rates decrease significantly. Since extended idling is not an appropriate focus of extensive development efforts at this stage, we believe the 2-minute threshold for continuous idle appropriately balances the need to include measurement during short idling periods with the technical challenges of controlling emissions under difficult conditions.

Second, we are proposing that the measured power during the sampling period must be above 5 percent of maximum power for an emission measurement to be considered valid. Brake-specific emissions (g/kW-hr) can be very high at low power because they are calculated by dividing the g/hr emission rate by a very small power level (kW). By ensuring that brake-specific emissions are not calculated by dividing by power levels less than 5 percent of the maximum, we can avoid this problem.

Third, gasoline-fueled engines need to run rich of stoichiometric combustion during extended high-load operation to protect against engine failure. This increases HC and CO emissions. We are accordingly proposing for gasoline-fueled engines that operation at 90 percent or more of maximum power must be less than 10 percent of the total sampling time. We would expect it to be uncommon for engine installations to call for such high power demand due to the shortened engine lifetime at very high-load operation. A larger engine could generally produce the desired power at a lower relative load, without compromising engine lifetime. Alternatively, applications that call for full-load operation typically use diesel engines. We propose to allow manufacturers to request a different threshold to allow more open-loop operation. Before we could approve

such a request, the engine manufacturer would need to have a plan for ensuring that the engines in their final installation would not routinely operate at loads above the specified threshold.

Fourth, as a part of the ''normal operation'' limitation, we are considering a limit on the frequency of accelerations. Very frequent acceleration events can make it difficult to consistently get enough air for combustion. Engine dynamometers also place a practical limit on the degree of transient operation that can be simulated in the laboratory. It would not be appropriate to exclude normal driving patterns, but drawing a line at the upper end of what happens in the field may be an appropriate constraint for field testing. This would likely take the form of a maximum frequency of acceleration events during the emission sampling period. We request comment on defining the most severe accelerations that we should include in field-testing as normal operation.

An additional parameter to consider is the minimum sampling time for field testing. A longer period allows for greater accuracy, due mainly to the smoothing effect of measuring over several transient events. On the other hand, an overly long sampling period can mask areas of engine operation with poor emission-control characteristics. To balance these concerns, we are proposing a minimum sampling period of 2 minutes. In other rules for diesel engines, we have allowed sampling periods as short as 30 seconds. Spark-ignition engines generally don't have turbochargers and they control emissions by maintaining air-fuel ratio with closed-loop controls through changing engine operation. Spark-ignition engines are therefore much less prone to consistent emission spikes from off-cycle or unusual engine operation. We believe the 2-minute sampling time requirement will ensure sufficient measurement accuracy and will allow for more meaningful measurements from engines that may be operated with very frequent but brief times at idle. We are not proposing a maximum sampling time. We would expect manufacturers testing in-use engines to select an approximate sampling time before measuring emissions. When selecting an engine family for the in-use testing program, we may add further direction related to the emission-sampling effort, such as sampling time or specific types of engine operation.

We request comment on whether these are appropriate constraints on sampling emissions using field-testing procedures. In particular, we request comment on whether the limitations described are necessary or sufficient to target the whole range of normal operation that should be subject to emission standards.

d. How do I test engines in the field? To test engines without removing them from equipment, analyzers would be connected to the engine's exhaust to detect emission concentrations during normal operation. Exhaust volumetric flow rate and continuous power output would also be needed to convert the analyzer responses to units of g/kW-hr for comparing to emission standards. We are proposing to calculate these values from measurements of the engine intake flow rate, the exhaust air/fuel ratio and the engine speed, and from torque information.

Small analyzers and other equipment are already available that could be adapted for measuring emissions from field equipment. A portable flame ionization detector could measure total hydrocarbon concentrations. Methane measurement currently requires more expensive laboratory equipment that is impractical for field measurements. Field-testing standards would therefore be based on total hydrocarbon emissions. A portable analyzer based on zirconia technology measures NO_X emissions. A nondispersive infrared (NDIR) unit could measure CO. Emission samples could best be drawn from the exhaust flow directly downstream of the catalyst material to avoid diluting effects from the end of the tailpipe. For this reason we request comment on a requirement for manufacturers to produce all their engines with this kind of sampling port in the exhaust pipe or at the end of the catalytic converter. Mass flow rates would also factor into the torque calculation; this could either be measured in the intake manifold or downstream of the catalyst.

Calculating brake-specific emissions depends on determining instantaneous engine speed and torque levels. We therefore propose to require that manufacturers design their engines to continuously monitor engine speed and torque. The proposed tolerance for speed measurements, which is relatively straightforward is ±5 percent. For torque, the onboard computer would need to convert measured engine parameters into useful units. The manufacturer would probably need to monitor a surrogate value such as intake manifold pressure or throttle position (or both), then rely on a look-up table programmed into the onboard computer to convert these torque indicators into newton-meters. Manufacturers may also want to program the look-up tables for torque conversion into a remote scan tool. Because of the greater uncertainty in these measurements and calculations, we are proposing that manufacturers produce their systems to report torque values that are within 85 and 105 percent of the true value. This broader range allows appropriately for the uncertainty in the measurement, while providing an incentive for manufacturers to make the torque reading as accurate as possible. Under-reporting torque values would over-predict emissions. These tolerances are taken into account in the selection of the field-testing standards, as described in Chapter 4 of the Draft Regulatory Support Document. We request comment on this approach to measuring in-use emissions and on any alternate approaches.

We request comment on all aspects of field-testing standards and procedures.

E. Special Compliance Provisions

We are proposing a variety of provisions to address the particular concerns of small-volume manufacturers of Large SI engines. These provisions are generally designed to address the limited capital and engineering resources of companies that produce very few engines.

As described in Section IV.B.4, we are proposing a provision to allow manufacturers to certify Large SI engines to emission standards for engines below 19 kW if they have displacement below 1 liter and rated power between 19 and 30 kW. We are proposing to expand this flexibility to include a limited number of engines up to 2.5 liters. This provision would be available for manufacturers producing 300 or fewer Large SI engines annually nationwide for the 2004 through 2006 model years. We request comment on this arrangement, especially in three areas. First, we request comment on the possible need to adjust the 30 kW cap for these engines to ensure that we include the appropriate engines. Second, we request comment on the sales threshold and whether a greater allowance would be necessary to accommodate the sales levels of small-volume manufacturers. Finally, since many of these engines may be used in places where individual exposure to CO emissions is a concern, we request comment on adopting an intermediate CO emission standard for these engines. The CO emission standard for engines rated below 19 kW is currently about 600 g/kW-hr. Engines with displacement between 1 and 2.5 liters generally have much lower CO emissions than small lawn and garden engines. Baseline emission levels on

small automotive-type engines shows that uncontrolled emission levels are about 130 g/kW-hr. We request comment on adopting this as a CO standard for engines that use the provision described in this paragraph.

Starting in 2007, we propose to discontinue the provisions described above for engines between 1 and 2.5 liters. In their place, we propose to adopt for three model years the standards that would otherwise apply in 2004 (4 g/kW-hr HC+NO_X and 50 g/kW-hr CO with steady-state duty cycles). Starting in 2010, there would no longer be separate emission standards for small-volume manufacturers. Since upgrading to the anticipated emission-control technology substantially improves performance, we expect that small-volume manufacturers may find it advantageous to introduce these technologies ahead of the schedule described here.

We are proposing several additional provisions to reduce the burden of complying with emission standards; we propose to apply these provisions to all manufacturers. These include (1) reduced production-line testing rates after consistent testing with good emission results, (2) allowance for alternative, low-cost testing methods to test production-line engines, (3) a flexible approach to developing deterioration factors, which gives the manufacturer broad discretion to develop appropriate emission-durability estimates.

We are also proposing provisions to address hardship circumstances, as described in Section VII.C. For Large SI engines, we are proposing a longer available extension of the deadline for meeting emission standards for small-volume manufacturers. Under this provision, we would extend the deadline by three years for companies that qualify for special treatment under the hardship provisions. We would, however, not extend the deadline for compliance beyond the three-year period. This approach considers the fact that, unlike most other engine categories, qualifying small businesses are more likely to be manufacturers designing their own products. Other types of engines more often involve importers, which are limited more by available engine suppliers than design or development schedules.

F. Technological Feasibility of the Standards

Our general goal in designing the proposed standards is to develop a program with technologically feasible standards that will achieve significant emission reductions. Our standards must comply with Clean Air Act section 213(a)(3), as described in Section III.B. The Act also instructs us to first consider standards equivalent in stringency to standards for comparable motor vehicles or engines (if any) regulated under section 202 of the Act, taking into consideration technological feasibility, costs, and other factors (the relevant engines regulated under section 202 are automotive and highway truck engines). We are proposing emission standards that depend on the industrial versions of established automotive technologies. The most recent advances in automotive technology have made possible even more dramatic emission reductions. However, we believe that transferring some of these most advanced technologies would not be appropriate for nonroad engines at this time, especially considering the much smaller sales volumes for amortizing fixed costs and the additional costs associated with the first-time regulation of these engines. On the other hand, the proposed emission standards for Large SI align well with standards we have adopted for the next tier of heavy-duty highway gasoline engines (64 FR 58472, October 29, 1999). We have also adopted long-term standards for these engines that require significant further reductions with more sophisticated technologies (66 FR 5002, January 18, 2001).

To comply with the 2004 model year standards, manufacturers should not need to do any development, testing, or certification work that is not already necessary to meet California ARB standards in 2004. As shown in Chapter 4 of the Draft Regulatory Support Document, manufacturers can meet these standards with three-way catalysts and closed-loop fuel systems. These technologies have been available for industrial engine applications for several years. Moreover, several manufacturers have already completed the testing effort to certify with California ARB that their engines meet these standards. Complying with the proposed standards nationwide in 2004 would therefore require manufacturers only to produce greater numbers of the engines complying with the California standards.

Chapter 4 of the Draft Regulatory Support Document further describes data and rationale showing why we believe that the proposed 2007 model year emission standards under the steady-state and transient duty-cycles and field-testing procedures are feasible. In summary, SwRI testing and other data show that the same catalyst and fuel-system technologies needed to meet the 2004 standards can be optimized to meet more stringent emission standards. Applying further development allows the design engineer to fine-tune control of air-fuel ratios and address any high-emission modes of operation to produce engines that consistently control emissions to very low levels, even considering the wide range of operation experienced by these engines. The proposed numerical emission standards are based on measured emission levels from engines that have operated for at least 5,000 hours with a functioning emission-control system. These engines demonstrate the achievable level of control from catalyst-based systems and provide a significant degree of basic development that should help manufacturers in optimizing their own engines.

We believe it is appropriate to initiate the second stage of standards in 2007, because we believe that applying these emission standards earlier would not allow manufacturers enough stability between introduction of different phases of emission standards to amortize their fixed costs and prepare for complying with the full set of requirements proposed in this notice. Three years of stable emission standards, plus the remaining lead time before 2004, allows manufacturers enough time to go through the development and certification effort to comply with the proposed standards. The proposed provisions to allow ''family banking'' for early compliance should provide an additional tool for companies that choose to spread out their design and certification efforts.

The proposed emission standards would either have no impact or a positive impact with respect to noise, energy, and safety, as described in Chapter 4 of the Draft Regulatory Support Document. In particular, the anticipated fuel savings associated with the expected emission-control technologies would provide a very big energy benefit related to new emission standards. The projected technologies are currently available and are consistent with those anticipated for complying with the emission standards adopted by California ARB. The lead time for the proposed interim and final emission standards allows manufacturers enough time to optimize these designs to most effectively reduce emissions from the wide range of Large SI equipment applications.

V. Recreational Marine Diesel Engines

This section describes the new provisions proposed for 40 CFR part 94, which would apply to engine manufacturers and other certificate holders. This section also discusses

proposed test equipment and procedures for anyone who tests engines to show they meet emission standards. We are proposing the same general compliance provisions from 40 CFR part 94 for engine manufacturers, equipment manufacturers, operators, rebuilders, and others. Similar general compliance provisions are described for the other engines included in this proposal in Section VII. See Section III for a description of our general approach to regulating nonroad engines and how manufacturers show that they meet emission standards.

A. Overview

We are proposing exhaust and crankcase emission standards for recreational marine diesel engines with power ratings greater than or equal to 37 kW. We are proposing emission standards for hydrocarbons (HC), oxides of nitrogen (NO_X), carbon monoxide (CO), and particulate matter (PM) beginning in 2006. We believe manufacturers will be able to use technology developed for use on land-based nonroad and commercial marine diesel engines. To encourage the introduction of low-emission technology, we are also proposing voluntary ''Blue Sky'' standards which are 40 percent lower than the proposed standards. We also recognize that there are many small businesses that manufacture recreational marine diesel engines; we are therefore proposing several regulatory flexibility options for small businesses that should help minimize any unique burdens caused by emission regulation. A history of environmental regulation for marine engines is presented in Section I.

We have determined there are at least 16 companies manufacturing marine diesel engines for recreational vessels. Six of the identified companies are considered small businesses as defined by the Small Business Administration (fewer than 1000 employees). Nearly 75 percent of diesel engines sales for recreational vessels in 2000 can be attributed to three large companies. Based on sales estimates for 2000, the six small businesses represent approximately 4 percent of recreational marine diesel engine sales. The remaining companies each comprise between two and seven percent of sales for 2000.

Diesel engines are primarily available in inboard marine configurations, but may also be available in sterndrive and outboard marine configurations. Inboard diesel engines are the primary choice for many larger recreational boats.

B. Engines Covered by This Proposal

The standards we are proposing in this section apply to recreational marine diesel engines. These engines were excluded from our final standards for commercial marine diesel engines finalized in 1999 because we thought their operation in planing mode might impose design requirements on recreational boat builders (64 CFR 73300, December 29, 1999). Commercial marine vessels tend to be displacement-hull vessels, designed and built for a unique commercial application (e.g., towing, fishing, general cargo). Power ratings for engines used on these vessels are analogous to land-based applications, and these engines are generally warranted for 2,000 to 5,000 hours of use. Recreational vessels, on the other hand, tend to be planing vessels, and engines used on these vessels are designed to achieve higher power output with less engine weight. This increase in power reduces the lifetime of the engine; recreational marine engines are therefore warranted for fewer hours of operation than their commercial counterparts. In our previous rulemaking, recreational engine industry representatives raised concerns about the ability of these engines to meet the standards without substantial changes in the size and weight of the engine. Such changes could have an impact on vessel builders, who might have to redesign vessel hulls to accommodate the new engines. Because most recreational vessel hulls are made on fiberglass molds, this could be a significant burden for recreational vessel builders.

Since we finalized the commercial marine diesel engine standards, we determined that recreational marine diesel engines can achieve those same emission standards without significant impacts on engine size and weight. Section V.G of this document and Chapters 3 and 4 of the Draft Regulatory Support Document describe the several technological changes we anticipate manufacturers will use to comply with the new emission standards. None of these technologies has an inherent negative effect on the performance or power density of an engine. As with engines in land-based applications, we expect that manufacturers will be able to use the range of technologies available to maintain or even improve the performance capabilities of their engines. We are nevertheless proposing to establish a separate program for recreational marine diesel engines in this rule. This will allow us to tailor certain aspects of the program to these applications, notably the not-to-exceed requirements. We seek comment on whether this approach is appropriate or if we should remove the distinction and apply identical emission-control requirements to both commercial and recreational marine diesel engines.

To distinguish between commercial and recreational marine diesel engines for the purpose of emission controls, it is necessary to define ''recreational marine diesel engine.'' According to the definition we finalized in our commercial marine diesel engine rule, recreational marine engine means a propulsion marine engine that is intended by the manufacturer to be installed on a recreational vessel. The engine must be labeled to distinguish it from a commercial marine diesel engine. The label must read: ''THIS ENGINE IS CATEGORIZED AS A RECREATIONAL ENGINE UNDER 40 CFR PART 94. INSTALLATION OF THIS ENGINE IN ANY NONRECREATIONAL VESSEL IS A VIOLATION OF FEDERAL LAW SUBJECT TO PENALTY.''

We are also including in the proposed definition that a recreational marine engine must be a Category 1 marine engine (have a displacement of less than 5 liters per cylinder). One manufacturer commented after the ANPRM that only engines less than 2.5 liters per cylinder in displacement should be considered recreational. We request comment on this size cut-off and we request comment on allowing manufacturers flexibility in defining the upper limit of their recreational product line provided that it is between 2.5 and 5 liters per cylinder.

For the purpose of the recreational marine diesel engine definition, recreational vessel was defined as ''a vessel that is intended by the vessel manufacturer to be operated primarily for pleasure or leased, rented, or chartered to another for the latter's pleasure.'' To put some boundaries on that definition, since certain vessels that are used for pleasure may have operating characteristics that are more similar to commercial marine vessels (e.g., excursion vessels and charter craft), we drew on the Coast Guard's definition of a ''small passenger vessel'' (46 U.S.C 2101(35)) to further delineate what would be considered to be a recreational vessel. Specifically, the term ''operated primarily for pleasure or leased, rented or chartered to another for the latter's pleasure'' would not include the following vessels: (1) Vessels of less than 100 gross tons that carry more than 6 passengers; (2) vessels of 100 gross tons or more than carry one or more passengers; or (3) vessels used solely for competition. For the purposes

of this definition, a passenger is defined by 46 U.S.C 2101 (21, 21a) which generally means an individual who pays to be on the vessel.

We received several comments in response to the ANPRM on these definitions. Engine manufacturers were concerned that the definitions may be unworkable for engine manufacturers, since they cannot know whether a particular recreational vessel might carry more than six passengers at a time. All they can know is whether the engine they manufacture is intended by them for installation on a vessel designed for pleasure and having the planing, power density and performance requirements that go along with that use.

We responded to similar concerns in the Summary and Analysis of Comments for the commercial marine diesel engine rule, explaining that a vessel would be considered a recreational vessel if the boat builder intends that the customer will operate the boat consistent with the recreational-vessel definition.[132] Relying on the boat builder's intent is necessary since manufacturers need to establish a vessel's classification before it is sold, whereas the Coast Guard definitions apply at the time of use. The definition therefore relies on the intent of the boat builder to establish that the vessel will be used consistent with the above criteria. If a boat builder manufactures a vessel for a customer who intends to use the vessel for recreational purposes, we would always consider that a recreational vessel regardless of how the owner (or a subsequent owner) actually uses it.

We are proposing to retain our existing definition of recreational marine vessel. We request comment on all aspects of this definition. We are also requesting comment on how to verify the validity of the vessel manufacturer's original intent. One option, as noted in the Summary and Analysis of Comments for the previous rule, would be written assurance from the buyer.

We are also requesting comment on two alternative approaches for the definition of recreational marine vessel that were suggested by ANPRM commenters. The first recommends that we follow the definition in 46 U.S.C. 2101(25), which defines a recreational vessel as one ''being manufactured or operated primarily for pleasure, or leased, rented, or chartered to another for the latter's pleasure.''[133] The second recommends that we define recreational vessel as one (1) which by design and construction is intended by the manufacturer to be operated primarily for pleasure, or to be leased, rented, or chartered to another for the latter's pleasure; and (2) whose major structural components are fabricated and assembled in an indoor production-line manufacturing plant or similar land-side operation and not in a dry dock, graving dock, or marine railway on the navigable waters of the United States.[134] We request comment on whether either of these definitions is preferable to the existing definition and, more specifically, on whether either of these alternative definitions would be sufficient to ensure that recreational marine diesel engines are installed on vessels that will be used only for recreational purposes.

C. Proposed Standards for Marine Diesel Engines

We are proposing technology-forcing emission standards for new recreational marine diesel engines with rated power greater than or equal to 37 kW. This section describes the proposed standards and implementation dates and gives an outline of the technology that can be used to achieve these levels. We request comment on these standards and dates. In particular, commenters should address whether the dates provide sufficient lead time. The technological feasibility discussion below (Section V.G) describes our technical rationale in more detail.

1. What Are the Proposed Standards and Compliance Dates?

To propose emission standards for recreational marine diesel engines, we first considered the Tier 2 standards for commercial marine diesel engines. Recreational marine diesel engines can use all the technologies projected for Tier 2 and many of these engines already use this technology. This includes electronic fuel management, turbocharging, and separate-circuit aftercooling. In fact, because recreational engines have much shorter design lives than commercial engines, it is easier to apply raw-water aftercooling to these engines, which allows manufacturers to enhance performance while reducing NO_X emissions.

Engine manufacturers will generally increase the fueling rate in recreational engines, compared to commercial engines, to gain power from a given engine size. This helps bring a planing vessel onto the water surface and increases the maximum vessel speed without increasing the weight of the vessel. This difference in how recreational engines are designed and used affects emissions.

We are proposing to implement the commercial marine engine standards for recreational marine diesel engines, allowing two years beyond the dates that standards apply for the commercial engines. This would provide engine manufacturers with additional lead time in adapting technology to their recreational marine diesel engines. The proposed standards and implementation dates for recreational marine diesel engines are presented in Table V.C–1. The subcategories refer to engine displacement in liters per cylinder.

TABLE V.C–1.—PROPOSED RECREATIONAL CI MARINE EMISSION STANDARDS AND IMPLEMENTATION DATES

Subcategory	$HC+NO_X$ g/kW-hr	PM g/kW-hr	CO g/kW-hr	Implementation date
power ≥ 37 kW	7.5	0.40	5.0	2007
0.5 ≤ disp < 0.9				
0.9 ≤ disp < 1.2	7.2	0.30	5.0	2006
1.2 ≤ disp < 2.5	7.2	0.20	5.0	2006
disp ≥ 2.5	7.2	0.20	5.0	2009

[132] Summary and Analysis of Comments: Control of Emissions from Marine Diesel Engines. EPA420–R–99–028, November 1999, Docket A–97–50, document V–C–1.

[133] Statement of the Engine Manufacturers Association, Docket A–2000–01, Document No. II–D–33.

[134] Comments of the National Marine Manufacturers Association, Docket A–2000–01, Document II–D–27.

2. Will I Be Able To Average, Bank, or Trade Emissions Credits?

Section III.C.3 gives an overview of the proposed emission-credit program, which is consistent with what we adopted for Category 1 commercial marine diesel engines. We are proposing that the emission-credit program be limited to $HC+NO_X$ and PM emissions.

Consistent with our land-based nonroad and commercial marine diesel engine regulations, we are proposing to disallow simultaneous generation of $HC+NO_X$ credits and use of PM credits on the same engine family, and vice versa. This is necessary because of the inherent trade-off between NO_X and PM emissions in diesel engines. We request comment on whether an engine should be allowed to generate credits on one pollutant while using credits on another, and whether allowing such an additional flexibility would necessitate a reconsideration of the stringency of the proposed emission limits.

We are proposing the same maximum value of the Family Emission Limit (FEL) as for commercial marine diesel engines. For engines with a displacement of less than 1.2 liters/cylinder, the maximum values are 11.5 g/kW-hr $HC+NO_X$ and 1.2 g/kW-hr PM; for larger engines, the maximum values are 10.5 g/kW-hr $HC+NO_X$ and 0.54 g/kW-hr PM. These maximum FEL values were based on the comparable land-based emission-credit program and will ensure that the emissions from any given family certified under this program not be significantly higher than the applicable emission standards. We believe these proposed maximum values will prevent backsliding of emissions above the baseline levels for any given engine model. Also, we are concerned that the higher emitting engines could result in emission increases in areas such as ports that may have a need for PM or NO_X emission reductions. Balancing this concern is the fact that recreational marine diesel engines constitute a small fraction of PM and $HC+NO_X$ emissions in nonattainment areas. Thus, if a few engine families have higher emissions then our proposed FEL cap, the incremental emissions in these areas may not be significant. Also, if we do not promulgate FEL caps for this category, manufacturers will need to offset high emitting engines with low-emitting engines to meet the average standard. We are interested in comments on these issues, on the degree to which FEL caps would hinder manufacturer flexibility and impose costs, and the environmental impact of FEL caps. We ask commenters to address whether we should promulgate FEL caps.

As an alternative, we are requesting comment on whether we should consider using the MARPOL Annex VI NO_X standard as the appropriate NO_X FEL upper limit. Under this approach we would continue to use the land-based Tier 1 PM standard as the recreational marine diesel engine FEL upper limit. As part of this approach we would have to accommodate the fact that the MARPOL Annex VI standard is for NO_X only and these proposed standards are $HC+NO_X$. We further request comment under this approach as to how best to deal with this inconsistency.

We are proposing that emission credits generated under this program have no expiration, with no discounting applied. This is consistent with the commercial marine credit program and gives manufacturers greater flexibility in implementing their engine designs. However, if we were to revisit the standards proposed today at a later date, we would have to reevaluate this issue in the context of spillover of credits in the new program.

Consistent with the land-based nonroad diesel rule, we are also proposing to disallow using credits generated on land-based engines for demonstrating compliance with marine diesel engines. In addition, we propose that credits may not be exchanged between recreational and commercial marine engines. We are concerned that manufacturers producing land-based and/or commercial marine engines in addition to recreational marine engines could effectively trade out of the recreational marine portion of the program, thereby potentially obtaining a competitive advantage over small companies selling only recreational marine engines. In addition, there are two differences in the way that land-based, commercial marine, and recreational marine credits are calculated that make the credits somewhat incompatible. The first is that the difference in test duty cycles means there is an difference in calculated load factors for each of these categories of engines. The second is that there are significant differences in the useful lives. EPA seeks comment on the need for these restrictions and on the degree to which imposing them may create barriers to low-cost emission reductions.

We are proposing to allow early banking of emission credits once this rule is finalized. We believe that early banking of emission credits will allow for a smoother implementation of the recreational marine standards. These credits are generated relative to the proposed standards and are undiscounted. We are aware that there are already some marine diesel engines that meet the proposed standards, and we are concerned about windfall credits from engines that generate early credits without any modifications to reduce emissions. We request comment on whether or not these engines should be able to generate credits.

We also propose that manufacturers have the option of generating credits relative to their pre-control emission levels. If manufacturers choose this option they will have to develop engine family-specific baseline emission levels. Credits will then be calculated relative to the manufacturer-generated baseline emission rates, rather than the standards. To generate the baseline emission rates, a manufacturer must test three engines from the family for which the baseline is being generated. The baseline will be the average emissions of the three engines. Under this option, engines must still meet the proposed standards to generate credits, but the credits will be calculated relative to the generated baseline rather than the standards. However, any credits generated between the level of the standards and the generated baseline will be discounted 10 percent. This is to account for the variability of testing in-use engines to establish the family-specific baseline levels, which may result from differences in hours of use and maintenance practices. We request comment on all aspects of the proposed emission-credit program.

One engine manufacturer commented after the ANPRM that all their recreational engine product lines fall into the per-cylinder displacement range with the proposed implementation date of 2006. This manufacturer expressed concern that it would be burdensome to introduce all their product lines at one time and presented the idea of phasing in their product lines from 2005 through 2007 instead. An alternative to early banking or a revised phase-in would be ''family-banking.'' Under the ''family-banking'' concept, we would allow manufacturers to certify an engine family early. For each year of certifying an engine family early, the manufacturer would be able to delay certification of a smaller engine family by one year. This would be based on the actual sales of the early family and the projected sales volumes of the late family; this would require no calculation or accounting of emission credits. We request comment on this approach or any other approach that would help manufacturers bring the product lines into compliance to the proposed standards without

compromising emissions reductions (see § 1048.145 of the proposed regulations).

3. Is EPA Proposing Voluntary Standards for These Engines?

a. Blue Sky. Section III.B.5 gives an overview of Blue Sky voluntary standards. We are proposing to target about a 45-percent reduction beyond the mandatory standards as a qualifying level for Blue Sky Series engines to match the voluntary standards already adopted for commercial marine diesel engines (see Table V.C–2). While the Blue Sky Series emission standards are voluntary, a manufacturer choosing to certify an engine under this program must comply with all the requirements proposed for this category of engines, including allowable maintenance, warranty, useful life, rebuild, and deterioration factor provisions. This program would become effective immediately once we finalize this rule. We request comment on the Blue Sky Series approach as it would apply to recreational marine diesel engines.

TABLE V.C.–2.—BLUE SKY VOLUNTARY EMISSION STANDARDS FOR RECREATIONAL MARINE DIESEL ENGINES

[g/kW–hr]

Rated Brake Power (kW)	$HC+NO_X$	PM
power ≥ 37 kW ..... displ.<0.9	4.0	0.24
0.9≤displ.<1.2	4.0	0.18
1.2≤displ.<2.5	4.0	0.12
2.5≤displ	5.0	0.12

b. MARPOL Annex VI. The MARPOL Annex VI standards are discussed above in Section I.F.3 for marine diesel engines rated above 130 kW. We are not proposing to adopt the MARPOL Annex VI NO_X emission limits as Clean Air Act standards at this time. However, we encourage engine manufacturers to make Annex VI-compliant engines available and boat builders to purchase and install them prior to the implementation of our proposed standards. If the international standards are ratified in the U.S., they would go into effect retroactively to all boats built January 1, 2000 or later. One advantage of using MARPOL-compliant engines is that if this happens, users will be in compliance with the standard without having to make any changes to their engines.

To encourage boat manufacturers to purchase MARPOL Annex VI-compliant engines prior to the date the Annex goes into force for the United States, we are proposing a voluntary certification program that will allow engine manufacturers to obtain a Statement of Voluntary Compliance to the MARPOL Annex VI NO_X limits. This voluntary approach to the MARPOL Annex VI emission limits depends on the assumption that manufacturers will produce MARPOL-compliant engines before the emission limits go into effect internationally. Engine manufacturers can use this voluntary certification program to obtain a Statement of Voluntary Compliance to the MARPOL NO_X limits.[135]

We request comment on whether or not we should apply the MARPOL Annex VI standards as a first Tier to this proposed regulation. We also request comment on reasons for whether or not the MARPOL Annex VI standards should apply to recreational marine at all.

4. What Durability Provisions Apply?

There are several related provisions that would be needed to ensure that emission control would be maintained throughout the life of the engine. Section III gives a general overview of durability provisions associated with emissions certification. This section discusses these proposed provisions specifically for recreational marine diesel engines.

a. *How long would my engine have to comply?* We propose to require that manufacturers produce engines that comply over the full useful life of ten years or until the engine accumulates 1,000 operating hours, whichever occurs first. We would consider the hours requirement to be a minimum value for useful life, and would require manufacturers to comply for a longer period in those cases where they design their engines to be operated longer than 1,000 hours. In making the determination that engines are designed to last longer than the proposed hour limit, we would look for evidence that the engines continue to reliably deliver the necessary power output without an unacceptable increase in fuel consumption.

b. How would I demonstrate emission durability? We are proposing the same durability demonstration requirements for recreational marine diesel engines as already exist for commercial marine diesel engines. This means that recreational marine engine manufacturers, using good engineering judgment, would generally need to test one or more engines for emissions before and after accumulating 1,000 operating hours (usually performed by continuous engine operation in a laboratory). The results of these tests are referred to as ''durability data,'' and are used to determine the rates at which emissions are expected to increase over the useful life of the engine for each engine family (the rates are known as deterioration factors). However, in many cases, manufacturers would be allowed to use durability data from a different engine family, or for the same engine family in a different model year. Because of this allowance to use the same data for multiple engine families, we expect durability testing to be very limited.

We are also proposing the same provisions from the commercial marine rulemaking for how durability data are to be collected and how deterioration factors are to be generated. These requirements are in 40 CFR 94.211, 94.218, 94.219, and 94.220. These sections describe when durability data from one engine family can be used for another family, how to select to the engine configuration that is to be tested, how to conduct the service accumulation, and what maintenance can be performed on the engine during this service accumulation.

c. What maintenance would be allowed during service accumulation? For engines certified to a 1,000-hour useful life, the only maintenance that would be allowed is regularly scheduled maintenance unrelated to emissions that is technologically necessary. This could typically include changing engine oil, oil filter, fuel filter, and air filter. We request comment on the allowable maintenance during service accumulation.

d. Would production-line testing be required? We are proposing to apply the production-line testing requirements for commercial marine engines to recreational marine diesel engines, with the additional provisions described in Section III.C.4. A manufacturer would have to test one percent of its total projected annual sales of Category 1 engines each year to meet production-line testing requirements. We are proposing that manufacturers combine recreational and commercial engine families in calculating their sample sizes for production-line testing. We are not proposing a minimum number of tests, so a manufacturer could produce up to 100 marine diesel engines without doing any production-line testing.

5. Do These Standards Apply to Alternative-Fueled Engines?

These proposed standards apply to all recreational marine diesel engines,

[135] For more information about our voluntary certification program, see ''guidance for Certifying to MARPOL Annex VI,'' VPCD–99–02. This letter is available on our website: *http://www.epa.gov/otaq/regs/nonroad/marine/ci/imolettr.pdf.*

without regard to the type of fuel used. While we are not aware of any alternative-fueled recreational marine engines that are currently being sold into the U.S. market, we are proposing alternate forms of the hydrocarbon standards to address the potential for natural gas-fueled and alcohol-fueled engines. In our regulation of highway vehicles and engines, we determined it is not appropriate to apply total hydrocarbon standards to engines fueled with natural gas (which is comprised primarily of methane), but rather that nonmethane hydrocarbon (NMHC) standards should be used (59 FR 48472, September 21, 1994). These alternate forms follow the precedent set in previous rulemakings to make the standards similar in stringency and environmental impact.

Similarly, we determined that alcohol-fueled highway engines and vehicles should be subject to HC-equivalent (HCE) standards instead of HC standards (54 FR 14426, April 11, 1989). HC-equivalent emissions are calculated from the oxygenated organic components and non-oxygenated organic components of the exhaust, summed together based on the amount of organic carbon present in the exhaust. Thus, we are proposing that alcohol-fueled recreational marine engines comply with total hydrocarbon equivalent (THCE) plus NO_X standards instead of THC plus NO_X standards.

6. Is EPA Controlling Crankcase Emissions?

We are proposing to require manufacturers to prevent crankcase emissions from recreational marine diesel engines, with one exception. We are proposing to allow turbocharged recreational marine diesel engines to be built with open crankcases, as long as the crankcase ventilation system allows measurement of crankcase emissions. For these engines with open crankcases, we will require crankcase emissions to be either routed into the exhaust stream to be included in the exhaust measurement, or to be measured separately and added to the measured exhaust mass. These measurement requirements would not add significantly to the cost of testing, especially where the crankcase vent is simply routed into the exhaust stream prior to the point of exhaust sampling. This proposal is consistent with our previous regulation of crankcase emissions from such diverse sources as commercial marine engines, locomotives, and passenger cars.

7. What Are the Smoke Requirements?

We are not proposing smoke requirements for recreational marine diesel engines. Marine diesel engine manufacturers have stated that many of their engines, though currently unregulated, are manufactured with smoke limiting controls at the request of customers. Users seek low smoke emissions both because they dislike the exhaust residue on decks and because they can be subject to penalties in ports with smoke emission requirements. In many cases, marine engine exhaust gases are mixed with water prior to being released. This practice reduces smoke visibility. Moreover, we believe the PM standards proposed here for diesel engines will have the effect of limiting smoke emissions as well. We request comment on this position and, specifically, on whether there is a need at this time for additional control of smoke emissions from recreational marine diesel engines, and if so, what the appropriate limits should be.

We also request comment on an appropriate test procedure for measuring smoke emissions, in case we choose to pursue smoke limits. There is currently no established test procedure for a marine engine to measure compliance with a smoke limit. Most propulsion marine engines operate over a torque curve governed by the propellor. Consequently, a vessel with an engine operating at a given speed will have a narrow range of torque levels. Some large propulsion marine engines have variable-pitch propellers, in which case the engine operates much like constant-speed engines. Note that the International Organization for Standardization (ISO) is working on a proposed test procedure for marine diesel engines.[136] As this procedure is finalized by ISO and emission data become available, we may review the issue of smoke requirements for all marine diesel engines. We request comment on this overall approach to smoke emissions from marine diesel engines, as well as comment on the draft ISO procedures.

8. What Are the Proposed Not-To-Exceed Standards and Related Requirements?

We are proposing not-to-exceed requirements similar to those finalized for commercial marine diesel engines. At the time of certification, manufacture would have to submit a statement that its engines will comply with these requirements under all conditions that may reasonably be expected to occur in normal vessel operation and use. The manufacturer would provide a detailed description of all testing, engineering analysis, and other information that forms the basis for the statement. This certification could be based on testing or on other research which could be used to support such a statement that is consistent with good engineering judgment. We request comment on applying the proposed NTE requirements to recreational marine diesel engines and on the application of the requirements to these engines.

a. Concept. Our goal is to achieve control of emissions over the broad range of in-use speed and load combinations that can occur on a recreational marine diesel engine so that real-world emission control is achieved, rather than just controlling emissions under certain laboratory conditions. An important tool for achieving this goal is an in-use program with an objective standard and an easily implemented test procedure. Prior to this concept, our approach has been to set a numerical standard on a specified test procedure and rely on the additional prohibition of defeat devices to ensure in-use control over a broad range of operation not included in the test procedure.

We are proposing to apply the defeat device provisions established for commercial marine engines to recreational marine diesel engines in addition to the NTE requirements (see 40 CFR 94.2). A design in which an engine met the standard at the steady-state test points but was intentionally designed to approach the NTE limit everywhere else would be considered to be defeating the standard. Electronic controls that recognize when the engine is being tested for emissions and adjust the emissions from the engine would be an example of a defeat device, regardless of the emissions performance of the engine.

No single test procedure can cover all real-world applications, operations, or conditions. Yet to ensure that emission standards are providing the intended benefits in use, we must have a reasonable expectation that emissions under real-world conditions reflect those measured on the test procedure. The defeat-device prohibition is designed to ensure that emission controls are employed during real-world operation, not just under laboratory or test-procedure conditions. However, the defeat-device prohibition is not a quantified standard and does not have an associated test procedure, so it does not have the clear objectivity and ready

[136] International Standards Organization, 8178–4, ''Reciprocating internal combustion engines—Exhaust emission measurement—Part 4: Test cycles for different engine applications,'' Docket A–2000–01, Document II–A–19.

enforceability of a numerical standard and test procedure. As a result, using a standardized test procedure alone makes it harder to ensure that engines will operate with the same level of control in the real world as in the test cell.

Because the ISO E5 duty cycle uses only five modes on an average propeller curve to characterize marine engine operation, we are concerned that an engine designed to the duty cycle would not necessarily perform the same way over the range of speed and load combinations seen on a boat. These duty cycles are based on average propeller curves, but a propulsion marine engine may never be fitted with an ''average propeller.'' For instance, an engine fit to a specific boat may operate differently based on how heavily the boat is loaded.

To ensure that emissions are controlled from recreational marine engines over the full range of speed and load combinations seen on boats, we propose to establish a zone under the engine's power curve where the engine may not exceed a specified emission limit. This limit would apply to all of the regulated pollutants under steady-state operation. In addition, we propose that the whole range of real ambient conditions be included in this ''not-to-exceed'' (NTE) zone testing. The NTE zone, limit, and ambient conditions are described below.

We believe there are significant advantages to taking this approach. The test procedure is very flexible so it can represent the majority of in-use engine operation and ambient conditions. Therefore, the NTE approach takes all of the benefits of a numerical standard and test procedure and expands it to cover a broad range of conditions. Also, laboratory testing makes it harder to perform in-use testing because either the engines would have to be removed from the vessel or care would have to be taken that laboratory-type conditions can be achieved on the vessel. With the NTE approach, in-use testing and compliance become much easier since emissions may be sampled during normal vessel use. Because this approach is objective, it makes enforcement easier and provides more certainty to the industry of what is expected in use versus over a fixed laboratory test procedure.

Even with the NTE requirements, we believe it is still important to retain standards based on the steady-state duty cycles. This is the standard that we expect the certified marine engines to meet on average in use. The NTE testing is more focused on maximum emissions for segments of operation and should not require additional technology beyond what is used to meet the proposed standards. We believe basing the emission standards on a distinct cycle and using the NTE zone to ensure in-use control creates a comprehensive program. In addition, the steady-state duty cycles give a basis for calculating credits for averaging, banking, and trading.

b. Shape of the NTE zone. Figure V–C–1 illustrates our proposed NTE zone for recreational marine diesel engines. We based this zone on the range of conditions that these engines could typically see in use. Also, we propose to divide the zone into subzones of operation which have different limits as described below. Chapter 4 of the Draft Regulatory Support Document describes the development of the boundaries and conditions associated with the proposed NTE zone. We request comment on the proposed NTE zone.

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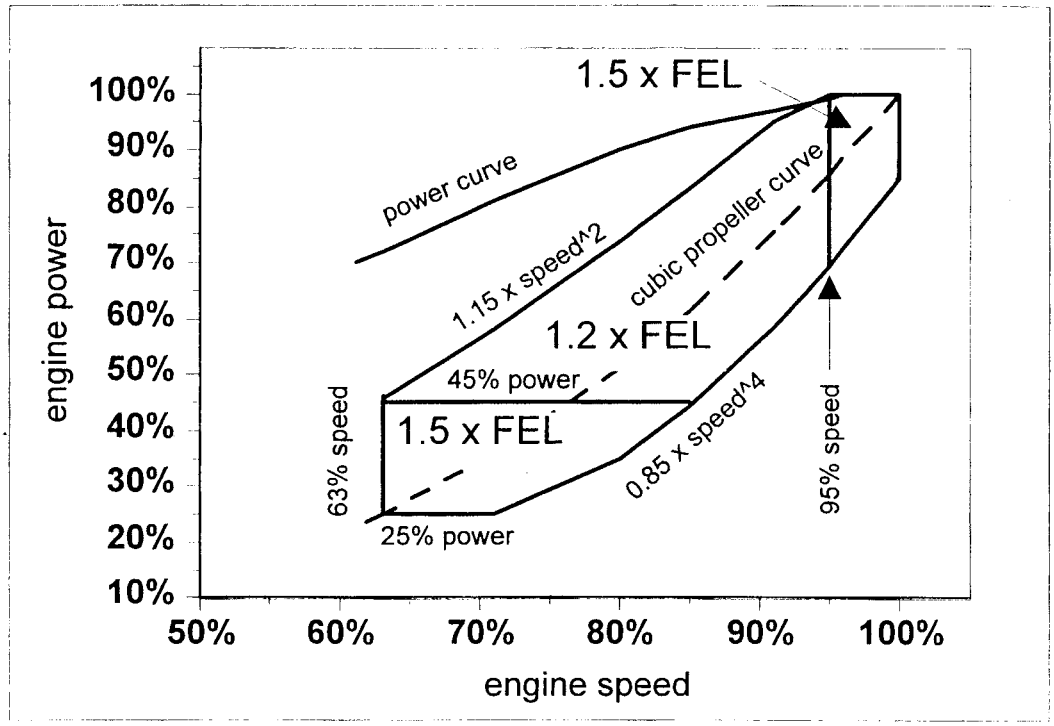
Figure V.C-1: Proposed NTE Zone for Recreational CI Marine Engines



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We propose to allow manufacturers to petition to adjust the size and shape of the NTE zone for certain engines if they can certify that the engine will not see operation outside of the revised NTE zone in use. This way, manufacturers could avoid having to test their engines under operation that they would never see in use. However, manufacturers would still be responsible for all operation of an engine on a vessel that

would reasonably be expected to be seen in use and would be responsible for ensuring that their specified operation is indicative of real-world operation. In addition, if a manufacturer designs an engine for operation at speeds and loads outside of the proposed NTE zone (i.e., variable-speed engines used with variable-pitch propellers), the manufacturer would be responsible for notifying us so their NTE zone can be modified appropriately to include this operation.

c. Transient operation. We are proposing that only steady-state operation be included in the NTE testing. We are basing the test for determining certification emissions levels on the ISO E5 steady-state duty cycles. The goal of the NTE, for this proposal, is to cover the operation away from the five modes on the assumed propeller curve. Our understanding is that the majority of marine engine operation is steady-state; however, we recognize that recreational marine use would likely be more transient than commercial marine use. At this time we do not have enough data on marine engine operation to accurately determine the amount of transient operation that occurs. We are aware that the high-load transient operation seen when a boat comes to plane would not be included in the NTE zone as defined, even if we would require compliance with NTE standards during transient operation. We are also aware that these speed and load points could not be achieved under steady-state operation for a properly loaded boat in use.

Our proposal to exclude transient operation from NTE testing is consistent with the commercial marine diesel requirements. Also, the proposed standards are technology-forcing and are for a previously unregulated industry. We believe excluding transient operation will simplify the requirements on this industry while still maintaining proportional emission reductions due to the technology-forcing nature of this proposal. We intend to study marine operation to understand better the effects of transient operation on emissions. If we find that excluding transient operation from the compliance requirements results in a significant increase in emissions, we will revisit this provision in the future. We request comment on the appropriateness of excluding transient operation from NTE requirements.

d. Emission standards. We are proposing emission standards for an NTE zone representing a multiplier times the weighted test result used for certification. Because an emission level is an average of various points over a test procedure, a multiplier of is inconsistent with the idea of a Federal Test Procedure standard as an average. This is consistent with the concept of a weighted modal emission test, such as the steady-state tests included in this proposal.

Consistent with the requirements for commercial marine engines, we propose that recreational marine diesel engines must meet a cap of 1.5 times the certified level for $HC+NO_X$, PM, and CO for the speed and power subzone below 45 percent of rated power and a cap of 1.2 times the certified levels at or above 45 percent of rated power. However, we are proposing an additional subzone, when compared to the commercial NTE zone, at speeds greater than 95 percent of rated. We are proposing a cap of 1.5 times the certified levels for this subzone. This additional subzone addresses the typical recreational design for higher rated power. We understand that this power is needed to ensure that the engine can bring the boat to plane.

We are aware that marine diesel engines may not be able to meet the emissions limit under all conditions. Specifically, there are times when emission control must be compromised for startability or safety. We are not proposing that engine starting be included in the NTE testing. In addition, manufacturers would have the option of petitioning the Administrator to allow emissions to increase under engine protection strategies such as when an engine overheats. This is also consistent with the requirements for commercial marine engines.

e. Ambient conditions. Variations in ambient conditions can affect emissions. Such conditions include air temperature, humidity, and (especially for aftercooled engines) water temperature. We are proposing to apply the commercial marine engine ranges for these variables. Chapter 4 of the Draft Regulatory Support Document provides more detail on how we determined these ranges. Within the ranges, there is no calculation to correct measured emissions to standard conditions. Outside of the ranges, emissions can be corrected back to the nearest end of the range. The proposed ambient variable ranges are 13 to 35°C (55 to 95°F) for intake air temperature, 7.1 to 10.7 g water/kg dry air (50 to 75 grains/pound dry air) for intake air humidity, and 5 to 27°C (41 to 80°F) for ambient water temperature.

D. Proposed Testing Requirements

40 CFR part 94 details specifications for test equipment and procedures that apply generally to commercial marine engines. We propose to base the recreational marine diesel engine test procedures on this part. Section VIII gives a general discussion of the proposed testing requirements; this section describes procedures that are specific to recreational marine such as the duty cycle for operating engines for emission measurements. Chapter 4 of the Draft Technical Support Document describes these duty cycles in greater detail.

1. Which Duty Cycles Are Used To Measure Emissions?

For recreational marine diesel engines, we are proposing to use the ISO E5 duty cycle. This is a 5-mode steady state cycle, including an idle mode and four modes lying on a cubic propeller curve. ISO intends for this cycle to be used for all engines in boats less than 24 meters in length. We propose to apply it to all recreational marine diesel engines to avoid the complexity of tying emission standards to boat characteristics. A given engine may be used in boats longer and shorter than 24 meters; engine manufacturers generally will not know the size of the boat into which an engine will be installed. Also, we expect that most recreational boats will be under 24 meters in length. Chapter 4 of the Draft Regulatory Support Document provides further detail on the ISO E5 duty cycle. We request comment on the appropriateness of this duty cycle.

2. What Fuels Will Be Used During Emission Testing?

We are proposing to use the same specifications for recreational marine diesel engines as we have used previously for commercial marine diesel engines. That means that the recreational engines will use the same test fuel that is required for testing Category 1 commercial marine diesel engines, which is a standard nonroad test fuel with moderate sulfur content. We are not aware of any difference in fuel specifications for recreational and commercial marine engines of comparable size.

3. How Would In-Use Testing Be Performed?

We have the authority to perform in-use testing on marine engines to ensure compliance in use. This testing may include taking in-use marine engines out of the vessel and testing them in a laboratory, as well as field testing of in use engines on the boat, in a marine environment. We request comments on the proposed in-use testing provisions described below.

We propose to use field-testing data in two ways. First, we would use it as a

screening tool, with follow-up laboratory testing over the ISO E5 duty cycle where appropriate. Second, we would use the data directly as a basis for compliance determinations provided that field testing equipment and procedures are capable of providing reliable information from which conclusions can be drawn regarding what emission levels would be in laboratory-based measurements.

For marine engines that expel exhaust gases underwater or mix their exhaust with water, we propose to require manufacturers to equip engines with an exhaust sample port where a probe can be inserted for in-use exhaust emission testing. It is important that the location of this port allow a well-mixed and representative sample of the exhaust. The purpose of this proposed provision is to simplify in-use testing.

One of the advantages of the not-to-exceed requirements will be to facilitate in-use testing. This will allow us to perform compliance testing in the field. As long as the engine is operating under steady-state conditions in the NTE zone, we will be able to measure emissions and compare them to the NTE limits.

E. Special Compliance Provisions

The provisions discussed here are designed to minimize regulatory burdens on manufacturers needing added flexibility to comply with the proposed engine standards. These manufacturers include engine dressers, small-volume engine marinizers, and small-volume boat builders.

1. What Are the Proposed Burden Reduction Approaches for Engine Dressers?

Many recreational marine diesel engine manufacturers take a new, land-based engine and modify it for installation on a marine vessel. Some of the companies that modify an engine for installation on a boat make no changes that would affect emissions. Instead, the modifications may consist of adding mounting hardware and a generator or reduction gears for propulsion. It can also involve installing a new marine cooling system that meets original manufacturer specifications and duplicates the cooling characteristics of the land-based engine, but with a different cooling medium (i.e., water). In many ways, these manufacturers are similar to nonroad equipment manufacturers that purchase certified land-based nonroad engines to make auxiliary engines. This simplified approach of producing an engine can more accurately be described as dressing an engine for a particular application. Because the modified land-based engines are subsequently used on a marine vessel, however, these modified engines will be considered marine diesel engines, which then fall under these proposed requirements.

To clarify the responsibilities of engine dressers under this rule, we propose to exempt them from the requirement to certify engines to the proposed emission standards, as long as they meet the following seven proposed conditions.

(1) The engine being dressed (the ''base'' engine) must be a highway, land-based nonroad, or locomotive engine, certified pursuant to 40 CFR part 86, 89, or 92, respectively, or a marine diesel engine certified pursuant to this part.

(2) The base engine's emissions, for all pollutants, must be at least as good as the otherwise applicable recreational marine emission limits. In other words, starting in 2005, a dressed nonroad Tier 1 engine will not qualify for this exemption, because the more stringent standards for recreational marine diesel engines go into effect at that time.

(3) The dressing process must not involve any modifications that can change engine emissions. We would not consider changes to the fuel system to be engine dressing because this equipment is integral to the combustion characteristics of an engine.

(4) All components added to the engine, including cooling systems, must comply with the specifications provided by the engine manufacturer.

(5) The original emissions-related label must remain clearly visible on the engine.

(6) The engine dresser must notify purchasers that the marine engine is a dressed highway, nonroad, or locomotive engine and is exempt from the requirements of 40 CFR part 94.

(7) The engine dresser must report annually to us the models that are exempt pursuant to this provision and such other information as we deem necessary to ensure appropriate use of the exemption.

We propose that any engine dresser not meeting all these conditions be considered an engine manufacturer and would accordingly need to certify that new engines comply with this rule's provisions.

Under this proposal, an engine dresser violating the above criteria might be liable under anti-tampering provisions for any change made to the land-based engine that affects emissions. The dresser might also be subject to a compliance action for selling new marine engines that are not certified to the required emission standards.

2. What Was the Small Business Advocacy Review Panel?

As described in Section XI.B, the August 1999 report of the Small Business Advocacy Review Panel addresses the concerns of sterndrive and inboard engine marinizers, compression-ignition recreational marine engine marinizers, and boat builders that use these engines.

To identify representatives of small businesses for this process, we used the definitions provided by the Small Business Administration for engine manufacturers and boat builders. We then contacted companies manufacturing internal-combustion engines employing fewer than 1,000 people to be small-entity representatives for the Panel. Companies selling or installing such engines in boats and employing fewer than 500 people were also considered small businesses for the Panel. Based on this information, we asked 16 small businesses to serve as small-entity representatives. These companies represented a cross-section of both gasoline and diesel engine marinizers, as well as boat builders.

With input from small-entity representatives, the Panel drafted a report with findings and recommendations on how to reduce the potential small-business burden resulting from this proposed rule. The Panel's recommended flexibility options are described in the following sections.

3. What Are the Proposed Burden Reduction Approaches for Small-Volume Engine Marinizers?

We are proposing several flexibility options for small-volume engine marinizers. The purpose of these options is to reduce the burden on companies for which fixed costs cannot be distributed over a large number of engines. For this reason, we propose to define a small-volume engine manufacturer based on annual U.S. sales of engines. This production count would include all engines (automotive, other nonroad, etc.) and not just recreational marine engines. We propose to consider small businesses to be those that produce fewer than 1000 internal combustion engines per year. Based on our characterization of the industry, there is a natural break in production volumes above 500 engine sales where the next smallest manufacturers make tens of thousands of engines. We chose 1000 engines as a limit because it groups together all the marinizers most needing the proposed burden reduction approaches, while still allowing for reasonable sales growth.

The proposed flexibility options for small-volume marinizers are discussed below and would be used at the manufacturers' discretion. We request comment on the appropriateness of these flexibility options or other options.

a. Broaden engine families. We propose to allow small-volume marinizers to put all of their models into one engine family (or more as necessary) for certification purposes. Marinizers would then certify using the ''worst-case'' configuration. This approach is consistent with the flexibility offered to post-manufacture marinizers under the commercial marine regulations. The advantage of this approach is that it minimizes certification testing because the marinizer can certify a single engine in the first year to represent their whole product line. As for large companies, the small-volume manufacturers would then be able carry-over data from year to year until engine design changes occur that would significantly affect emissions.

We understand that this flexibility alone may not be able to reduce the burden enough for all small-volume manufactures because it would still require a certification test. We consider this to be the foremost cost concern for some small-volume manufacturers, because the test costs are spread over low sales volumes. Also, we recognize that it may be difficult to determine the worst-case emitter without additional testing.

b. Minimize compliance requirements. We propose to waive production-line and deterioration testing for small-volume marinizers. We would assign a deterioration factor for use in calculating end-of-life emission factors for certification. The advantages of this approach would be to minimize compliance testing. Production-line and deterioration testing would be more extensive than a single certification test.

There are also some disadvantages of this approach, because there would be no testing assurance of engine emissions at the production line. This is especially a concern without a manufacturer-run in-use testing program. Also, assigned deterioration factors would not be as accurate as deterioration factors determined by the manufacturer through testing. We request comment on appropriate deterioration factors for the technology discussed in this proposal.

c. Expand engine dresser flexibility. We propose to expand the engine dresser definition for small-volume marinizers to include water-cooled turbochargers where the goal is to match the performance of the non water-cooled turbocharger on the original certified configuration. We believe this would provide more opportunities for diesel marinizers to be excluded from certification testing if they operate as dressers.

There would be some potential for adverse emissions impacts because emissions are sensitive to turbo-matching; however, if the goal of the marinizer is to match the performance of the original turbocharger, this risk should be small. We recognize that this option would not likely benefit all diesel marinizers because changes to fuel management for power would not qualify under engine dressing.

d. Streamlined certification. We are requesting comment on allowing small-volume marinizers to certify to a performance standard by showing their engines meet design criteria rather than by certification testing. The goal would be to reduce the costs of certification testing. We are concerned that this approach must be implemented carefully to work effectively. This would put us in the undesirable position of specifying engine designs for marinizers, which we have historically avoided by setting performance standards.

We are not clear on how to set meaningful design criteria for marine diesel engines. We expect that emission reductions in diesel engines will be achieved through careful calibration of the engine fuel and air management systems using strategies such as timing retard and charge-air cooling. It may not be feasible to specify criteria for ignition timing, charge-air temperatures, and injection pressures that would ensure that every engine can achieve the targeted level of emission control. While we do not believe design criteria can be set to provide sufficient assurance of emission control from these engines, we ask for comment on any possible approaches.

We propose to allow small-volume marinizers to certify to the proposed not-to-exceed (NTE) requirements with a streamlined approach. We believe small-volume marinizers could make a satisfactory showing that they meet NTE standards with limited test data. Once these manufacturers test engines over the proposed five-mode certification duty cycle (E5), they could use those or other test points to extrapolate the results to the rest of the NTE zone. For example, an engineering analysis could consider engine timing and fueling rate to determine how much the engine's emissions may change at points not included in the E5 cycle. For this streamlined NTE approach, we propose that keeping all four test modes of the E5 cycle within the NTE standards would be enough for small-volume marinizers to certify compliance with NTE requirements, as long as there are no significant changes in timing or fueling rate between modes. We request comment on this approach.

e. Delay standards for five years. We propose that small-volume marinizers not have to comply with the standards for five years after they take effect for larger companies. Under this plan the proposed standards would take effect from 2011 to 2014 for small-volume marinizers, depending on engine size. We propose that marinizers would be able to apply this delay to all or just a portion of their production. They could therefore still sell engines that meet the standards when possible on some product lines while delaying introduction of emission-control technology on other product lines. This option provides more time for small marinizers to redesign their products, allowing time to learn from the technology development of the rest of the industry.

While we are concerned about the loss of emission control from part of the fleet during this time, we recognize the special needs of small-volume marinizers and believe the added time may be necessary for these companies to comply with the proposed emission standards. This additional time will allow small-volume marinizers to obtain and implement proven, cost-effective emission-control technology. Some small-volume marinizers have expressed concern to the Small Business Advocacy Panel that large manufacturers could have competitive advantage if they market their engines as cleaner than the small-business engines. Other small-volume manufacturers commented that this provision would be useful to them.

We are also requesting comment on limited exemptions for small-volume marinizers. Under this sort of flexibility, upon request from a small-volume marinizer, we would exempt a small number of engines per year for 8 to 10 years. An example of a small-volume exemptions would be 50 marine diesel engines per year. We are concerned, however, that this approach may not be appropriate given our goal of reducing burden on small businesses without significant loss in emission control.

f. Hardship provisions. We are proposing two hardship provisions for small-volume marinizers. Marinizers would be able to apply for this relief on an annual basis. First, we propose that small marinizers could petition us for additional time to comply with the standards. The marinizer would have to make the case that it has taken all

possible steps to comply but the burden of compliance costs would have a major impact on the company's solvency. Also, if a certified base engine were available, we propose that the marinizer would have to use this engine. We believe this provision would protect small-volume marinizers from undue hardship due to certification burden. Also, some emission reduction could be gained if a certified base engine becomes available.

Second, we propose that small-volume marinizers could also apply for hardship relief if circumstances outside their control caused the failure to comply (such as a supply contract broken by parts supplier) and if failure to sell the subject engines would have a major impact on the company's solvency. We would consider this relief mechanism as a option to be used only as a last resort. We believe this provision would protect small-volume marinizers from circumstances outside their control.

g. Use of emission credits. We request comment on the appropriateness of allowing small-volume manufacturers to purchase credits under the streamlined certification approach described above. Under this approach, the engine's emission performance for purposes of certification is determined on the basis of design features rather than emission test results alone. Certification would therefore depend on engineering analysis and design criteria. Without a full set of emission test data, however, it would not be possible for these manufacturers to participate in an emission-credit program.

We believe the level of credits necessary to offset emissions from uncontrolled engines could be established conservatively to maximize assurance of compliance. For this reason, the baseline emissions of the uncontrolled engine could be based on the worst-case baseline data we are aware of, which would currently be 20 g/kW-hr HC+NO_X and 1 g/kW-hr PM. The credits needed would then be calculated using the proposed standards and the usage assumptions presented in Chapter 6 of the Draft Regulatory Support Document.

Under this limited emission-credit program, we propose that the participating manufacturer would be able to buy credits offered for sale by recreational marine diesel engine manufacturers certifying only on the basis of emission tests (not using the streamlined certification described above). We propose that cross-trading outside of recreational marine not be allowed, because it could prevent emission reductions from being achieved in areas where boats contribute most significantly to local air pollution and it could prevent new technology from being applied to recreational marine engines. However, we request comment on whether or not small-volume marinizers should be able to use credits generated from other sectors such as land-based nonroad engines.

4. What Are the Proposed Burden Reduction Approaches for Small-Volume Boat Builders Using Recreational Marine Diesel Engines?

The SBAR Panel Report recommends that we propose burden reduction approaches for small-volume boat builders. This recommendation was based on the concern that, although boat builders would not be directly regulated under the proposed engine standards, they may need to redesign engine compartments on some boats if engine designs were to change significantly. Based on comments from industry, we believe these flexibility options may be appropriate; however, they may also turn out to be unnecessary.

We are proposing four flexibility options for small-volume vessel manufacturers using recreational marine diesel engines. The purpose of these options is to reduce the burden on companies for which fixed costs cannot be distributed over a large number of vessels. For this reason, we propose to define a small-volume boat builder as one that produces fewer than 100 boats for sale in the U.S. in one year and meets the Small Business Administration definition of a small business (fewer than 500 employees). The production count would include all engine-powered recreational boats. We propose that these flexibility options be used at the manufacturer's discretion. The proposed flexibility options for small-volume boat builders are discussed below. We request comment on the appropriateness of these or other flexibility options.

a. Percent-of-production delay. This proposed flexibility would allow manufacturers, with written request from a small-volume boat builder and prior approval from us, to produce a limited number of uncertified recreational marine engines. We propose that, over a period of five years (2006–2010), small-volume boat builders would be able to purchase uncertified engines to sell in boats for an amount equal to 80 percent of engine sales for one year. For example, if the small boat builder sells 100 engines per year, a total of 80 uncertified engines may be sold over the five-year period. This should give small boat builders flexibility to delay using new engine designs for a portion of business.

We currently believe this flexibility is appropriate, however, it is possible that this flexibility could turn out to be unnecessary if the standards do not result in significant changes in engine size, power-to-weight ratio, or other parameters that would affect boat design. Moreover, custom boat builders may not need this flexibility if they design each boat from the ground up. We are also concerned that this flexibility could reduce the market for the certified engines produced by the engine manufacturers and could make it difficult for customs inspectors to know which uncertified engines can be imported. We therefore propose that engines produced under this flexibility would have to be labeled as such.

b. Small-volume allowance. This proposed flexibility is similar to the percent-of-production allowance, but is designed for boat builders with very small production volumes. The only difference with the above flexibility would be that the 80-percent allowance described above could be exceeded as long as sales do not exceed either 10 engines per year or 20 engines over five years (2006–2010). This proposed flexibility would apply only to engines less than or equal to 2.5 liters per cylinder.

c. Existing inventory and replacement engine allowance. We propose that small-volume boat builders be allowed to sell their existing inventory after the implementation date of the new standards. However, no purposeful stockpiling of uncertified engines would be permitted. This provision is intended to allow small boat builders flexibility to turn over engine designs.

d. Hardship relief provision. We propose that small boat builders could apply for hardship relief if circumstances outside their control caused the problem (for example, if a supply contract were broken by the engine supplier) and if failure to sell the subject vessels would have a major impact on the company's solvency. This relief would allow the boat builder to use an uncertified engine and would be considered a mechanism of last resort. These hardship provisions are consistent with those currently in place for post-manufacture marinizers of commercial marine diesel engines.

F. Technical Amendments

The proposed regulations include a variety of amendments to the programs already adopted for marine spark-ignition and diesel engines, as described in the following paragraphs.

1. 40 CFR Part 91

We have identified three principal amendments to the requirements for outboard and personal watercraft engines. First, we are proposing to add a definition of United States. This is especially helpful in clearing up questions related to U.S. territories in the Carribean Sea and the Pacific Ocean. Second, we have found two typographical errors in the equations needed for calculating emission levels in 40 CFR 91.419. Finally, we are proposing to clarify testing rates for the in-use testing program. The regulations currently specify a maximum rate of 25 percent of a manufacturer's engine families. We are proposing to clarify that for manufacturers with fewer than four engine families, the maximum testing rate should be one family per year in place of the percentage calculation. We request comment on these amendments. Specifically, we request comment on whether there is a need to delay the effectiveness of any of these amendments to allow manufacturers time to comply with new requirements.

2. 40 CFR Part 94

We are proposing several regulatory amendments to the program for commercial marine diesel engines. Several of these are straightforward edits for correct grammar and cross references.

We propose to change the definition of United States, as described in the previous section.

We are proposing to add a definition for spark-ignition, consistent with the existing definition for compression-ignition. This would allow us to define compression-ignition as any engine that is not spark-ignition. This would help ensure that marine emission standards for the different types of engines fit together appropriately. We do not expect this change to affect any current engines.

The discussion of production-line testing in Section III includes a proposal to reduce testing rates after two years of consistent good performance. We propose to extend this provision to commercial marine diesel engines as well.

The test procedures for Category 2 marine engines give a cross-reference to 40 CFR part 92, which defines the procedures for testing locomotives and locomotive engines. Part 92 specifies a wide range of ambient temperatures for testing, to allow for outdoor measurements. We expect all testing of Category 2 marine engines to occur indoors and are therefore proposing to adopt a range of 13° to 30° C (55° to 86° F) for emission testing.

We request comment on modifying the language prohibiting emission controls that increase unregulated pollutants. The existing language states:

> An engine with an emission-control system may not emit any noxious or toxic substance which would not be emitted in the operation of the engine in the absence of such a system, except as specifically permitted by regulation.

Amended regulatory language would focus on preventing emissions that would endanger public welfare, rather than setting a standard that allows no tradeoff between pollutants. We are considering this also in emission-control programs for other types of engines, since various prospective engine technologies require more careful consideration of this issue.

> You may not design your engines with emission-control devices, systems, or elements of design that cause or contribute to an unreasonable risk to public health, welfare, or safety while operating. This applies especially if the engine emits any noxious or toxic substance it would otherwise not emit.

After completing the final rule for commercial marine diesel engines, manufacturers expressed a concern about the phase-in schedule for engine models under 2.5 liters per cylinder. Some of these engine models include ratings above 560 kW (750 hp). When we proposed emission standards for these engines, we suggested that the larger engines could certify according to an earlier schedule, since the lower-power engines from those product lines would need to meet emission standards for marine and land-based nonroad engines earlier. We received no comment on this position. We request comment on the need to accommodate manufacturers' calibration, certification, and production schedules in aligning the marine and land-based nonroad diesel engine emission standards and on what offsets are appropriate.

G. Technological Feasibility

We believe the emission-reduction strategies expected for land-based nonroad diesel engines and commercial marine diesel engines can also be applied to recreational marine diesel engines. Marine diesel engines are generally derivatives of land-based nonroad and highway diesel engines. Marine engine manufacturers and marinizers make modifications to the engine to make it ready for use in a vessel. These modifications can range from basic engine mounting and cooling changes to a restructuring of the power assembly and fuel management system. Chapters 3 and 4 of the Draft Regulatory Support Document discuss this process in more detail. Also, we have collected emission data demonstrating the feasibility of the not-to-exceed requirements. These data are presented in Chapter 4 of the Draft Regulatory Support Document.

1. Implementation Schedule

For recreational marine diesel engines, the proposed implementation schedule allows an additional two years of delay beyond the commercial marine diesel standards. This represents up to a five-year delay in standards relative to the implementation dates of the land-based nonroad standards. This should reduce the burden of complying with the proposed regulatory scheme by allowing time for carryover of technology from land-based nonroad and commercial marine diesel engines. In addition, the proposed implementation dates represent four or more years of lead time beyond the planned date for our final rule.

2. Standard Levels

Marine diesel engines are typically derived from or use the same technology as land-based nonroad and commercial marine diesel engines and should therefore be able to effectively use the same emission-control strategies. In fact, recreational marine engines can make more use of the water they operate in as a cooling medium compared with commercial marine, because they are able to make use of raw-water aftercooling. This can help them reduce charge-air intake temperatures more easily than the commercial models and much more easily than land-based nonroad diesel engines. Cooling the intake charge reduces the formation of NO_X emissions.

3. Technological Approaches

We anticipate that manufacturers will meet the proposed standards for recreational marine diesel engines primarily with technology that will be applied to land-based nonroad and commercial marine diesel engines. Much of this technology has already been established in highway applications and is being used in limited land-based nonroad and marine applications. Our analysis of this technology is described in detail in Chapters 3 and 4 of the Draft Regulatory Support Document for this proposed rule and is summarized here. We request comment on the applicability of the technology discussed below for CI recreational marine engines.

Our cost analysis is based on the technology package which we believe

most manufacturers will apply and is described in Chapter 5 of the Draft Regulatory Support Document. Our estimated costs of control are an ''average'' based on this technology package. This assumes that reductions from the package are all necessary and that the performance in the area of emission reductions is linear. While we believe this is a reasonable approach for estimating the overall costs of compliance, we are also seeking comment on whether there are different technologies or different application of the technologies in our package which could affect the marginal costs of compliance. That is to say, is there an incremental difference in technology which would reduce (or increase) costs significantly, and thus significantly affect the costs of control for a small given margin of additional emission reduction.

By proposing standards that don't go into place until 2006, we are providing engine manufacturers with substantial lead time for developing, testing, and implementing emission-control technologies. This lead time and the coordination of standards with those for land-based nonroad engines allows time for a comprehensive program to integrate the most effective emission-control approaches into the manufacturers' overall design goals related to durability, reliability, and fuel consumption.

Engine manufacturers have already shown some initiative in producing limited numbers of low-NO_X marine diesel engines. More than 80 of these engines have been placed into service in California through demonstration programs. The Draft Regulatory Support Document further discusses these engines and their emission results. Through the demonstration programs, we were able to gain some insight into what technologies can be used to meet the proposed emission standards.

Highway engines have been the leaders in developing new emission-control technology for diesel engines. Because of the similar engine designs in land-based nonroad and marine diesel engines, it is clear that much of the technological development that has led to lower-emitting highway engines can be transferred or adapted for use on land-based nonroad and marine engines. Much of the improvement in emissions from these engines comes from ''internal'' engine changes such as variation in fuel-injection variables (injection timing, injection pressure, spray pattern, rate shaping), modified piston bowl geometry for better air-fuel mixing, and improvements intended to reduce oil consumption. Introduction and ongoing improvement of electronic controls have played a vital role in facilitating many of these improvements.

Turbocharging is widely used now in marine applications, especially in larger engines, because it improves power and efficiency by compressing the intake air. Turbocharging may also be used to decrease particulate emissions in the exhaust. Today, marine engine manufacturers generally have to rematch the turbocharger to the engine characteristics of the marine version of a nonroad engine and often will add water jacketing around the turbocharger housing to keep surface temperatures low. Once the nonroad Tier 2 engines are available to the marine industry, matching the turbochargers for the engines will be an important step in achieving low emissions.

Aftercooling is a well established technology for reducing NO_X by decreasing the temperature of the charge air after it has been heated during compression. Decreasing the charge-air temperature directly reduces the peak cylinder temperature during combustion, which is the primary cause of NO_X formation. Air-to-water and water-to-water aftercoolers are well established for land-based applications. For engines in marine vessels, there are two different types of aftercooling: jacket-water and raw-water aftercooling. With jacket-water aftercooling, the fluid that extracts heat from the aftercooler is itself cooled by ambient water. This cooling circuit may either be the same circuit used to cool the engine or it may be a separate circuit. By moving to a separate circuit, marine engine manufacturers would be able to achieve further reductions in the charge-air temperature. This separate circuit could result in even lower temperatures by using raw water as the coolant. This means that ambient water is pumped directly to the aftercooler. Raw-water aftercooling is currently widely used in recreational applications. Because of the access that marine engines have to a large ambient water cooling medium, we anticipate that marine diesel engine manufacturers will largely achieve the reductions in NO_X emissions for this proposal through the use of aftercooling.

Electronic controls also offer great potential for improved control of engine parameters for better performance and lower emissions. Unit pumps or injectors would allow higher-pressure fuel injection with rate shaping to carefully time the delivery of the whole volume of injected fuel into the cylinder. Marine engine manufacturers should be able to take advantage of modifications to the routing of the intake air and the shape of the combustion chamber of nonroad engines for improved mixing of the fuel-air charge. Separate-circuit aftercooling (both jacket-water and raw-water) will likely gain widespread use in turbocharged engines to increase performance and lower NO_X.

4. Our Conclusions

The proposed standards for recreational marine diesel engines reasonably reflect what manufacturers can achieve through the application of available technology. Recreational marine diesel engine manufacturers will need to use the available lead time to develop the necessary emission-control strategies, including transfer of technology from land-based nonroad and commercial marine CI engines. This development effort will require not only achieving the targeted emission levels, but also ensuring that each engine will meet all performance and emission requirements over its useful life. The proposed standards clearly represent significant reductions compared with baseline emission levels.

Emission-control technology for diesel engines is in a period of rapid development in response to the range of emission standards in place (and under consideration) for highway and land-based nonroad engines in the years ahead. This development effort will automatically transfer to some extent to marine engines, because marine engines are often derivatives of highway and land-based nonroad engines. Regardless, this development effort would need to expand to meet the proposed standards. Because the technology development for highway and land-based nonroad engines will largely constitute basic research of diesel engine combustion, the results should generally find direct application to marine engines.

Based on information currently available, we believe it is feasible for recreational marine diesel engine manufacturers to meet the proposed standards using combinations of technological approaches discussed above and in Chapters 3 and 4 of the Draft Regulatory Support Document. To the extent that the technologies described above may not yield the full degree of emission reduction anticipated, manufacturers could still rely on a modest degree of fuel-injection timing retard as a strategy for complying with the proposed emission standards.

In addition, we believe the flexibilities incorporated into this proposal will permit marinizers and boat builders to respond to engine changes in an orderly way. We expect that meeting these requirements will

pose a challenge, but one that is feasible taking into consideration the availability and cost of technology, time, noise, energy, and safety.

VI. Recreational Vehicles and Engines

A. Overview

This section applies to recreational vehicles. We are proposing to set new emission standards for snowmobiles, off-highway motorcycles, and all-terrain vehicles (ATVs). The engines used in these vehicles are a subset of nonroad SI engines.[137] In our program to set standards for nonroad SI engines below 19 kW (Small SI), we excluded recreational vehicles because they have different design characteristics and usage patterns than certain other engines in the Small SI category. For example, engines typically found in the Small SI category are used in lawn mowers, chainsaws, trimmers, and other lawn and garden applications. These engines tend to have low power outputs and operate at constant loads and speeds, whereas recreational vehicles can have high power outputs with highly variable engine loads and speeds. This suggests that these engines should be tested differently than Small SI engines. In the same way, we are proposing to treat snowmobiles, off-highway motorcycles, and ATVs separately from our Large SI engine program, which is described in Section IV. For recreational vehicles that are not snowmobiles, off-highway motorcycles, or ATVs, we propose to apply the standards otherwise applicable to nonroad SI engines (see Section VI.B.2).

We are proposing emission standards for hydrocarbons (HC), and carbon monoxide (CO) from all recreational vehicles and NO_X from off-highway motorcycles and ATVs. Many of these vehicles use two-stroke engines which emit high levels of HC and CO. We believe that vehicle and engine manufacturers will be able to use technology already established for other types of engines, such as highway motorcycles, small spark-ignition engines, and marine engines, to meet these near-term standards. To encourage the introduction of low-emission technology such as catalytic control and the conversion from two-stroke to four-stroke engines, we are also proposing a Voluntary Low Emission Standards program. We also recognize that there are many small businesses that manufacture recreational vehicles; we are therefore proposing several regulatory special compliance provisions to reduce the burden of emission regulations on small businesses.

1. What Are Recreational Vehicles and Who Makes Them?

We are proposing to adopt new emission standards for off-highway motorcycles, all-terrain vehicles (ATVs), and snowmobiles. Eight manufacturers dominate the sales of these recreational vehicles. Of these eight manufacturers, seven of them manufacture a combination of two or more of the three main types of recreational vehicles. For example, there are four companies that manufacture both off-highway motorcycles and ATVs. There are three companies that manufacture ATVs and snowmobiles; one company manufactures all three. These eight companies represent approximately 95 percent of all domestic sales of recreational vehicles.

a. Off-highway motorcycles. Motorcycles come in a variety of configurations and styles. For the most part, however, they are two-wheeled, self-powered vehicles. Off-highway motorcycles are similar in appearance to highway motorcycles, but there are several important distinctions between the two types of machines. Off-highway motorcycles are not street-legal and are primarily operated on public and private lands over trails and open areas. Off-highway motorcycles tend to be much smaller, lighter and more maneuverable than their larger highway counterparts. They are equipped with relatively small-displacement single-cylinder two-or four-stroke engines ranging from 48 to 650 cubic centimeters (cc). The exhaust systems for off-highway motorcycles are distinctively routed high on the frame to prevent damage from brush, rocks, and water. Off-highway motorcycles are designed to be operated over varying surfaces, such as dirt, sand, or mud, and are equipped with knobby tires to give better traction in off-road conditions. Unlike highway motorcycles, off-highway motorcycles have fenders mounted far from the wheels and closer to the rider to keep dirt and mud from spraying the rider and clogging between the fender and tire. Off-highway motorcycles are also equipped with more advanced suspension systems than those for highway motorcycles. This allows the operator to ride over obstacles and make jumps safely.

Five companies dominate sales of off-highway motorcycles. They are long-established, large corporations that manufacture several different products including highway and off-highway motorcycles. These five companies account for 90 to 95 percent of all domestic sales of off-highway motorcycles. There are also several relatively small companies that manufacture off-highway motorcycles, many of which specialize in racing or competition machines.

b. All-terrain vehicles. ATVs have been in existence for a long time, but have become increasingly popular over the last 25 years. Some of the earliest and most popular ATVs were three-wheeled off-highway models with large balloon tires. Due to safety concerns, the three-wheeled ATVs were phased-out in the mid-1980s and replaced by the current and more popular four-wheeled vehicle known as ''quad runners'' or simply ''quads.'' Quads resemble the earlier three-wheeled ATVs except that the single front wheel was replaced with two wheels controlled by a steering system. The ATV steering system uses motorcycle handlebars, but otherwise looks and operates like an automotive design. The operator sits on and rides the quad much like a motorcycle. The engines used in quads tend to be very similar to those used in off-highway motorcycles—relatively small, single-cylinder two- or four-stroke engines. Quads are typically divided into utility and sport models. The utility quads are designed for recreational use but have the ability to perform many utility functions, such as plowing snow, tilling gardens, and mowing lawns. They are typically heavier and equipped with relatively large four-stroke engines and automatic transmissions with a reverse gear. Sport quads are smaller and designed primarily for recreational purposes. They are equipped with two- or four-stroke engines and manual transmissions.

There are two other less common types of ATVs, both of which are six-wheeled models. One looks similar to a large golf cart with a bed for hauling cargo, much like a pick-up truck. These ATVs are typically manufactured by the same companies that make quad runners and use similar engines. The other can operate both in water and on land. These amphibious ATVs typically have small gasoline-powered engines similar to those found in lawn and garden tractors, rather than the motorcycle engines used in quads, though some use automotive-based Large SI engines.

Of all of the types of recreational vehicles, ATVs have the largest number of major manufacturers. All but one of the companies noted above for off-highway motorcycles and snowmobiles are significant ATV producers. These seven companies represent over 95

[137] Almost all recreational vehicles are equipped with SI engines. Any diesel engines used in these applications must meet our emission standards for nonroad diesel engines.

percent of total domestic ATV sales. The remaining 5 percent of sales come from importers, which tend to import less expensive, youth-oriented ATVs.

c. Snowmobiles. Snowmobiles, also referred to as ''sleds,'' are tracked vehicles designed to operate over snow. Snowmobiles have some similarities to off-highway motorcycles and ATVs. A snowmobile rider sits on and rides a snowmobile similar to an ATV. Snowmobiles use high-powered two- and three-cylinder two-stroke engines that look similar to off-highway motorcycle engines. Rather than wheels, snowmobiles are propelled by a track system similar to what is used on a bulldozer. The snowmobile is steered by two skis at the front of the sled. Snowmobiles use handlebars similar to off-highway motorcycles and ATVs. The typical snowmobile seats two riders comfortably. Over the years, snowmobile performance has steadily increased to the point that many snowmobiles currently have engines over 100 horsepower and are capable of exceeding 100 miles per hour. The proposed definition for snowmobiles includes a limit of 1.5-meter width to differentiate conventional snowmobiles from ice-grooming machines and snow coaches, which use very different engines. We request comment on this definition and on any other approaches to differentiate these products.

There are four major snowmobile manufacturers, accounting for more than 99 percent of all domestic sales. The remaining sales come from very small manufacturers who tend to specialize in expensive, high-performance designs.

d. Other recreational vehicles. Currently, our Small SI nonroad engine regulations cover all recreational engines that are under 19 kW (25 hp) and have either an installed speed governor or a maximum engine speed less than 5,000 rpm. Recreational vehicles currently covered by the Small SI standards include go-carts, golf carts, and small mini-bikes. Although some off-highway motorcycles, ATVs and snowmobiles have engines with rated horsepower less than 19 kW, they all have maximum engine speeds greater than 5,000 rpm. Thus they have not been included in the Small SI regulations. The only other types of small recreational engines not covered by the Small SI rule are those engines under 19 kW that aren't governed and have maximum engine speed of at least 5,000 rpm. There are relatively few such vehicles with recreational engines not covered by the Small SI regulations. The best example of vehicles that fit in this category are scooters and skateboards that are powered by very small gasoline spark-ignition engines. The engines used on these vehicles are typically the same as those used in string trimmers or other lawn and garden equipment, which are covered under the Small SI regulations. Because these engines are generally already covered by the Small SI regulations and are the same as, or very similar to, engines as those used in lawn and garden applications, we are proposing to revise the Small SI rules to cover these engines under the Small SI regulations. To avoid any problems in transitioning to meet emission standards, we propose to apply these standards in 2006. We request comments on these issues.

2. What Is the Regulatory History for Recreational Vehicles?

California ARB established standards for off-highway motorcycles and ATVs, which took effect in January 1997 (1999 for vehicles with engines of 90 cc or less). California has not adopted standards for snowmobiles. The standards, shown in Table VI.A–1, are based on the highway motorcycle chassis test procedures. Manufacturers may certify ATVs to optional standards, also shown in Table VI.A–1, which are based on the utility engine test procedure.[138] This is the test procedure over which Small SI engines are tested. The stringency level of the standards was based on the emission performance of 4-stroke engines and advanced 2-stroke engines with a catalytic converter. California ARB anticipated that the standards would be met initially through the use of high performance 4-stroke engines.

TABLE VI.A–1.—CALIFORNIA OFF-HIGHWAY MOTORCYCLE AND ATV STANDARDS FOR MODEL YEAR 1997 AND LATER

[1999 and later for engines at or below 90 cc]

	HC	NO_X	CO	PM
Off-highway motorcycle and ATV standards (g/km)	[a]1.2	.....	15	.....

	HC + NO_X	CO	PM
Optional standards for ATV engines below 225 cc (g/bhp-hr)	[a]12.0	300	.....
Optional standards for ATV engines at or above 225 cc (g/bhp-hr)	[a]10.0	300	.....

[a] Corporate-average standard.

California revisited the program because a lack of certified product from manufacturers was reportedly creating economic hardship for dealerships. The number of certified off-highway motorcycle models was particularly inadequate.[139] In 1998, California revised the program, allowing the use of uncertified products in off-highway vehicle recreation areas with regional/seasonal use restrictions. Currently, noncomplying vehicles may be sold in California and used in attainment areas year-round and in nonattainment areas during months when exceedances of the state ozone standard are not expected. For enforcement purposes, certified and uncertified products are identified with green and red stickers, respectively. Only about one-third of off-highway motorcycles selling in California are certified. All certified products have 4-stroke engines.

B. Engines Covered by This Proposal

We are proposing new emission standards for all new off-highway motorcycles, all-terrain vehicles (ATVs), and snowmobiles. We are also proposing to apply existing Small SI emission standards to other recreational vehicles, as described above. The engines used in these vehicles tend to be small, air-or liquid-cooled, reciprocating Otto-cycle engines that operate on gasoline.[140] With the exception of what we define as ''other recreational vehicles,'' these engines are designed to be used in vehicles, where engine performance is characterized by highly transient operation, with a wide range of engine speed and load capability. Maximum engine speed is typically well above 5,000 rpm. Also, with the exception of snowmobiles, the vehicles are typically equipped with transmissions rather than torque converters to ensure performance under a variety of operating conditions.[141]

[138] Notice of Off-Highway Recreational Vehicle Manufacturers and All Other Interested Parties Regarding Alternate Emission Standards for All-Terrain Vehicles, Mail Out #95–16, April 28, 1995, California ARB (Docket A–2000–01, document II–D–06).

[139] Initial Statement of Reasons, Public Hearing to Consider Amendments to the California Regulations for New 1997 and Later Off-highway Recreational Vehicles and Engines, California ARB, October 23, 1998 (Docket A–2000–01, document II–D–08).

[140] Otto cycle is another name for a spark-ignition engine which utilizes a piston with homogeneous external or internal air and fuel mixture formation and spark ignition.

[141] Snowmobiles use continuously variable transmissions, which tend to operate like torque converters.

1. Two-Stroke vs. Four-Stroke Engines

The engines used by recreational vehicles can be separated into two distinct designs: two-stroke and four-stroke. The distinction between two-stroke and four-stroke engines is important for emissions because two-stroke engines tend to emit much greater amounts of unburned hydrocarbons (HC) and particulate matter (PM) than four-stroke engines of similar size and power. Two-stroke engines also have greater fuel consumption than four-stroke engines, but they also tend to have higher power output per-unit displacement, lighter weight, and better cold-starting performance. These advantages, combined with a simple design and lower manufacturing costs, tend to make two-stroke engines popular as a power unit for recreational vehicles. With the exception of a few youth models, almost all snowmobiles use two-stroke engines. Currently, about 63 percent of all off-highway motorcycles (predominantly in high performance, youth, and entry-level bikes) and 20 percent of all ATVs sold in the United States use two-stroke engines.

The basis for the differences in engine performance and exhaust emissions between two-stroke and four-stroke engines can be found in the fundamental differences in how two-stroke and four-stroke engines operate. Four-stroke operation takes place in four distinct steps: intake, compression, power, and exhaust. Each step corresponds to one up or down stroke of the piston or 180° of crankshaft rotation. The first step of the cycle is for an intake valve in the combustion chamber to open during the intake stroke, allowing a mixture of air and fuel to be drawn into the cylinder while the piston moves down the cylinder. The intake valve then closes and the momentum of the crankshaft causes the piston to move back up the cylinder, compressing the air and fuel mixture. At the very end of the compression stroke, the air and fuel mixture is ignited by a spark from a spark plug and begins to burn. As the air and fuel mixture burns, increasing temperature and pressure cause the piston to move back down the cylinder. This is referred to as the ''power'' stroke. At the bottom of the power stroke, an exhaust valve opens in the combustion chamber and as the piston moves back up the cylinder, the burnt gases are pushed out through the exhaust valve to the exhaust manifold, and the cycle is complete.

In a four-stroke engine, combustion and the resulting power stroke occur only once every two revolutions of the crankshaft. In a two-stroke engine, combustion occurs every revolution of the crankshaft. Two-stroke engines eliminate the intake and exhaust strokes, leaving only compression and power strokes. This is due to the fact that two-stroke engines do not use intake and exhaust valves. Instead, they have intake and exhaust ports in the sides of the cylinder walls. With a two-stroke engine, as the piston approaches the bottom of the power stroke, it uncovers exhaust ports in the wall of the cylinder. The high pressure combustion gases blow into the exhaust manifold. As the piston gets closer to the bottom of the power stroke, the intake ports are uncovered, and fresh mixture of air and fuel are forced into the cylinder while the exhaust ports are still open. Exhaust gas is ''scavenged'' or forced into the exhaust by the pressure of the incoming charge of fresh air and fuel. In the process, however, some mixing between the exhaust gas and the fresh charge of air and fuel takes place, so that some of the fresh charge is also emitted in the exhaust. Losing part of the fuel out of the exhaust during scavenging causes very high hydrocarbon emission characteristics of two-stroke engines. The other major reason for high HC emissions from two-stroke engines is their tendency to misfire under low-load conditions due to greater combustion instability.

2. Applicability of Small SI Regulations

In our regulations for Small SI engines, we established criteria, such as rated engine speed at or above 5,000 rpm and the use of a speed governor, that excluded engines used in certain types of recreational vehicles (see 40 CFR § 90.1(b)(5)). Engines used in some other types of recreational vehicles may be covered by the Small SI standards, depending on the characteristics of the engines. For example, lawnmower-type engines used in go carts would typically be covered by the Small SI standards because they don't operate above 5000 rpm. Similarly, engines used in golf carts are also included in the Small SI program. As discussed above, we are proposing to revise the Small SI regulations to include all recreational engines except those in off-highway motorcycles, ATVs, snowmobiles, and hobby engines. We are proposing to remove the 5,000 rpm and speed governor criteria from the applicability provisions of the Small SI regulations.

There may, however, be instances where an ATV, off-road motorcycle, or snowmobile manufacturer currently uses a certified small utility engine in their vehicle, and could be required to recertify that engine to the recreational vehicle standards in the future. Relatively slow-moving amphibious ATVs would be one example where certified small utility engines may be used. We request comment on whether or not we should allow off-road motorcycles, ATVs, and snowmobiles to be certified to the Small SI standards in cases where a manufacturer has chosen to use a certified small utility engine. We also request comment on retaining the 5,000-rpm rated speed criteria for determining the applicability of the Small SI standards for snowmobiles, ATVs, and off-road motorcycles. Further, we request comment and information on any vehicles that currently have an engine certified to Small SI standards which would be required to certify to the recreational vehicle standards due to this regulatory change.

3. Hobby Engines

The Small SI rule categorized SI engines used in model cars, boats, and airplanes as recreational engines and exempted them from the Small SI program.[142] We continue to believe that it would be inappropriate to include hobby engines in the Small SI program because of significant engine design and use differences. At this time, we also believe that hobby engines are substantially different than engines used in recreational vehicles and, as discussed below, we are not proposing to include SI hobby engines in this proposal.

There are about 8,000 spark-ignition engines sold per year for use in scale-model aircraft, cars, and boats.[143] This is a very small subsection of the overall model engine market, most of which are glow-plug engines that run on a mix of castor oil, methyl alcohol, and nitro methane.[144] A typical SI hobby engine is approximately 25 cc with a horsepower rating of about 1–3 hp, though larger engines are available. These SI engines are specialty products sold in very low volumes, usually not more than a few hundred units per engine line annually. Many of the engines are used in model airplanes, but they are also used in other types of models such as cars and boats. These engines, especially the larger

[142] 65 FR 24929, April 25, 2000.

[143] Comments submitted by Hobbico on behalf of Great Plains Model Distributors and Radio Control Hobby Trade Association, February 5, 2001, Docket A–2000–01, document II–D–58.

[144] Glow plug hobby engines are considered compression ignition engines (diesel) because they lack a spark ignition system and throttle (see definition of compression ignition, 40 CFR § 89.2). The nonroad diesel engine regulations (40 CFR § 89.2) do not apply to hobby engines and therefore these engines are unregulated.

displacement models, are frequently used in competitive events by more experienced operators. The racing engines sometimes run on methanol instead of gasoline. In addition, the engines are usually installed and adjusted by the hobbyist who selects an engine that best fits the particular model being constructed.

The average annual hours of operation has been estimated to be about 12.2 hours per year.[145] The usage rate is very low compared to other recreational or utility engine applications due to the nature of their use. Much of the hobby revolves around building the model and preparing the model for operation. The engine and model must be adjusted, maintained, and repaired between uses.

SI model engines are highly specialized and differ significantly in design compared to engines used in other recreational or utility engine applications. While some of the basic components such as pistons may be the similar, the materials, airflow, cooling, and fuel delivery systems are considerably different.[146] [147] Some SI model engines are scale replicas of multi-cylinder aircraft or automobile engines and are fundamentally different than SI engines used in other applications. Model-engine manufacturers often select lighter-weight materials and simplified designs to keep engine weight down, often at the expense of engine longevity. Hobby engines use special ignition systems designed specifically for the application to be lighter than those used in other applications. To save weight, hobby engines typically lack pull starters that are found on other engines. Hobby engines must be started by spinning the propeller. In addition, the models themselves vary significantly in their design, introducing packaging issues for engine manufacturers.

We are not proposing to include SI hobby engines in the recreational vehicles program at this time. The engines differ significantly from the recreational engines included in the proposal in their design and use, as noted above. Emission-control strategies envisioned for other recreational vehicles may not be well suited for hobby engines because of their design, weight constraints, and packaging limitations. Approaches such as using a 4-stroke engine, a catalyst, or fuel injection all would involve increases in weight, which would be particularly problematic for model airplanes. The feasibility of these approaches for these engines is questionable. Reducing emissions, even if feasible, would likely involve fundamental engine redesign and substantial R&D efforts. The costs of achieving emission reductions are likely to be much higher per engine than for other recreational applications because the R&D costs would be spread over very low sales volumes. The cost of fundamentally redesigning the engines could double the cost of some engines.

By contrast, because of their very low sales volumes, annual usage rates, and relatively short engine life cycle, SI hobby engine emission contributions are extremely small compared to recreational vehicles. The emission reductions possible from regulating such engines would be minuscule (we estimate that SI hobby engines as a whole account for less than 30 tons of HC nationally per year, much less than 0.01% of Mobile Source HC emissions).[148] Thus, the cost per ton associated with regulating such engines would be well above any regulations previously adopted under the mobile source program (we estimate potential cost per ton for HC to over $200,000 per ton compared to less than $2,500 per ton for most other mobile source programs).

In addition, hobby engines differ significantly in their in-use operating characteristics compared to small utility engines and other recreational vehicle engines. It is unclear if the test procedures developed and used for other types of SI engine applications would be sufficiently representative for hobby engines. We are not aware of any efforts to develop an emission test cycle or conduct any emission testing of these engines. In addition, because installing, optimizing, maintaining, and repairing the engines are as much a part of the hobby as operating the engine, emission standards could fundamentally alter the hobby itself. Engines with emission-control systems would be more complex and the operator would need to be careful not to make changes that would cause the engine to exceed emission standards.

For all the above reasons, we do not have adequate information and are not able to propose emission standards and test procedures for SI hobby engines at this time. We request comment on the above points, including feasibility, cost, and benefits associated with potential control technologies for these engines. We also request comment on any other information or unique characteristics of hobby engines that should be taken into consideration.

4. Competition Off-Highway Motorcycles

Currently, a large portion of off-highway motorcycles are designed as competition/racing motorcycles. These models often represent a manufacturer's high-performance offerings in the off-highway market. Most such motorcycles are of the motocross variety, although some high performance enduro models are marketed for competition use.[149] [150] These high-performance motorcycles are largely powered by 2-stroke engines, though some 4-stroke models have been introduced in recent years.

Competition events for motocross motorcycles mostly involve closed-course or track racing. Other types of off-highway motorcycles are usually marketed for trail or open-area use. When used for competition, these models are likely to be involved in point-to-point competition events over trails or stretches of open land. There are also specialized off-highway motorcycles that are designed for competitions such as ice racing, drag racing, and observed trials competition. A few races involve professional manufacturer-sponsored racing teams. Amateur competition events for off-highway motorcycles are also held frequently in many areas of the U.S.

Clean Air Act subsections 216 (10) and (11) exclude engines and vehicles ''used solely for competition'' from nonroad engine and nonroad vehicle regulations. In our previous nonroad

[145] Comments submitted by Hobbico on behalf of Great Plains Model Distributors and Radio Control Hobby Trade Association, February 5, 2001, Docket A–2000–01, document II–D–58.

[146] E-mail from Carl Maroney of the Academy of Model Aeronautics to Christopher Lieske, of EPA, June 4, 2001, Docket A–2000–01, document II–G–144.

[147] Comments submitted by Hobbico on Behalf of Great Plains Model Distributors and Radio Control Hobby Trade Association, February 5, 2001, Docket A–2000–01, document II–D–58.

[148] For further information on the feasibility, emission inventories, and costs, see ''Analysis of Spark Ignition Hobby Engines'', Memorandum from Chris Lieske to Docket A–2000–01, document II–G–144.

[149] A motocross bike is typically a high performance off-highway motorcycle that is designed to be operated in motocross competition. Motocross competition is defined as a circuit race around an off-highway closed-course. The course contains numerous jumps, hills, flat sections, and bermed or banked turns. The course surface usually consists of dirt, gravel, sand, and mud. Motocross bikes are designed to be very light for quick handling and easy maneuverability. They also come with large knobby tires for traction, high fenders to protect the rider from flying dirt and rocks, aggressive suspension systems that allow the bike to absorb large amounts of shock, and are powered by high performance engines. They are not equipped with lights.

[150] An enduro bike is very similar in design and appearance to a motocross bike. The primary difference is that enduros are equipped with lights and have slightly different engine performance that is more geared towards a broader variety of operation than a motocross bike. An enduro bike needs to be able to cruise at high speeds as well as operate through tight woods or deep mud.

engine emission-control programs, we have generally defined the term as follows:

> Used solely for competition means exhibiting features that are not easily removed and that would render its use other than in competition unsafe, impractical, or highly unlikely.

If retained for the recreational vehicles program, the above definition may be useful for identifying certain models that are clearly used only for competition. For example, there are motorcycles identified as ''observed trials'' motorcycles which are designed without a standard seat because the rider does not sit down during competition. This feature would make recreational use unlikely:)

Most motorcycles marketed for competition do not appear to have obvious physical characteristics that constrain their use to competition. Upon closer inspection, however, there are several features and characteristics for many competition motorcycles that would make recreational use unlikely. For example, motocross bikes are not equipped with lights or a spark arrester, which prohibits them from legally operating on public lands (e.g., roads, parks, state land, federal land, etc.).[151] Vehicle performance of modern motocross bikes are so advanced (e.g., extremely high power-to-weight ratios and advanced suspension systems) that it is highly unlikely that these machines would be used for recreational purposes. In addition, motocross and other competition off-highway motorcycles typically do not come with a warranty, which would further deter the purchase and use of competition bikes for recreational operation.[152] We believe these features should be sufficient in distinguishing competition motorcycles from recreational motorcycles. We are specifically proposing the following features as indicative of motorcycles used solely for competition: absence of a headlight or other lights; the absence of a spark arrester; suspension travel greater than 10 inches; and an engine displacement greater than 50 cc.

Vehicles not meeting the applicable criteria listed above would be excluded only in cases where the manufacturer has clear and convincing evidence that the vehicles for which the exemption is being sought will be used solely for competition. Examples of this type of evidence could be technical rationale explaining the differences between a competition and non-competition motorcycle, marketing and/or sales information indicating the intent of the motorcycle for competition purposes, or survey data from users indicating the competitive nature of the motorcycle.

Although there are several features that distinguish competition motorcycles from recreational motorcycles, several parties have commented that they believe motorcycles designed for competition use may be used for recreational purposes, rather than solely for competition. This is of particular concern because competition motorcycles represent about 29 percent of total off-highway motorcycle sales or approximately 43,000 units per year. However, a study on the characterization of off-highway motorcycle usage found that there are numerous—and increasingly popular—amateur off-highway motorcycle competitions across the country, especially motocross.[153] The estimated number of off-highway motorcycle competitors is as high as 80,000. Since it is very common for competitive riders to replace their machines every one to two years, the sale of 43,000 off-highway competition motorcycles appears to be a reasonable number, considering the number of competitive participants. We are therefore confident that, although we are proposing to exclude a high percentage of off-highway motorcycles as being competition machines, this definition is appropriate because a high percentage of these motorcycles are in fact used solely for competition.

We are very interested in receiving input on the proposed competition exclusion. We request comment on ways the program can be established to exclude motorcycles used solely for competition, consistent with the Act, without excluding vehicles that are also used for other purposes. We specifically request comment on the identifying characteristics of competition vehicles in § 1051.620 of the proposed regulations. Ideally, the program can be established in a way that provides reasonable certainty at certification. However, approaches could include reasonable measures at time of sale or in-use that would ensure that the competition exclusion is applied appropriately.

C . Proposed Standards

1. What Are the Proposed Standards and Compliance Dates?

a. Off-highway Motorcycles and ATVs. We are proposing HC plus NO_X and CO standards for off-highway motorcycles and ATVs. We expect the largest benefit to come from reducing HC emissions from two-stroke engines. Two-stroke engines have very high HC emission levels. Baseline NO_X levels are relatively low for engines used in these applications and therefore NO_X standards serve only to cap NO_X emissions for these engines. Comparable CO reductions can be expected from both 2-stroke and 4-stroke engines, as CO levels are similar for the two engine types. We are also proposing averaging, banking and trading provisions for off-highway motorcycles and ATVs, as discussed below.

2006 Standards. In the current off-highway motorcycle and ATV market, consumers can choose between two-stroke and four-stroke models in most sizes and categories. Each engine type offers unique performance characteristics. Some manufacturers specialize in two-stroke or four-stroke models, while others offer a mix of models. The HC standard is likely to be a primary determining factor for what technology manufacturers choose to employ to meet emission standards overall. HC emissions can be reduced substantially by switching from two-stroke to four-stroke engines. Four-stroke engines are very common in off-highway motorcycle and ATV applications. Eighty percent of all ATVs sold are four-stroke. In addition, approximately 55 percent of non-competition off-highway motorcycles are four-stroke. Certification results from California ARB's emission-control program for off-highway motorcycles and ATVs, combined with our own baseline emission testing, provides ample data on the emission-control capability of four-stroke engines in off-highway motorcycles and ATV applications. Off-highway motorcycles certified to California ARB standards for the 2000 model year have HC certification levels ranging from 0.4 to 1.0 g/km. These motorcycles have engines ranging in size from 48 to 650 cc; none of these use catalysts.

In determining what standards to set for off-highway motorcycles and ATVs, we considered several approaches. One approach was to establish separate standards for two-stroke and four-stroke engines. This would take into

[151] A spark arrester is a device located in the end of the tailpipe that catches carbon sparks coming from the engine before they get out of the exhaust system. This is important when a bike is used off-highway, where hot carbon sparks falling in grassy or wooded areas could result in fires.

[152] Most manufacturers of motocross racing motorcycles do not offer a warranty. Some manufacturers do, however, offer very limited (1 to 3 months) warranties under special conditions.

[153] Characterization of Off-Road Motorcycle, ICF Consulting, September 2001, A–2000–1 document II–A–81.

consideration the fact that it could be expensive and difficult for two-stroke engines to meet the same emission levels as four-stroke engines. The problem with this approach is that two-stroke engines emit up to 25 times more HC emissions than four-stroke engines. Four stroke engines are currently being used on most, if not all, of the different subclasses of ATVs and off-highway motorcycles that we would be regulating, and we believe they can be used on all such subclasses. We are concerned that setting lesser standards for two-stroke engines could possibly result in the increase of two-stroke engine usage at the expense of four-stroke engines, which would result in a greater level of emissions and could miss the opportunity for a more appropriate and cost-effective standard. As a result, we proposing an approach that would require a single set of off-highway motorcycle and ATV standards for all engine types, similar to California ARB. We believe that this approach is consistent with our statutory requirement to propose standards that achieve the greatest emission reduction achievable, considering cost, noise, and safety factors.We ask for comment on this proposed approach and the rationale underlying this approach.

In 1994, California ARB adopted emission standards for off-highway motorcycles and ATVs. At the time, these standards were stringent enough that manufacturers were unable to provide performance-oriented off-highway motorcycles and ATVs that met the standards. As a result, ARB allowed manufacturers to sell non-compliant off-highway motorcycles and ATVs, resulting in approximately a third of the off-highway motorcycles and ATVs sold being compliant with the standards. Four-stroke engine technology has advanced considerably since the ARB regulations went into effect. Manufacturers are now capable of offering four-stroke engines that provide excellent performance. However, this performance can be achieved only as long as manufacturers are allowed to operate four-stroke engines with a slightly rich air and fuel mixture, which can result in somewhat higher HC and CO emissions. However, the HC emissions from four-stroke engines even when they operate rich are significantly lower than those from two-stroke engines. The market appears to be shifting to four-stroke technology.

As discussed above in Section # B.1.4, the CAA requires us to exempt from emission standards off-highway motorcycles and ATVs used for competition. We expect several competition off-highway motorcycle models, most equipped with two-stroke engines, to continue to be available. We are concerned that setting standards as stringent as ARB's would result in a performance penalty for four-strokes which could encourage consumers who want performance-oriented off-highway motorcycles to purchase competition vehicles in lieu of purchasing compliant machines that don't provide the desired performance. That is why we are proposing emission standards that are slightly less stringent than the California ARB. We believe that our proposed emission standards would allow the continued advancement of four-stroke technology and are a good compromise between available emission-control technology, cost, and vehicle performance.

We are proposing exhaust emission standards for off-highway motorcycles and ATVs to take effect in the 2006 model year. We would allow a short phase-in of 50-percent implementation in the 2006 model year with full implementation in 2007. These standards apply to testing with the highway motorcycle Federal Test Procedure (FTP) test cycle. For $HC+NO_X$ emissions, the standard is 2.0 g/km (3.2 g/mi). For CO emissions, the standard is 25.0 g/km (40.5 g/mi). These emission standards would allow us to set near-term requirements to introduce the low-emission technologies for substantial emission reductions with minimal lead time. We expect manufacturers to meet these standards using four-stroke engines with some low-level modifications to fuel-system calibrations. These systems would be similar to those used for many years in highway applications, but not necessarily with the same degree of sophistication.

We considered proposing several alternative sets of standards. The first alternative considered was to set the $HC+NO_X$ standard at a level higher than 2.0 g/km, since this standard could prove to be difficult for a two-stroke engine to achieve. However, since two-stroke engines emit so much higher levels of HC than four-stroke engines, and HC emission-control technology for two-stroke engines is more expensive and complicated, we would expect that such a standard would have to be considerably higher than 2.0 g/km, perhaps in the range of 10 to12 g/km. Even a standard this high would still likely require secondary air injection and a catalytic converter for most two-stroke engines to comply. We believe that the concerns over high catalyst temperatures and potential negative impacts on engine performance would most likely result in manufacturers choosing to convert two-stroke applications to four-stroke, especially since four-stroke engines are already so prevalent in off-highway motorcycle and ATV applications. In addition, we believe that the cost differential between air injection and a catalyst for a two-stroke engine and using a four-stroke engine would be minimal. We request comment on such a standard, and on the costs and emissions benefits associated with that approach. Commenters should include a recommendation for the level of the standard.

We also considered setting the $HC+NO_X$ standard at a level lower than 2.0 g/km, since it is possible to use a catalyst on a four-stroke engine and achieve lower emission levels. We decided that for off-highway motorcycles, the technologies necessary to meet emission standards lower than our proposed level of 2.0 g/km for $HC+NO_X$ could be prohibitive due to several factors such as limited catalyst locations that are considered safe to the operator and potential negative engine performance impacts (see our discussion on proposed 2009 standards for more detail). These issues are not as important for ATVs. However, it would be difficult to implement them by the 2006 model year since 20 percent of the fleet is still two-stroke and manufacturers would need time to convert their fleet to four-stroke. Therefore, we are not proposing a $HC+NO_X$ standard lower than 2.0 g/km for off-highway motorcycles and are instead proposing a second phase of standards for ATVs in the 2009 model year. We are asking for comment on this aspect of the proposal, and on such a standard.

Some youth-oriented off-highway motorcycles and ATVs with small engine displacements have engine governors limiting vehicle speeds. In the case of ATVs, the Consumer Product Safety Commission (CPSC) limit youth ATVs with engine displacements between 50 and 100 cc to a top speed of 35 mph. Similarly, ATVs with engine displacements of 50 cc and less are limited to a top speed of 15 mph. Many small off-highway motorcycles use the same governors. For vehicles with a displacement greater than 50 cc, we believe the FTP is an appropriate test cycle because of the transient capability of these vehicles. However, for the vehicles with engine displacements of 50 cc and less, the governed top speed of 15 mph restricts the operation of these vehicles to either idle or the governed wide-open throttle setting, similar to a lawn mowers. It may not make sense to require these small-displacement vehicles to be tested over

the FTP. Therefore, we propose that off-highway motorcycles and ATVs with an engine displacement of 50 cc or less have the option to certify to the proposed off-highway motorcycle and ATV standards discussed above or to meet the Phase 1 Small SI emission standards for non-handheld Class I engines. We request comment on this option.

ATV manufacturers have requested that we allow them the option of certifying ATVs to the same optional exhaust emission standards as allowed by California ARB. California allows ATVs to be optionally tested using the California ARB utility engine test cycle (SAE J1088) and procedures. In California, manufacturers may use the J1088 engine test cycle to meet the California Small Off-Road Engine emission standards. Manufacturers were required to submit some emission data from the various modes of the J1088 test cycles to show that emissions from these modes were comparable to FTP emissions. California allowed this option because the goal of their program was to encourage the use of four-stroke engine technology in ATVs. The lawn and garden test cycle and standards were considered stringent enough to encourage manufacturers to switch from two-stroke engines to four-stroke engines. We continue to be concerned that the J1088 test cycle doesn't represent actual ATV operation, but for our Phase 1 standards, our goal is to encourage manufacturers to switch from two-stroke to four-stroke engine technology. Therefore, to facilitate this phase-in we are proposing here that manufacturers may optionally certify ATVs using the California utility cycle and standards as shown in Table VI.C–1 instead of the FTP standards of 2.0 g/km $HC+NO_X$ and 25 g/km CO discussed above.

TABLE VI.C–1.—CALIFORNIA UTILITY ENGINE EMISSION STANDARDS

Engine displacement	$HC+NO_X$	CO
Less than 225 cc	12.0 g/hp-hr (16.1 g/kW-hr)	300 g/hp-hr (400 g/kW-hr)
Greater than 225 cc	10.0 g/hp-hr (13.4 g/kW-hr)	300 g/hp-hr (400 g/kW-hr)

Some manufacturers have expressed concern about the stringency of the proposed standards for some small displacement (e.g., less than 80 cc) youth off-highway motorcycles and ATVs. They have also stated that some of these small vehicles may have a difficult time operating over the FTP cycle. Therefore, we request comment on the ability of small displacement youth off-highway motorcycles and ATVs to operate over the FTP test cycle and meet our proposed emission standards.

2009 Standards. As stated above, we expect manufacturers to meet the proposed 2006 standards by using four-stroke engines with minor modifications to fuel calibrations. Several technologies are available to further reduce emissions from off-highway motorcycles and ATVs. The most likely choices would be the use of electronic fuel injection, secondary air injection into the exhaust system, and catalytic converters. Although these technologies would be capable of further emission reductions, there are potential concerns with applying each of these technologies to off-highway motorcycles. The complexity and increased cost of electronic fuel injection makes it problematic for off-highway motorcycle applications. Off-highway motorcycle manufacturers and enthusiasts have expressed concern over possible leg burns resulting from catalysts since off-highway motorcycles have exhaust systems that run higher up on the frame. They are concerned that if a rider were to fall over with the motorcycle on top of them, the hot catalyst could burn the rider. Catalysts and secondary air also have the potential to adversely affect engine performance. Since motorcycle performance is paramount for off-highway motorcycles, any technologies that could impact performance or pose a perceived safety threat could encourage consumers to purchase high-performance competition motorcycles rather than recreational motorcycles. For ATVs, however, the design of the vehicle is more receptive to placing a catalyst on the exhaust. Since the engine is further inside the vehicle with numerous plastic fairings around the engine, the operator's legs are far away and shielded from the exhaust pipe. ATV engines also tend to have lower power output than off-highway motorcycle engines, making the use of secondary air or catalysts more tolerable.

Since ATV design and use are more conducive to these more advanced emission-control technologies than off-highway motorcycles, we believe it is appropriate to pursue more advanced emission-control technologies for ATVs. We also note that the usage rate and population of ATVs is growing substantially compared to off-highway motorcycles. We expect that, with additional time to optimize designs to better control emissions, manufacturers of ATVs should be able to meet more stringent emission standards. Starting with the 2009 model year for ATVs only, we propose to apply emission standards of 1.0 g/km (1.6 g/mi) for $HC+NO_X$ emissions and 25 g/km (40.5 g/mi) for CO emissions. As with the Phase 1 standards, we are proposing a two-year phase-in, with 50 percent of models complying in 2009 and all models complying in 2010.

We are proposing that ATVs would be required to meet a 1.0 g/km $HC+NO_X$ standard because we believe it can be met by using four-stroke engines with secondary air injection. Secondary air injection is a common HC emission-control technology used on highway motorcycles. It's use is more transparent to the ATV operator than a catalyst and is a relatively inexpensive means of achieving significant emission reductions. Depending on several variables, some models may have a more difficult time meeting the Phase 2 standards without the use of a catalyst. Therefore, while we expect ATV manufacturers to meet the Phase 2 standards for many of their models using four-stroke engines with air injection, they may also choose to use a combination of several possible emission-control technologies, including base-engine modifications, improved fuel-system calibrations, electronic fuel injection, and catalytic converters. Off-highway motorcycles would continue to meet the 2006 standards described above.

Several ATV manufacturers have expressed concern over being able to meet tighter $HC+NO_X$ standards while still meeting the proposed CO standards. They have asked us to increase or even eliminate the CO standard for Phase 2. Therefore, we request comment on whether the CO standard for Phase 2 should be increased from the proposed level of 25 g/km.

We are proposing to discontinue the provision allowing manufacturers of ATVs the option to certify to the California utility engine test procedure and emission standards for Phase 2 ATVs. We propose to require that manufacturers test all Phase 2 ATVs with the highway motorcycle FTP test procedure. Manufacturers have expressed concerns over the cost of building emission test cells equipped with chassis dynamometers and the representativeness of the FTP relative to in-use ATV operation. They argue that the FTP is no more representative of ATV operation than the steady-state J1088 engine test cycle. While it may be true that the chassis-based FTP test cycle is not fully representative of in-use ATV operation, there is currently very limited data addressing this. California is in the process of gathering in-use operating data for ATVs. Preliminary examination of that data is too inconclusive to determine whether the FTP is adequately representative of in-use ATV operation. It does indicate that the five steady-state modes captured in the J1088 cycle are not adequately representative of ATV operation. It has long been known that ATVs experience considerable transient operation, similar to automobiles and motorcycles. The California data support this view. The chassis-based FTP used for certification of motorcycles, while possibly not ideal for ATVs, therefore appears to be more representative of ATV operation than the J1088 test cycle. With this in mind, we request comment on the possibility of developing an alternate test cycle and procedure for ATVs that would be more representative of typical ATV operation. An alternate test cycle could be chassis-based or engine-based, but would need to incorporate transient operation. If an acceptable alternative cycle is developed, we would reassess whether our proposed emission test procedure for Phase 2 would still be appropriate.

As with the 2006 proposed emission standards, we request comment on the ability of small-displacement ATVs to operate over the FTP test cycle and meet our proposed emission standards.

We request comment on whether a Phase 2 standard for ATVs is appropriate, and on the proposed level of the Phase 2 standard. We also request comment on technology, cost, and safety issues associated with a possible second phase of off-highway motorcycle emission standards.

b. Snowmobiles. We are proposing CO and HC standards for snowmobiles. We are requesting comment on whether we should set standards for PM and NO_X emissions from snowmobiles, and what appropriate levels would be. As previously discussed, snowmobile engines are almost exclusively two-stroke. As such, they emit high levels of HC and PM. However, we are not proposing PM standards at this time for snowmobiles, because limits on HC emissions will serve to simultaneously limit PM. We considered adding a regulatory requirement for manufacturers to measure and report PM emission rates along with their other certification data, but we did not include such a requirement in the proposed regulations. We are most concerned about the cost to manufacturers if they were required to build PM measurement capabilities into all of their test facilities. We request comment on the need for PM emission data, and whether it is necessary to put a requirement in the regulations.

We are not proposing NO_X standards for snowmobiles because they are primarily operated during the winter months when ozone is not a concern. However, we are proposing that manufacturers measure NO_X emission rates and report them in their applications for certification. We believe that this would provide necessary information, but would not be a significant burden for manufacturers. We request comment on this element of the proposal.

2006 Standards. We are proposing standards for snowmobiles to take effect for all models starting in the 2006 model year: 275 g/kW-hr (205 g/hp-hr) for CO and 100 g/kW-hr (75 g/hp-hr) for HC. As discussed below, we are proposing an emission-credit program with these standards. Thus, we expect manufacturers to meet these proposed standards using a variety of technologies and strategies across their product lines. Snowmobiles pose some unique problems for implementing emission-control technologies and strategies. Snowmobiles are very sensitive to weight, power, and packaging constraints. Current snowmobile designs have very high power-to-weight ratios, allowing for excellent performance. Manufacturers have stated that if snowmobile performance declines, customers will either stop purchasing snowmobiles, or will replace original equipment (e.g., emission-control technology) with uncertified aftermarket parts. The desire for low weight is perceived as a safety issue, since operators may have to drag their sleds out of deep snow. Styling, especially very low-profile hoods, has also become paramount among snowmobile enthusiasts. All these concerns mean that it may be initially more difficult for manufacturers to develop a broad range of technologies capable of significant emission reductions. Some manufacturers may aggressively pursue clean carburetion and associated engine modifications and apply those uniformly across their entire product line. Others may choose to apply more advanced technologies such as direct or semi-direct injection to some of their more expensive, high-performance sleds and be less aggressive in pursuing emission reductions from their lower-priced offerings in order to optimize the fit of different technologies (and their associated costs) to the various product offerings. We also expect some manufacturers to offer some models featuring four-stroke engines.

We are proposing to require all snowmobiles to meet the proposed first phase of emission standards beginning with the 2006 model year. We request comment on options to ease the transition to the new standards, as described in Section VI.C.2.b.

Due to the unique performance requirements for snowmobiles, we believe our proposed 2006 standards would be challenging for manufacturers and would result in cleaner snowmobiles. While some advanced technologies such as two-stroke direct injection and four-stroke engines, would be found in some models, many models would still be equipped with two-stroke engines with relatively minor engine modifications resulting in minimum emission reductions, while some models may not even have any emission controls.

2010 Standards. We have had many discussions with manufacturers about emission control technologies. We have also closely examined the certification emission results of outboard boat engines and personal watercraft (PWC) equipped with two-stroke direct injection and four-stroke engines. It is our belief that with sufficient lead time, manufacturers can successfully implement these technologies across a much broader range of their snowmobile fleet. Manufacturers have indicated to us that two-stroke engines equipped with direct fuel injection systems could reduce HC emissions by 70 to 75 percent and reduce CO emissions by 50 to 60 percent. Certification results for 1999 and 2000 model year outboard engines and PWC support the manufacturers projections. In addition, two snowmobile manufacturers plan to sell a four-stroke model next year. These manufacturers indicated that their machines are capable of HC reductions in the 70 to 95 percent range, with CO reductions of 60 to 80 percent. Therefore, we believe that with

sufficient time it is feasible for snowmobile manufacturers to achieve a greater penetration of advanced emission control technologies throughout their fleets and reduce emissions further.

We are, therefore, proposing a second phase of average standards to take effect with the 2010 model year. The proposed 2010 average standards are 200 g/kW-hr (149 g/hp-hr) for CO and 75 g/kW-hr (56 g/hp-hr) for HC. These standards represent a 50% reduction in HC and CO emissions from the current average baseline levels. We believe that implementation in 2010 would provide sufficient time for advanced technologies to be more broadly available. We also believe that manufacturers will have had adequate time to make appropriate modifications to snowmobile designs (e.g., styling and packaging issues) so they can more broadly spread advanced emission-control technologies across their product lines. We expect these standards would be met through the application of direct injection two-stroke technology and, to a much lesser extent, four-stroke technology, to cover about half of overall production, with the remaining models utilizing clean carburetion and electronic fuel injection, along with the associated engine modifications. The actual mix of technologies used would be the manufacturers choice, but the data mentioned above gives us reason to believe that the basic technology exists to meet the standard based on a 50-percent reduction. We believe that the lead time provided to meet these standards is sufficient to overcome the technical hurdles discussed below in Section VI.F.2.

We request comment on our second phase of snowmobile standards. In particular, we are interested in comments on the level of the standards, our technical assessment and potential fleet mix projections, any safety, reliability, or performance considerations associated with adoption of four-stroke technology. We also request comment on the cost of adopting such standards and the effects on sales and consumer satisfaction. We are also interested in further information addressing the benefits associated with such a standard.

c. Noise Standards. The Noise Control Act (42 U.S.C. 4901 *et seq.*) authorizes EPA to establish noise emission standards for motorized equipment. Under this authority, we established noise emission standards for motorcycles and three-wheeled ATVs in 40 CFR Part 205 (45 FR 86708, December 31, 1980). These regulations include voluntary ''Low noise emission product standards'' for motorcycles § CFR 205.152(c)).

Prior to proposal, we received public comments requesting that we consider setting new noise standards for recreational vehicles. Noise from these vehicles in public parks or other public lands can adversely impact other activities. However, at this time we do not have funding to pursue noise standards for nonroad equipment that does not have an existing noise requirement.

2. Are There Opportunities for Averaging, Emission Credits, or Other Flexibilities?

a. Averaging, Banking and Trading. Historically, voluntary emission-credit programs have allowed a manufacturer to certify one or more engine families at emission levels above the applicable emission standards, provided that the increased emissions are offset by one or more engine families certified below the applicable standards. With averaging alone, the average of all emissions for a particular manufacturer's production must be at or below that level of the applicable emission standards. We are proposing separate emission-credit programs for snowmobiles, off-highway motorcycles, and ATVs. We are proposing an emissions credit program for the optional Phase 1 ATV engine-based standards as well as the chassis-based standards. We request comment on whether or not averaging, banking, and trading adds value to the engine-based option considering the level of the standards being proposed.

In addition to the averaging program just described, the proposed emission-credit program contains banking and trading provisions, which allow manufacturers to generate emission credits and bank them for future use in their own averaging program or sell them to another entity. We are not proposing a credit life limit or credit discounting for these credits. Unlimited credit life and no discounting increases the incentive to introduce the clean technologies needed to gain credits. In order to generate credits, the average emissions level must be below the standard, so the credits would be the result of reductions in excess of those required by the standards.

We are seeking comment on whether or not a credit life limit (e.g., three years) is needed to ensure that manufacturers do not have the opportunity to, in effect, postpone the Phase 2 standards for several years for one or more vehicle families. Unlimited credit life has the potential to interfere with the timely and orderly phase-in of future standards, especially if the manufacturer is able to bank large amounts of credits during intervening years. This is a concern here because the proposed level of the Phase 1 standards may provide considerable opportunity for credit generation for manufacturers that can market a significant number of relatively clean models early in the program. For example, some 4-stroke ATV models are likely to have emissions levels below the Phase 1 standards, allowing for considerable credit generation.

We also request comment on how this issue may differ for credits generated under Phase 2, where the affect on the next tier of standard is not a complicating issue. We would have the opportunity to consider and reassess such a provision if and when we were to propose a third phase of standards. In addition, we request comments on an alternative approach of not allowing credits generated in Phase 1 to be used in Phase 2.

For off-highway motorcycles and ATVs, we are proposing to allow averaging for the HC plus NO_X standard. Off-highway motorcycle and ATVs would be averaged separately to avoid providing an advantage in the market to companies that offer both types of products over those that produce only one type. In addition, there are differing degrees of stringency in the standards for ATVs and off-road motorcycles long-term and we do not want off-road motorcycle credits to dilute the effectiveness of the Phase 2 ATV standards. Also, ATVs certified to the chassis-based standards and engine-based standards would be considered separate averaging groups with no credit exchanges between the two. We are not allowing credit exchanges between engine and chassis-based testing because there is little, if any, correlation between the two test cycles. Without a strong correlation, it is not possible to establish an exchange rate between the two programs. We are not proposing a CO averaging, banking, and trading program because the level of the standard does not appear to add substantial technological challenge to the program, especially for Phase 1. The usefulness of CO averaging may not warrant the additional complexity of an averaging program. We request comment on the need for a CO ABT program for Phase 2, and on the proposed approach for separate ABT programs.

For the Phase 2 ATV standards, we are proposing a maximum allowable Family Emission Limit (FEL) of 2.0 g/km HC plus NO_X (the Phase 1 standard). In several other ABT programs, we have

established a cap at the previous emission standard to ensure a minimum level of control long term. We request comment on whether or not an FEL limit is appropriate to ensure a minimum level of control for all models. Please see the discussion on this issue in the recreational marine diesel section of this document for more information. We request comment specifically on how this approach could affect product offerings and consumer choice. We also request comment on the level of the emissions cap and alternative levels.

For snowmobiles, we are proposing an emission-credit program for both CO and HC. We are proposing that maximum allowable Family Emission Limits be set at the current average baseline emission levels of 400 g/kW-hr (300 g/hp-hr) CO and 150 g/kW-hr (110 g/hp-hr) HC. This cap ensure a minimum level of control for each snowmobile certified under the program. We believe that this is appropriate due to the potential for personal exposure to very high levels of emissions as well as the potential for high levels of emissions in areas where several snowmobiles are operated in a group. We request comment on the level of the cap for Phase 1. We also request comment on whether it would be appropriate to set more stringent maximum allowable Family Emission Limits for 2010 and later model year snowmobiles, for example, at the levels of the 2006 standards. We are interested in comment on any potential impacts a more stringent cap may have on the variety of products available to the consumer. We are proposing that manufacturers may not both generate and use credits for the different pollutants within a given engine family.

We request comment on all aspect of the proposed ABT program, including on the administrative and liability provisions provided in the proposed regulatory text.

b. Early Credits and Alternative Phase-in Schedule. We are interested in but are not specifically proposing opportunities for early credits, and other flexibilities, as discussed below. We are proposing no phase-in schedule for snowmobiles and a two-year phase-in schedule for off-road motorcycles and ATVs. While we believe adequate lead-time is provided to meet the proposed standards, we recognize that some flexibility in timing could help manufacturers transition their full product line to new standards. We are requesting comment on three specific approaches to providing additional flexibility to manufacturers, described below. We are interested in how these provisions could be established in a way that would be environmentally neutral and yet also provide manufacturers with flexibility.

We are not proposing provisions for early generation of credits, because we have not been able to resolve our concerns about substantial windfall credits (credits generated relatively easily from baseline engines). For example, there could be substantial credits available for snowmobile manufacturers that have developed four-stroke snowmobile models. Also, some baseline ATV and off-highway motorcycles could also have relatively low emission levels. However, as discussed below, we are seeking comment on approaches for early credits that could address concerns regarding windfall credits.

Under an early emission-credit approach, manufacturers could earn credits by reducing emissions earlier than required, then use those credits after the program begins. Because there is a wide variation in baseline emission levels, we would need to consider taking steps to ensure that manufacturers do not generate windfall credits. One way to address the concern for windfall credits would be to allow credits only for emission reductions below the proposed standards and limit the life of those credits to three years. We believe this approach may ensure that manufacturers would generate credits only through the use of cleaner technologies. It also ensures that the credits would not adversely impact the long-term effectiveness of the program. This approach would provide incentive for manufacturers to pull ahead significantly cleaner technologies. We request comment on early credits for CO and HC emissions for snowmobiles and $HC+NO_X$ emissions for off-road motorcycles and ATVs, and a requirement that the credit-generating engines also meet the standards for the other regulated pollutants.

Under the second approach, an alternative phase-in schedule, manufacturers would be provided with a one-for-one credit in the phase-in schedule for selling complying recreational vehicles prior to the start of the program. Manufacturers who pull ahead a percentage of their product line would get a phase-in credit to be used during the initial years of the program (i.e., 2008 and earlier). For example, if a snowmobile manufacturer phased in 10 percent of their product line early in 2005, they could then phase-in 90 percent, rather than 100 percent, of their product line in 2006. We would expect this to be a transitional provision limited to the first few years of the program (all vehicles would need to be certified by 2008). We could implement the program through a calculation based on the sum of the phase-in percentages over a series of model years. For example, for snowmobiles, the sum of the phase-in percentages over model years 2004–2008 could be required to be equal to or greater than 300% (100% each for 2006, 2007, and 2008). For off-road motorcycles and ATVs, the calculation would take into account the 50/100 percent phase-in schedule for 2006/2007, with a requirement that the sum of the phase-in be equal to or greater than 250 percent. For example, an alternative phase-in schedule of 25/50/75/100 percent in 2005 through 2008 would be acceptable. The calculation of the percentage phase-in would be the same as that for the standard program.

An alternative to early banking or a revised phase-in would be ''family-banking.'' Under the ''family-banking'' concept, we would allow manufacturers to certify an engine family early. For each year of certifying an engine family early, the manufacturer would be able to delay certification of a smaller engine family by one year. This would be based on the actual sales of the early family and the projected sales volumes of the late family; this would require no calculation or accounting of emission credits.

We request comment on the above approaches or any other approach that would help manufacturers bring the product lines into compliance to the proposed standards without compromising emissions reductions (see § 1048.145 of the proposed regulations). We request comment on the merits of the various approaches noted above, and others commenter may wish to suggest. We request that commenters provide detailed comments on how the approaches should be set up, enhanced, or constrained to ensure that they serve their purpose without diminishing the overall effectiveness of the standards.

3. Is EPA Proposing Voluntary Low-Emission Standards for These Engines?

We are proposing a Voluntary Low-Emission Standards program for recreational vehicles. The purpose of this program is two-fold; first, to encourage new emission-control technology and second, to aid the consumer in choosing clean technologies. At the point of purchase, manufacturers could add a tag designating qualifying vehicles to inform consumers which engines are certified by this program and listing the certification levels of the vehicles. In addition, we are suggesting that manufacturers provide information about the program in the vehicle

Owner's Manual. To qualify for this program, engines must meet the voluntary standards described below. Manufacturers choosing to sell engines with this designation may generate certification emission credits from these technologies.

The general purpose of the Voluntary Low-Emission Standards program is to provide incentives to manufacturers to produce clean products and thus create market choices for consumers to purchase these products.[154] We believe that EPA designation of clean technologies through this voluntary program can provide useful information to consumers. We request comment on the merits and design of the program and also on additional measures we can take to encourage this program and prohibit misuse.

We are proposing Voluntary Low-Emission Standards for off-highway motorcycles and ATVs of 0.8 g/km (1.3 g/mi) HC+NO_X and 12 g/km (24.3 g/mi) CO. These emission levels are consistent with the 2008 standards proposed by California ARB for highway motorcycles. We believe that off-highway motorcycles and ATVs could meet these voluntary standards by employing some of the same technologies manufacturers will use to meet the 2008 California emission standards for highway motorcycles. We request comment on the level of the standards and the need for lower voluntary standards for Phase 2 of the ATV program.

We are proposing Voluntary Low Emission Standards for snowmobiles of 200 g/kW-hr (149 g/hp-hr) for CO and 75 g/kW-hr (56 g/hp-hr) for HC through 2009 model year snowmobiles. These are the same levels as our proposed phase 2 standards. For the 2010 model year and later, the standards are 120 g/kW-hr (89 g/hp-hr) for CO and 45 g/kW-hr (34 g/hp-hr) for HC for any snowmobiles. We believe these voluntary standards could be met with either direct injection two-stroke, or four-stroke technology. Snowmobiles included in this program may generate credits for use in the proposed emission-credit program. We request comment on the level of the voluntary standards being proposed and whether we should consider more or less stringent voluntary standards for snowmobiles.

[154] The snowmobile industry (see docket item II–G–221) and a group of public health and environmental organizations (see docket item II–G–139) have both expressed their general support for labeling programs that can provide information on the environmental performance of various products to consumers.

4. What Durability Provisions Apply?

We are proposing several additional provisions to ensure that emission controls would be effective throughout the life of the vehicle. This section discusses these proposed provisions for recreational vehicles. More general certification and compliance provision, which would apply across the different vehicle categories in this proposal, are discussed in Sections III and VII, respectively.

a. How long would my engine have to comply? We propose to require manufacturers to produce off-highway motorcycle and ATV engines that comply over their full useful life, where useful life is the period that lasts either 5 years or until the vehicle accumulates 30,000 kilometers, whichever occurs first. We would consider this 30,000-kilometer value to be a minimum kilometer value for useful life, and would require manufacturers to comply for a longer period in those cases where they design their vehicles to be operated longer than 30,000 kilometers.

For snowmobiles, we are proposing a minimum useful life of 5 years or 300 hours of operation, whichever occurs first. We based these values on discussions with manufacturers regarding typical snowmobile life, and on emission-modeling data regarding typical snowmobile usage rates.[155]

We request comment on the proposed useful life values. Any comments in support of a different useful life should include documentation of typical life and operation.

b. Would I have to warrant my engine's emission controls? We are proposing a design/defect warranty period of 3 years, with an hours or kilometers limit equal to half the useful life interval proposed above. During this time manufacturers would repair or replace free of charge emission-related components that fail. Because this warranty requirement applies only for emission-related components, manufacturers are not responsible for routine maintenance that is currently performed for uncontrolled engines (e.g., changing oil filters or carburetors).

c. How would I demonstrate emission durability during certification? For off-highway motorcycles and ATVs, we are proposing the same durability demonstration requirements that apply to highway motorcycles. This includes a requirement to run the engines long enough to test for exhaust emissions at the end of the useful life. This allows manufacturers to generate a deterioration factor that helps ensure that the engines will continue to control emissions over a lifetime of operation.

d. What maintenance would be allowed during service accumulation? For vehicles certified to the proposed useful life, no emission-related maintenance would be allowed during service accumulation. The only maintenance that would be allowed is regularly scheduled maintenance unrelated to emissions that is technologically necessary. This could typically include changing engine oil, oil filter, fuel filter, and air filter.

5. Do These Standards Apply to Alternative-Fueled Engines?

These proposed standards apply to all spark-ignited recreational vehicles, without regard to the type of fuel used. However, because we are not aware of any alternative-fueled recreational vehicles sold into the U.S. market, we are not proposing extensive special provisions to address them at this time.

6. Is EPA Controlling Crankcase Emissions?

We are proposing to require that new off-highway motorcycles and ATVs be built to prevent crankcase emissions. This means that engines would no longer emit crankcase vapors directly to the atmosphere. The typical control strategy is to route the crankcase vapors back to the engine intake. This proposal is consistent with our previous regulation of crankcase emissions from such diverse sources as highway motorcycles, outboard and personal watercraft marine engines, locomotives, and passenger cars. We have data from California ARB showing that a performance-based four-stroke off-highway motorcycle experienced considerably higher tailpipe emission results when crankcase emissions were routed back into the intake of the engine, illustrating the potentially high levels of crankcase emissions that exist.[156] We are also proposing closed crankcases on new snowmobiles. This requirement is only relevant for four-stroke snowmobiles, however, since two-stroke engines, by virtue of their operation, have closed crankcases. Information on the costs and benefits of this action can be found in the Draft Regulatory Support Document.

D. Proposed Testing Requirements

1. What Duty Cycles Are Used To Measure Emissions?

Testing a vehicle or engine for emissions consists of exercising it over

[155] EPA memorandum, ''Emission Modeling for Recreational Vehicles,'' from Linc Wehrly to Docket A–98–01, November 13, 2000.

[156] Memo to Docket from Linc Wehrly, dated September 10, 2001. (A–2000–1) document II–B–25.

a prescribed duty cycle of speeds and loads, typically using a chassis or engine dynamometer. The nature of the duty cycle used for determining compliance with emission standards during the certification process is critical in evaluating the likely emission performance of engines designed to those standards. Duty cycles must be relatively comparable to the way equipment is actually used because if they are not, then compliance with emission standards would not assure that emissions from the equipment are actually being reduced in use as intended.

a. Off-highway Motorcycles and ATVs. For off-highway motorcycles and ATVs, we propose that the current highway motorcycle test procedure be used for measuring emissions. The highway motorcycle test procedure is the same test procedure as used for light-duty vehicles (i.e., passenger cars and trucks) and is referred to as the Federal Test Procedure (FTP). The FTP for a particular class of engine or equipment is actually the aggregate of all of the emission tests that the engine or equipment must meet to be certified. However, the term FTP has also been used traditionally to refer to the exhaust emission test based on the Urban Dynamometer Driving Schedule (UDDS), also referred to as the LA4 (Los Angeles Driving Cycle #4). The UDDS is a chassis dynamometer driving cycle that consists of numerous ''hills'' which represent a driving event. Each hill includes accelerations, steady-state operation, and decelerations. There is an idle between each hill. The FTP consists of a cold start UDDS, a 10 minute soak, and a hot start. The emissions from these three separate events are collected into three unique bags. Each bag represents one of the events. Bag 1 represents cold transient operation, bag 2 represents cold stabilized operation, and bag 3 represents hot transient operation.

Highway motorcycles are divided into three classes based on engine displacement, with Class I (50 to 169 cc) being the smallest and Class III (280 cc and over) being the largest. The highway motorcycle regulations allow Class I motorcycles to be tested on a less severe UDDS cycle than the Class II and III motorcycles. This is accomplished by reducing the acceleration and deceleration rates on some of the more aggressive ''hills.'' We propose that this same class/cycle distinction be allowed for off-highway motorcycles and ATVs. In other words, off-highway motorcycles and ATVs with an engine displacement between at or below 169 cc would be tested over the FTP test cycle for Class I highway motorcycles. Off-highway motorcycles and ATVs with engine displacements greater than 169 cc would be tested over the FTP test cycle for Class II and Class III highway motorcycles. Some manufacturers have expressed concern over the ability of some small-displacement (e.g., less than 80 cc) youth off-highway motorcycles and ATVs to operate over the FTP. We request comment on the ability of these small-displacement vehicles to operate over the FTP test cycle. We also request comment on whether or not it would be appropriate to allow all ATVs to be certified using the Class I cycle.

Some manufacturers have noted that they do not currently have chassis-based test facilities capable of testing ATVs. Manufacturers have noted that requiring chassis-based testing for ATVs would require them to invest in additional testing facilities that can handle ATVs, since ATVs do not fit on the same roller(s) as motorcycles used in chassis testing. Some manufacturers also have stated that low-pressure tires on ATVs would not stand up to the rigors of a chassis dynamometer test. California provides manufacturers with the option of certifying ATVs using the engine-based, utility engine test procedure (SAE J1088), and most manufacturers use this option for certifying their ATVs. Manufacturers have facilities to chassis-test motorcycles and therefore California does not provide an engine-testing certification option for motorcycles.

We have tested numerous ATVs over the FTP and have found that several methods can be used to test ATVs on chassis dynamometers. The most practical method for testing an ATV on a motorcycle dynamometer is to disconnect one of the drive wheels and test with only one drive wheel in contact with the dynamometer. For chassis dynamometers set up to test light-duty vehicles, wheel spacers or a wide axle can be utilized to make sure the drive wheels fit the width of the dynamometer. We have found that the low-pressure tires have withstood dynamometer testing without any problems.

We acknowledge that a chassis dynamometer could be very costly to purchase and difficult to put in place in the short run, especially for smaller manufacturers. Therefore, we are proposing that for the model years 2006 through 2009, ATV manufacturers would be allowed the option to certify using the J1088 engine test cycle per the California off-highway motorcycle and ATV program. After 2009, this option would end and the FTP would be the required test cycle. If an alternate transient test cycle (engine or chassis) correlates with the FTP or better represents in-use ATV operation, we would consider allowing manufacturers to use the alternative test cycle in place of the FTP.

b. Snowmobiles. We are proposing to adopt the snowmobile duty cycle developed by Southwest Research Institute (SwRI) in cooperation with the International Snowmobile Manufacturers Association (ISMA) for all snowmobile emission testing.[157] The test procedure consists of two main parts; the duty cycle that the snowmobile engine would operate over during testing and other testing protocols surrounding the measurement of emissions (sampling and analytical equipment, specification of test fuel, atmospheric conditions for testing, etc.). While the duty cycle we are proposing was developed specifically to reflect snowmobile operation, many of the testing protocols are well established in other EPA emission-control programs and have been simply adapted where appropriate for snowmobiles.

The snowmobile duty cycle was developed by instrumenting several snowmobiles and operating them in the field in a variety of typical riding styles, including aggressive (trail), moderate (trail), double (trail with operator and one passenger), freestyle (off-trail), and lake driving. A statistical analysis of the collected data produced the five mode steady-state test cycle is shown in Table VI.D–1.

TABLE VI.D–1.—PROPOSED SNOWMOBILE ENGINE TEST CYCLE

Mode	1	2	3	4	5
Normalized Speed	1	0.85	0.75	0.65	Idle
Normalized Torque	1	0.51	0.33	0.19	0

[157] ''Development and Validation of a Snowmobile Engine Emission Test Procedure,'' Jeff J. White, Southwest Research Institute and Christopher W. Wright, Arctic Cat, Inc., Society of Automotive Engineers paper 982017, September, 1998. (A–2000–1) document II–D–05.

TABLE VI.D–1.—PROPOSED SNOWMOBILE ENGINE TEST CYCLE—Continued

Mode	1	2	3	4	5
Relative Weighting (%)	12	27	25	31	5

We believe this duty cycle is representative of typical snowmobile operation and is therefore appropriate for demonstrating compliance with the proposed snowmobile emission standards. We request comment on this proposed duty cycle, and on any alternatives that we should consider.

The other proposed testing protocols are largely derived from our regulations for marine outboard and personal watercraft engines, as recommended in the SwRI/ISMA test cycle development work (61 FR 52088, October 4, 1996). The testing equipment and procedures from that regulation are generally appropriate for snowmobiles. Unlike snowmobiles, however, the marine engines tend to operate in fairly warm ambient temperatures. Thus, some provision needs to be made in the snowmobile test procedure to account for the colder ambient temperatures typical of snowmobile operation. Since snowmobile carburetors are jetted for specific ambient temperatures and pressures, we could take one of two general approaches. The first is to require testing at ambient temperatures typical of snowmobile operation, with appropriate jetting. A variation of this option is to simply require that the engine inlet air temperature be representative of typical snowmobile operation, without requiring that the entire test cell be at that temperature. The second is to allow testing at higher temperatures than typically experienced during snowmobile operation, with jetting appropriate to the warmer ambient temperatures.

We are proposing that snowmobile engine inlet air temperature be between −15° C and −5° C (5° F and 23° F), but that the ambient temperature in the test cell not be required to be refrigerated. We believe this approach strikes an appropriate balance between the need to test at conditions that are representative of actual use, and the fact that simply cooling the inlet air would be significantly less costly than requiring a complete cold test cell.

We request comment on whether we should allow snowmobile engine testing to be done according to the test procedures developed by Southwest Research Institute. Under those procedures testing is done at warmer ambient temperatures than typical of snowmobile operation. Appropriate jetting under this approach is determined by extrapolating from the manufacturer's jet chart (if necessary).

We invite comment on all aspects of the proposed test procedures.

2. What Fuels Will Be Used During Emission Testing?

We are proposing to use the same fuel specifications for all recreational vehicles as we currently use for highway motorcycles and light-duty vehicles, which is representative of a summertime blend. We believe that off-highway motorcycles and ATVs use the same fuel as highway motorcycles. While snowmobiles typically operate during wintertime, we believe it is appropriate to use summertime gasoline for testing, primarily because it is the fuel that was used for the snowmobile emission testing that supported the development of our baseline emission estimates. Also, the majority of snowmobile HC emissions are a result of scavenging losses (unburned fuel from the intake charge exiting the combustion chamber with the exhaust gases). The primary difference between summertime and wintertime gasoline blends is the volatility, which is not likely to have a significant effect on scavenging losses. However, given that snowmobiles typically operate during wintertime, we request comment on whether we should consider a unique test fuel specifically for snowmobiles, and what specifications might be appropriate for such a fuel. Also, if we were to consider a unique snowmobile test fuel based on wintertime gasoline properties, should the proposed standards be adjusted in any way to account for the fact that the baseline emission estimates were developed from test data utilizing summertime blends.

3. Are There Production-Line Testing Provisions for These Engines?

We are proposing that recreational vehicle or engine manufacturers perform emission tests on a small percentage of their production as it leaves the assembly line to ensure that production vehicles operate at certified emission levels. The broad outline of this program is discussed in Section III.C.4 above. We are proposing that production-line testing be performed using the same test procedures as for certification testing. We request comment on all aspects of the proposed production-line testing requirements, including engine sampling rates and options for using alternative testing methods.

E. Special Compliance Provisions

As described in Section XI.B, the report of the Small Business Advocacy Review Panel addresses the concerns of small-volume manufacturers of recreational vehicles.

Off-Highway Motorcycles and ATVs

To identify representatives of small businesses for this process, we used the definitions provided by the Small Business Administration for motorcycles, ATVs, and snowmobiles (fewer than 500 employees). Eleven small businesses agreed to serve as small-entity representatives. These companies represented a cross-section of off-highway motorcycle, ATV, and snowmobile manufacturers, as well as importers of off-highway motorcycles and ATVs.

As discussed above, our proposed emission standards for off-highway motorcycles and ATVs will likely necessitate the use of 4-stroke engines. Most small-volume off-highway motorcycle and ATV importers—and to a lesser degree, small-volume manufacturers—currently use 2-stroke engines. While 4-stroke engines are in widespread use in motorcycles and ATVs in general, their adoption by any manufacturer is still a significant business challenge. Small manufacturers of these engines could face additional challenges in certifying engines to emission standards, because the cost of certification would be spread over the relatively few engines they produce. These higher per-unit costs could place small manufacturers at a competitive disadvantage without specific provisions to address this burden.

We are proposing to apply the flexibilities described below to engines produced or imported by small entities with combined off-highway motorcycle and ATV annual sales of fewer than 5,000 units. The SBAR Panel recommended these provisions to address the potentially significant adverse effects on small entities of an emission standard that will likely result in the use of four-stroke engines. The 5,000-unit threshold is intended to focus these flexibilities on those segments of the market where the need

is likely to be greatest and to ensure that the flexibilities do not result in significant adverse environmental effects during the period of additional lead-time recommended below.[158] We request comment on the appropriateness of the 5,000-unit threshold. In addition, we propose to limit use of some or all of these flexibilities to entities that are in existence or have product sales at the time of proposal to avoid creating arbitrary opportunities in the import sector, and to guard against the possibility of corporate reorganization, entry into the market, or other action for the sole purpose of circumventing emission standards. We request comment on any such restrictions.

We also request comment on allowing small entities with sales in excess of 5,000 units to certify using the flexible approaches described below for several engines equal to their 2000 or 2001 sales level. This would assure that all small entities currently in the market would be able to take advantage of these approaches. In addition, we request comment on when small entities must notify EPA that they intend to use the small-entity flexibilities.

During the Panel's outreach meeting with small entities on issues related to recreational ATVs and off-road motorcycles, small entities expressed particular concern that a federal emission standard requiring manufacturers to switch to four-stroke engines might increase costs to the point that many small importers and manufacturers could experience significant adverse effects. As noted above, the Panel recommendations are designed to reduce the burden on small entities without compromising the environmental benefits of the program. However, it is possible that even with the broad flexibility under consideration, costs to small entities may still be too high. Also, they may not be able to recover costs without losing much or all of their business. We seek comment on the effect of the proposed standard on small entities, including any data or related studies to estimate the extent to which sales of their products are likely to be reduced as a result of changes in product price resulting from the proposed standards, more specifically from the conversion of two-stroke technology to four-stroke technology. Additionally, we seek comment on any differences in costs between small and large manufacturers. We plan to assess information received in response to this request to inform the final rule decision-making process on whether additional flexibility (beyond that proposed below) is warranted.

Snowmobiles

There are only a few small snowmobile manufacturers and they sell only a few hundred engines a year, which represents less than 0.5 percent of total annual production. Therefore, the per-unit cost of regulation could be significantly higher for these small entities because they produce very low volumes. Additionally, these companies do not have the design and engineering resources to tackle compliance with emission standard requirements at the same time as large manufacturers and tend to have limited ability to invest the capital necessary to conduct emission testing related to research, development, and certification. Finally, the requirements of the snowmobile program may be infeasible or highly impractical because some small-volume manufacturers may have typically produced engines with unique designs or calibrations to serve niche markets (such as mountain riding). Our proposed snowmobile emission standards could impose significant economic hardship on these few manufacturers whose market presence is small. We therefore believe significant flexibility is necessary and appropriate for this category of small entities, as described below.

Flexibilities

1. Additional Lead Time

We believe additional lead-time would be a way of reducing the burden to meet the proposed standards. This would provide extra time for technology to develop and, in the case of importers, extra time to resolve supplier issues that may arise. We propose a delay of two years beyond the date larger businesses would be required to comply. For ATVs and snowmobiles, the two-year delay would also apply to the timing of the proposed Phase 2 standards.

In addition, for small snowmobile manufacturers, we propose that the emission standards be phased in over an additional two years at a rate of 50 percent, then 100 percent. Phase 1 would be phased in at 50/50/100 percent in 2008/2009/2010 and Phase 2 would be phased in 50/50/100 percent in 2012/2013/2014. We seek comment on whether a longer time period is appropriate given the costs of compliance for small businesses and the relationship between importers and their suppliers.

2. Design-Based Certification

The process of certification is a business cost and lead time issue that may place a disproportionate burden on small entities, particularly importers. Certification is a fixed cost of doing business, which is potentially more burdensome on a unit-cost basis for small entities. It is potentially an even greater challenge, since some small entities will either contract emission testing to other parties or, in the case of importers, perhaps rely on off-shore manufacturers to develop and certify imported engines.

We propose to permit small-volume manufacturers to use design-based certification, which would allow us to issue a certificate to a small business for the emission-performance standard based on a demonstration that engines or vehicles meet design criteria rather than by emission testing. The intent is to demonstrate that an engine using a design similar to or superior than that being used by larger manufacturers to meet the proposed emission standards would ensure compliance with the proposed standards. The demonstration would be based in part on emission test data from engines of a similar design. Under a design-based certification program, a manufacturer would provide evidence in the application for certification that an engine or vehicle would meet the applicable standards for its useful life based on its design (e.g., the use a four-stroke engine, advanced fuel injection, or any other particular technology or calibration). The design criteria could include specifications for engine type, calibrations (spark timing, air/fuel ratio, etc.), and other emission-critical features, including, if appropriate, catalysts (size, efficiency, precious metal loading). Manufacturers would submit adequate engineering and other information about their individual designs showing that they meet emission standards for the useful life. We request comment on how these provisions should be implemented. We also seek comment on whether we should allow large manufacturers to use similar provisions on a limited basis.

3. Broaden Engine Families

We propose an approach that would allow for relaxed criteria for what constitutes an engine or vehicle family. It would allow small businesses to put all their models into one vehicle or engine family (or more) for certification purposes if appropriate. Manufacturers would then certify their engines using the ''worst-case'' configuration within the family.

[158] For example, importers may have access to large supplies of vehicles from major overseas manufacturers and potentially could substantially increase their market share by selling less expensive noncomplying products.

A small manufacturer might need to conduct certification emission testing rather than pursuing design-based certification. Such a manufacturer would likely find broadened engine families useful.

4. Production-Line Testing Waiver

As discussed above, we are proposing to require manufacturers to test a small sampling of production engines to ensure that production engines meet emission standards. We propose to waive production-line testing for small entities and request comment on whether limits for this waiver would be appropriate. This would eliminate or substantially limit production-line testing requirements for small businesses. It could be limited to engine/vehicle families under a given production volume or could be applied broadly to small businesses. This is likely to be important to small businesses, many of which do not have testing facilities on-site and would rely on outside contractors for testing.

5. Use of Assigned Deterioration Factors for Certification

We propose to provide small entities with the option of using assigned deterioration factors. Rather than performing a durability demonstration for each family for certification, manufacturers would elect to use deterioration factors determined by us to demonstrate emission levels at the end of the useful life, thus reducing the development and testing burden. This could be a very useful and cost-beneficial option for a small manufacturer opting to perform certification emission testing instead of design-based certification.

6. Using Emission Standards and Certification From Other EPA Programs

A wide array of engines that have been certified to other EPA programs could be used in recreational vehicles. For example, there is a large variety of engines certified to EPA lawn and garden standards (Small SI). We propose to allow manufacturers of recreational vehicles to use engines certified to any other EPA standards for five years. Under this approach, engines certified to the Small SI standards could be used in recreational vehicles, and such engines would be subject to the Small SI standards and related provisions rather than the Recreational Vehicle program. The small business using the engine would not have to recertify the engine, provided the manufacturer does not alter the engine in such a way as to cause it to exceed the emission standards it was originally certified as meeting. Also, the recreational vehicle application may not be the primary intended application for the engine. We request comment on which of the already established standards and programs would be a useful certification option for small businesses.

Additionally, a certified snowmobile engine produced by a large snowmobile manufacturer could be used by a small snowmobile manufacturer, provided the small manufacturer did not alter the engine in such a way as to cause it to exceed the snowmobile emission standards. This would provide a reasonable degree of emission control provided all other elements of the program were met. For example, if the only change a manufacturer were to make to the certified engine was to replace the stock Y-pipes and exhaust pipes with pipes of similar configuration or the stock muffler and air intake box with a muffler and air box of similar air flow, the engine could, subject to our review, still be eligible for this flexibility option. The manufacturer could also change the carburetor to have a leaner air/fuel ratio without losing eligibility. We believe that the manufacturer in such cases could establish a reasonable basis for knowing that emissions performance is not negatively affected be the changes. However, if the manufacturer were to change the bore or stroke of the engine, the engine would no longer qualify, as emissions could increase. We propose to allow the above approach for small snowmobile manufacturers.

7. Averaging, Banking, and Trading

For the overall program, we are proposing corporate-average emission standards with opportunities for banking and trading of emission credits. We would expect the averaging provisions to be most helpful to manufacturers with broad product lines. Small manufacturers and small importers with only a few models might not have as much opportunity to take advantage of these flexibilities. However, we received comment from one small manufacturer supporting these types of provisions as a critical component of the program. We request comment on how the provisions could be enhanced for small business to make them more useful.

8. Hardship Provisions

We are proposing provisions to address hardship circumstances, as described in Section VII.C.

9. Unique Snowmobile Engines

Even with the broad flexibilities described above, there may be a situation where a small snowmobile manufacturer cannot comply. Therefore, we propose an additional provision to allow a small snowmobile manufacturer to petition us for relaxed standards for one or more engine families. The manufacturer would have to justify that the engine has unique design, calibration, or operating characteristics that make it atypical and infeasible or highly impractical to meet the emission-reduction requirements, considering technology, cost, and other factors. At our discretion, we would then set an alternative standard at a level between the prescribed standard and the baseline level. Such a standard would be intended to apply until the engine family is retired, or modified in such a way as to increase emissions. These engines would be excluded from the averaging calculation. We seek comment on allowing this provision for up to 300 engines per year per manufacturer, which would ensure that it is sufficiently available for those manufacturers needing it most.

We seek comment on initial and deadline dates for submitting these petitions. While any relief would be enacted for the first year standards apply, there may be value to getting feedback early. It would seem reasonable that the first date for submittals would be during the first year of requirements for large manufacturers. The deadline for submittals might be at some time during the last year of the small-business delay.

F. Technological Feasibility of the Standards

1. Off-Highway Motorcycles and ATVs

We believe the proposed standards are technologically feasible given the availability of emission-control technologies in the context of the proposed program, as described below.

a. What are the baseline technologies and emission levels? As discussed earlier, off-highway motorcycles and ATVs are equipped with relatively small (48 to 650 cc) high-performance two- or four-stroke single cylinder engines that are either air- or liquid-cooled.[159] Since these vehicles are unregulated outside of the state of California, the main emphasis of engine design is on performance, durability, and cost and thus they generally have no emission controls. The fuel systems used on these engines are almost exclusively carburetors. Two-stroke engines

[159] The engines are small relative to automotive engines. For example, automotive engines typically range from one liter to well over five liters in displacement, whereas off-highway motorcycles would range from 0.05 liters to 0.65 liters.

lubricate the piston and crankshaft by mixing oil with the air and fuel mixture. This is accomplished by most contemporary 2-stroke engines with a pump that sends two-cycle oil from a separate oil reserve to the carburetor where it is mixed with the air and fuel mixture. Some less expensive two-stroke engines require that the oil be mixed with the gasoline in the fuel tank. Four-stroke engines inject oil via a pump throughout the engine as the means of lubrication. With the exception of those vehicles certified in California, most of these engines are unregulated and thus have no emission controls. For performance and durability reasons, off-highway motorcycle and ATV engines all tend to operate with a ''rich'' air and fuel mixture. That is, they operate with excess fuel, which enhances performance and allows engine cooling to promote longer engine life. However, rich operation results in high levels of HC, CO, and PM emissions. Also, two-stroke engines tend to have high scavenging losses, where up to a third of the unburned air and fuel mixture goes out of the exhaust resulting in high levels of HC emissions.

b. What technology approaches are available to control emissions? Several approaches are available to control emissions from off-highway motorcycles and ATVs. The simplest approach would consist of modifications to the base engine, fuel system, cooling system, and recalibration of the air and fuel mixture. These could, for example, consist of changes to valve timing for four-stroke engines, changing from air- to liquid-cooling, and the use of advanced carburetion techniques or electronic fuel injection in lieu of traditional carburetion systems. Other approaches could include the use of secondary air injected into the exhaust, an oxidation or three-way catalyst, or a combination of secondary air and a catalyst. The engine technology that may have the most potential for maximizing emission reductions from two-stroke engines is the use of direct fuel injection. Direct fuel injection is able to reduce or even eliminate scavenging losses by pumping only air through the engine and then injecting fuel into the combustion chamber after the intake and exhaust ports have closed. The use of oxidation catalysts in conjunction with direct injection could potentially reduce emissions even further. Finally, conversion of two-stroke engine technology to four-stroke engine technology would significantly reduce HC emissions.

None of these technologies should have any negative noise, safety, or energy impacts. Fuel injection can improve the combustion process which can result in lower engine noise. The vast majority of four-stroke engines used in off-highway motorcycles and ATVs are considerably quieter than their two-stroke counterparts. Fuel injection has no impact on safety and four-stroke engines often have a more ''forgiving'' power band which means the typical operator may find the performance of the machine to be more reasonable and safe. The use of fuel injection, the enleanment of the air and fuel mixture and the use of four-stroke technology all can result in significant reductions in fuel consumption.

c. What technologies are most likely to be used to meet the proposed standards? 2006 Standards. Four-Stroke Engines. We believe off-highway motorcycles and ATVs utilizing four-stroke engines will need only to make some minor calibration changes and improvements to the carburetor to meet our proposed emission standards for the 2006 model year. The calibration changes will most likely consist of reducing the amount of fuel in the air/fuel mixture. This is commonly referred to as enleaning the air/fuel ratio. Although four-stroke engines produce considerably lower levels of HC than two-stroke engines, the four-stroke engines used in off-highway motorcycles and ATVs all tend to be calibrated to operate with a rich air/fuel ratio for performance and durability benefits. This rich operation results in high levels of CO, since CO is formed in the engine when there is a lack of oxygen to complete combustion. We believe that many of these engines are calibrated to operate richer than needed, because they have either never had to consider emissions when optimizing air/fuel ratio or those that are certified to the California standards can operate richer because the California ATV CO standards are fairly lenient. Thus, we do not believe the standards will significantly reduce the performance or durability of these engines. Carburetion improvements could include increased carburetor tolerances, which would ensure more precise flow of fuel and air resulting in better fuel atomization (i.e., smaller fuel droplets), better combustion and less emissions.

Since our proposed emission standards are for HC+NO_X, as well as for CO, manufacturers will have to use an emission-control strategy or technology that doesn't cause NO_X emissions to increase disproportionately. However, since all of these vehicles operate with rich air/fuel ratios, as discussed above, NO_X levels from these engines are generally low and strategies designed to focus on HC reduction should allow manufacturers to meet our proposed standards without significantly increasing NO_X levels.

Two-Stroke Engines. Off-highway motorcycles and ATVs using two-stroke engines will present a greater challenge for compliance with the proposed standards. We believe it is possible for a two-stroke engine equipped with direct injection and an oxidation catalyst to meet our proposed standards. However, there are several issues associated with direct injection, such as system durability and the need for high electrical system output, that need to be resolved before it can be successfully integrated into off-highway motorcycle and ATV applications by the 2006 model year. For example, there is concern over how durable a direct injection system would be when exposed to harsh environmental conditions such as water, mud, rocks and sand, to name a few. The typical electrical system on a two-stroke off-highway motorcycle and ATV uses a magneto system which produces between 250 and 300 watts of electrical power. A typical direct injection system needs up to 1,000 watts of electrical power, meaning a traditional low-cost magneto system would be insufficient and possibly have to be replaced with an expensive and cumbersome alternator, similar to what is used on automobiles. For these reasons, and because of the potential complexities and cost of a direct injection system, we anticipate that most manufacturers would chose to convert models using two-stroke engines to four-stroke engines. Most manufacturers have experience with four-stroke engine technology and currently have several models powered by four-stroke engines. This is especially true in the ATV market where four-stroke engines account for 80 percent of sales. Because four-stroke engines have been so prevalent over the last 10 years in the off-highway motorcycle and ATV industry, manufacturers have developed a high level of confidence in four-stroke technology and its application. In addition to converting to four-stroke technology, manufacturers will also most likely have to make some minor calibration and carburetion improvements to meet the proposed 2006 emission standards.

2009 Standards. As discussed above, the proposed 2009 standards are proposed to apply only to ATVs. To meet these standards, we believe manufacturers will need to use four-stroke engines with further advancements in carburetor calibrations and improved tolerances or possibly

even switch to electronic fuel injection for some models. There is currently one manufacturer who uses electronic fuel injection in their off-highway motorcycles and ATVs. The technologies most likely to be used to meet these standards are secondary air and/or an oxidation catalytic converter.

Secondary air has been used by passenger cars and highway motorcycles for many years as a means to help control HC and CO. The hot exhaust gases coming from the combustion chamber contain significant levels of unburned HC and CO. If sufficient oxygen is present, these gases will continue to react in the exhaust system, reducing the amount of pollution emitted into the atmosphere. To assure that sufficient oxygen is present in the exhaust, air is injected into the exhaust system. For off-highway motorcycles and ATVs, the additional air can be injected into the exhaust manifold using a series of check valves which use the normal pressure pulsations in the exhaust manifold to draw air from outside. We have tested several four-stroke ATVs with secondary air injected into the exhaust manifold and found that the HC and CO emission levels were at or below our proposed 2009 standards (further details of our secondary air testing are described in the Draft Regulatory Support Document). Thus, we believe secondary air injection alone could be a viable technology used by ATV manufacturers to meet our proposed 2010 standards.

We also tested several ATVs with oxidation catalysts. We evaluated several different catalyst configurations with varying size, loading, cell density, and washcoat. We also examined different catalyst locations in the exhaust system. We found that a relatively small oxidation catalyst located in the exhaust system produced emission levels below our proposed emission standards. Therefore, we also believe that the use of an oxidation catalyst could be another viable technology available to ATV manufacturers to meet our proposed 2009 emission standards.

2. Snowmobiles

a. What are the baseline technologies and emission levels? As discussed earlier, snowmobiles are equipped with relatively small high-performance two-stroke two and three cylinder engines that are either air- or liquid-cooled. Since these vehicles are currently unregulated, the main emphasis of engine design is on performance, durability, and cost and thus they have no emission controls. The fuel system used on these engines are almost exclusively carburetors, although some have electronic fuel injection. Two-stroke engines lubricate the piston and crankshaft by mixing oil with the air and fuel mixture. This is accomplished by most contemporary 2-stroke engines with a pump that sends two-cycle oil from a separate oil reserve to the carburetor where it is mixed with the air and fuel mixture. Some less expensive two-stroke engines require that the oil be mixed with the gasoline in the fuel tank. Snowmobiles currently operate with a ''rich'' air and fuel mixture. That is, they operate with excess fuel, which enhances performance and allows engine cooling which promotes longer lasting engine life. However, rich operation results in high levels of HC, CO, and PM emissions. Also, two-stroke engines tend to have high scavenging losses, where up to a third of the unburned air and fuel mixture goes out of the exhaust resulting in high levels of raw HC. Current average snowmobile emission rates are 397 g/kW-hr (296 g/hp-hr) CO and 150 g/kW-hr (111 g/hp-hr) HC.

b. What technology approaches are available to control emissions? We believe the proposed standards would be technologically feasible. A variety of technologies are currently available or in stages of development to be available for use on 2-stroke snowmobiles. These include improvements to carburetion (improved fuel control and atomization, as well as improved production tolerances), enleanment strategies for both carbureted and fuel injected engines, and semi-direct and direct fuel injection. In addition to these 2-stroke technologies, converting to 4-stroke engines is feasible for some snowmobile types. Each of these is discussed in the following paragraphs.

There are several things that can be done to improve carburetion in snowmobile engines. First, strategies to improve fuel atomization would promote more complete combustion of the fuel/air mixture. Additionally, production tolerances could be improved for more consistent fuel metering. Both of these things would allow for more accurate control of the air/fuel ratio. In conjunction with these improvements in carburetion, the air/fuel ration could be leaned out some. Snowmobile engines are currently calibrated with rich air/fuel ratios for durability reasons. Leaner calibrations would serve to reduce CO and HC emissions. Such calibration changes could reduce snowmobile engine durability. However, there are many engine improvements that could be made to regain lost durability that occurs with leaner calibration. These include changes to the cylinder head, pistons, ports and pipes to reduce knock. In addition critical engine components could be made more robust to improve durability.

The same calibration changes to the air/fuel ratio just discussed for carbureted engines could also be employed, possibly with more accuracy, with the use of fuel injection. At least one major snowmobile manufacturer currently employs electronic fuel injection on several of its snowmobile models.

In addition to rich air/fuel ratios, one of the main reasons that two-stroke engines have such high HC emission levels is that they release a substantial amount of unburned fuel into the atmosphere as a result from scavenging losses, as described above. One way to reduce or eliminate such losses is to inject the fuel into the cylinder after the exhaust port has closed. This can be done by injecting the fuel into the cylinder through the transfer port (semi-direct injection) or directly into the cylinder (direct injection). Both of these approaches are currently being used successfully in two-stroke personal watercraft engines. We believe these technologies hold promise for application to snowmobiles. Manufacturers must address a variety of technical design issues for adapting the technology to snowmobile operation, such as operating in colder ambient temperatures and at variable altitude. The several years of lead time give manufacturers time to incorporate these development efforts into their overall research plan as they apply these technologies to snowmobiles.

In addition to the two-stroke technologies just discussed, the use of four-stroke engines in snowmobiles is another feasible approach to reduce emissions. Since they do not scavenge the exhaust gases with the incoming air/fuel mixture, four-stroke engines have inherently lower HC emissions compared to two-strokes. Four-stroke engines have a lower power to weight ratio than two-stroke engines and are heavier. Thus, they are more appropriately used in snowmobile models where extreme power and acceleration are not the primary selling points. Such models include touring and sport trail sleds, as opposed to high performance sleds such as those used for aggressive trail, cross country, mountain and lake riding.

c. What technologies are most likely to be used to meet the proposed standards. 2006 Standards. We expect that, in the context of an emission-credit program, manufacturers might choose to take different paths to meet the

proposed 2006 model year emission standards. We expect that many of the reductions required will come from aggressive implementation of improved carburetion and enleanment strategies. Manufacturers have indicated to us that direct injection strategies can result in emission reductions of 70 to 75 percent for HC and 60 to 65 percent for CO. Certification results from 2000 model year outboard engines and PWC support such reductions. At least one manufacturer has indicated that direct injection technology will be available for snowmobiles on at least some models well in advance of 2006. We believe that as manufacturers learn to apply direct injection strategies they may choose to implement those technologies on some of their more expensive sleds and use less aggressive technologies, such as improved carburetion and enleanment on their lower performance models. Finally, there are at least two snowmobile manufacturers planning on offering four-stroke models in the future, and we expect further interest in four-strokes to develop for those snowmobile categories for which four-strokes are a good fit.

2010 Standards. We expect that, in the context of an emission credit program, manufacturers would choose to apply enleanment strategies and the associated engine modification to roughly half of their production. The rest of their production would encompass primarily direct injection two stroke and to a much lesser extent, four stroke technology.

VII. General Nonroad Compliance Provisions

This section describes a wide range of compliance provisions that apply generally to all of the engines and vehicles that would be subject to the proposed standards. Several of these provisions apply not only to manufacturers, but also to equipment manufacturers installing certified engines, remanufacturing facilities, operators, and others.

The proposed regulatory text for the compliance requirements for Large SI and recreational vehicles would be contained in a new Part 1068 of title 40, entitled ''General Compliance Programs for Nonroad Engines.'' The compliance provisions for marine engines would be the same as those in our existing programs for commercial diesel marine engines (40 CFR part 94), which are similar to the provisions proposed in 40 CFR part 1068.

The following discussion of the general nonroad provisions follows the proposed regulatory text. For ease of reference, the subpart designations are provided. We request comment on all these provisions.

A. Miscellaneous Provisions (Part 1068, Subpart A)

This regulation contains some general provisions, including general applicability and the definitions that apply to Part 1068. Other provisions concern good engineering judgment, how we would handle confidential information; how the EPA Administrator delegates decision-making authority; and when we may inspect a manufacturer's facilities, engines, or records.

The process of testing engines and preparing an application for certification requires the manufacturer to make a variety of judgments. This includes, for example, selecting test engines, operating engines between tests, and developing deterioration factors. Section 1068.5 of the proposed regulations describes the methodology we propose to use to evaluate concerns related to manufacturers' use of good engineering judgment in cases where the manufacturer has such discretion. If we find a problem in these areas, we would take into account the degree to which any error in judgment was deliberate or in bad faith. This subpart is consistent with provisions in the final rule for light-duty highway vehicles and commercial marine diesel engines.

B. Prohibited Acts and Related Requirements (Part 1068, Subpart B)

The proposed provisions in this subpart lay out a set of prohibitions for engine manufacturers, equipment manufacturers, operators, and engine rebuilders to ensure that engines comply with the emission standards. These provisions are summarized below, but readers are encouraged to review the proposed regulatory text. These provisions are intended to help ensure that each new engine sold or otherwise entered into commerce in the United States is certified to the relevant standards, that it remains in its certified configuration throughout its lifetime, and that only certified engines are used in the appropriate nonroad equipment.

1. General Prohibitions (§ 1068.100)

This proposed regulation contains several prohibitions consistent with the Clean Air Act. No one may sell an engine in the United States without a valid certificate of conformity issued by EPA, deny us access to relevant records, or keep us from entering a facility to test or inspect engines. In addition, no one may remove or disable a device or design element that may affect an engine's emission levels, or manufacture any device that will make emission controls ineffective, which we would consider tampering. We have generally applied the existing policies developed for tampering with highway engines and vehicles to nonroad engines.[160] Other prohibitions reinforce manufacturers' obligations to meet various certification requirements. We also prohibit selling engine parts that prevent emission-control systems from working properly. Finally, for engines that are excluded for certain applications (i.e., stationary or solely for competition), we generally prohibit using these engines in other applications.

These proposed prohibitions are the same as those that apply to other engines we have regulated in previous rulemakings. Each prohibited act has a corresponding maximum penalty as specified in Clean Air Act section 205. As provided for in the Federal Civil Penalties Inflation Adjustment Act of 1990, Public Law 10–410, these maximum penalties are in 1970 dollars and should be periodically adjusted by regulation to account for inflation. The current penalty amount for each violation is $27,500.[161]

2. Equipment Manufacturer Provisions (§ 1068.105)

According to this proposed regulation, equipment manufacturers may not sell new equipment with uncertified engines once the emission standards begin to apply. We would allow a grace period for equipment manufacturers to use up their supply of uncertified engines, as long as they follow their normal inventory practices for buying engines.

We propose to require equipment manufacturers to observe the engine manufacturers emission-related installation specifications to ensure that the engine remains consistent with the application for certification. This may include such things as radiator specifications, placement of catalytic converters, diagnostic signals and interfaces, and steps to minimize evaporative emissions.

If equipment manufacturers install a certified engine in a way that obscures the engine label, we propose to require them to add a duplicate label on the equipment. Equipment manufacturers may make these labels or get them from the engine manufacturer.

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[160] ''Interim Tampering Enforcement Policy,'' EPA memorandum from Norman D. Shulter, Office of General Counsel, June 25, 1974 (Docket A–2000–01; document II–B–20).

[161] EPA acted to adjust the maximum penalty amount in 1996 (61 FR 69364, December 31, 1996). See also 40 CFR part 19.

If equipment manufacturers don't fulfill the responsibilities we describe in this section, we would consider them to be violating one or more of the prohibited acts described above.

3. In-Service Engines (§ 1068.110)

The proposed regulations would prevent manufacturers from requiring owners to use any certain brand of aftermarket parts and give the manufacturer responsibility for engine servicing related to emissions warranty, leaving the responsibility for all other maintenance with the owner. This proposed regulation would also reserve our right to do testing (or require testing) to investigate potential defeat devices, as authorized by the Act.

4. Engine Rebuilding (§ 1068.120)

We are proposing to establish rebuild provisions for all the nonroad engines subject to the proposed emission standards. This approach is similar to what applies to heavy-duty highway engines, nonroad diesel engines, and commercial marine diesel engines. This is necessary to prevent an engine rebuilder from rebuilding engines in a way that disables the engine's emission controls or compromises the effectiveness of the emission-control system. For businesses involved in commercial engine rebuilding, we are proposing minimal recordkeeping requirements so rebuilders can show that they comply with regulations.

In general, we propose to require that anyone who rebuilds a certified engine must restore it to its original (or a lower-emitting) configuration. We are proposing to add unique requirements for rebuilders to replace some critical emission-control components such as fuel injectors and oxygen sensors in all rebuilds for engines that use those technologies. We are also proposing that rebuilders replace an existing catalyst if there is evidence that the catalyst is not functional; for example, if a catalyst has lost its physical integrity with loose pieces rattling inside, it would need to be replaced. See § 1068.65 for more detailed information.

The proposed rebuilding provisions define good rebuilding practices to help rebuilders avoid violating the prohibition on ''removing or disabling'' emission-control systems. We therefore propose to extend these provisions to individuals who rebuild their own engines, but without any recordkeeping requirements.

We request comment on applying these proposed requirements for engine rebuilding and maintenance to the engines and vehicles subject to this rulemaking. In addition, we request comment on the associated recordkeeping requirements.

C. Exemptions (Part 1068, Subpart C)

We are proposing to include several exemptions for certain specific situations. Most of these are consistent with previous rulemakings. We highlight the new or different proposed provisions in the following paragraphs. In general, exempted engines would need to comply with the requirements only in the sections related to the exemption. Note that additional restrictions could apply to importing exempted engines (see Section VII.D). Also, we are also proposing that we may require manufacturers (or importers) to add a permanent label describing that the engine is exempt from emission standards for a specific purpose. In addition to helping us enforce emission standards, this would help ensure that imported engines clear Customs without difficulty.

1. Testing

Anyone would be allowed to request an exemption for engines used only for research or other investigative purposes.

2. Manufacturer-Owned Engines

Engines that are used by engine manufacturers for development or marketing purposes could be exempted from regulation if they are maintained in the manufacturers' possession and are not used for any revenue-generating service.

3. Display Engines

Engine manufacturers would get an exemption without request if the engines are for display only.

4. National Security

Engine manufacturers could receive an exemption for engines they can show are needed by an agency of the federal government responsible for national defense. For cases where the engines will not be used on combat applications, the manufacturer would have to request the exemption with the endorsement of the procuring government agency.

5. Exported Engines

Engines that will be exported to countries that don't have the same emission standards as those that apply in the United States would be exempted without need for a request. This exemption would not be available if the destination country has the same emission standards as those in the United States.

6. Competition Engines

New engines that are used solely for competition are excluded from regulations applicable to nonroad engines. For purposes of our certification requirements, a manufacturer would receive an exemption if it can show that it produces the engine specifically for use solely in competition. In addition, engines that have been modified for use in competition would be exempt from the prohibition against tampering described above (without need for request). The literal meaning of the term ''used solely for competition'' would apply for these modifications. We would therefore not allow the engine to be used for anything other than competition once it has been modified. This also applies to someone who would later buy the engine, so we would require the person modifying the engine to remove or deface the original engine label and inform a subsequent buyer in writing of the conditions of the exemption.

7. Replacement Engines

An exemption would be available to engine manufacturers without request if that is the only way to replace an engine from the field that was produced before the current emission standards took effect. If less stringent standards applied to the old engine when it was new, the replacement engine would also have to meet those standards.

8. Hardship Related to Economic Burden

There are two types of hardship provisions. The first type of hardship program would allow small businesses to petition EPA for additional lead time (e.g., up to 3 years) to comply with the standards. A small manufacturer would have to make the case that it has taken all possible business, technical, and economic steps to comply but the burden of compliance costs would have a significant impact on the company's solvency. A manufacturer would be required to provide a compliance plan detailing when and how it would achieve compliance with the standards. Hardship relief could include requirements for interim emission reductions and/or purchase and use of emission credits. The length of the hardship relief decided during review of the hardship application would be up to one year, with the potential to extend the relief as needed. The second hardship program would allow companies to apply for hardship relief if circumstances outside their control cause the failure to comply (i.e., supply contract broken by parts supplier) and if the failure to sell the subject engines would have a major impact on the company's solvency. See the proposed

regulatory text in 40 CFR 1068.240 and 1068.241 for additional details.

9. Hardship for Equipment Manufacturers

Equipment manufacturers in many cases depend on engine manufacturers to supply certified engines in time to produce complying equipment by the date emission standards begin to apply. This is especially true for industrial and marine applications. In other programs, we have heard of certified engines being available too late for equipment manufacturers to adequately accommodate changing engine size or performance characteristics. To address this concern, we are proposing to allow equipment manufacturers to request up to one extra year before using certified engines if they are not at fault and would face serious economic hardship without an extension. See the proposed regulatory text in 40 CFR 1068.245 for additional information.

D. Imports (Part 1068, Subpart D)

In general, the same certification requirements would apply to engines and equipment whether they are produced in the U.S. or are imported. This proposed regulation also includes some additional provisions that would apply if someone wants to import an exempted or excluded engine. For example, the importer would need written approval from us to import any exempted engine; this is true even if an exemption for the same reason doesn't require approval for engines produced in the U.S.

All the proposed exemptions described above for new engines would also apply to importation, though some of these apply only on a temporary basis. If we approve a temporary exemption, it would be available only for a defined period and could require the importer to post bond while the engine is in the U.S. There are several additional proposed exemptions that would apply only to imported engines.

—*Identical configuration:* This would be a permanent exemption to allow individuals to import engines that were designed and produced to meet applicable emission standards. These engines may not have the emission label only because they were not intended for sale in the United States. This exemption would apply to all the nonroad engines covered by this proposal. We did not finalize this exemption for commercial marine diesel engines, since we expected no individuals to own or import such an engine.

—*Personal use:* This would be a permanent exemption to allow individuals to import engines for their personal use. To prevent abuse of this exemption, we would require that importers own the exempted engines and we would generally exempt only one of each type of engine over an individual's lifetime.

—*''Antique'' engines:* We would generally treat used engines as new if they are imported without a certificate of conformity. However, this permanent exemption would allow for importation of uncertified engines if they are more than 20 years old in their original configuration.

—*Repairs or alterations:* This would be a temporary exemption to allow companies to repair or modify engines. This exemption would not allow for operating the engine, except as needed to do the intended work.

—*Diplomatic or military:* This would be a temporary exemption to allow diplomatic or military personnel to use uncertified engines during their term of service in the U.S.

We request comment on all the proposed exemptions for domestically produced and imported engines and vehicles.

E. Selective Enforcement Audit (Part 1068, Subpart E)

Clean Air Act section 206(b) gives us the discretion in any program with vehicle or engine emission standards to do selective enforcement auditing of production engines. In selective enforcement auditing, we would choose an engine family and give the manufacturer a test order detailing a testing program to show that production-line engines meet emission standards. The proposed regulation text describes the audit procedures in greater detail.

We intend generally to rely on manufacturers' testing of production-line engines to show that they comply with emission standards. However, we reserve our right to do selective enforcement auditing if we have reason to question the emission testing conducted and reported by the manufacturer.

F. Defect Reporting and Recall (Part 1068, Subpart F)

We are proposing provisions for defect reporting. Specifically, we are proposing that manufacturers tell us when they learn of a defect occurring 25 times or more for engine families with annual sales up to 10,000 units. This threshold of defects would increase proportionately for larger families. For catalyst-related defects, we propose a threshold of approximately half the frequency of noncatalyst problems to trigger a defect report. While these thresholds would depend on engine family sales, counting defects would not be limited to a single engine family. For example, if a manufacturer learns that operators reported 25 cases of a short-circuit in the electronic control unit from three different low-volume engine models spread over five years, that would trigger the need to file a defect report. This information could come from warranty claims, customer complaints, product performance surveys, or anywhere else. The proposed regulation language in § 1068.501 also provides information on the thresholds for triggering a further investigation for where a defect report is more likely to be necessary. We request comment on the proposed defect reporting provisions.

Under Clean Air Act section 207, if we determine that a substantial number of engines within an engine family, although properly used and maintained, do not conform to the appropriate emission standards, the manufacturer will be required to remedy the problem and conduct a recall of the noncomplying engine family. However, we also recognize the practical difficulty in implementing an effective recall program for nonroad engines. It would likely be difficult to properly identify all the affected owners absent a nationwide registration requirement similar to that for cars and trucks. The response rate for affected owners or operators to an emission-related recall notice is also a critical issue to consider. We recognize that in some cases, recalling noncomplying nonroad engines may not achieve sufficient environmental protection, so our intent is to generally allow manufacturers to nominate alternative remedial measures to address most potential noncompliance situations. We expect that successful implementation of appropriate alternative remediation would obviate the need for us to make findings of substantial nonconformity under section 207 of the Act. We would consider alternatives nominated by a manufacturer based on the following criteria; the alternatives should—

(1) Represent a new initiative that the manufacturer was not otherwise planning to perform at that time, with a clear connection to the emission problem demonstrated by the engine family in question;

(2) Cost more than foregone compliance costs and consider the time value of the foregone compliance costs and the foregone environmental benefit of the engine family;

(3) Offset at least 100 percent of the emission exceedance relative to that

required to meet emission standards (or Family Emission Limits); and

(4) Be possible to implement effectively and expeditiously and to complete in a reasonable time.

These criteria would guide us in evaluating projects to determine whether their nature and burden is appropriate to remedy the environmental impact of the nonconformity. We request comment on this approach to addressing the Clean Air Act provisions related to recall. In addition, we request comment on the proposed requirement to keep recall-related records until three years after a manufacturer completes all responsibilities under a recall order.

G. Public Hearings (Part 1068, Subpart G)

According to this regulation, manufacturers would have the opportunity to challenge our decision to suspend, revoke, or void an engine family's certificate. This also applies to our decision to reject the manufacturer's use of good engineering judgment (see § 1068.005). Part 1068, subpart G, describes the proposed procedures for a public hearing to resolve such a dispute.

VIII. General Test Procedures

The regulatory text in part 1065 is written with the intent to apply broadly to EPA engine programs. This proposal, however, applies to anyone who tests engines to show that they meet the emission standards for Large Industrial SI engines or for recreational vehicles. This includes certification testing, as well as all production-line and in-use testing. See the program descriptions above for testing provisions that are unique to Large SI engines. We may later propose to apply the same provisions to other engines, with any appropriate additions and changes. Recreational marine diesel engines would use the test procedures already adopted in 40 CFR part 94.

A. General Provisions

As we have done in previous programs, we are proposing specific test procedures to define how measurements are to be made, but would allow the use of alternate procedures if they are shown to be equivalent to our specified procedures. The test procedures proposed in part 1065 are derived from our test procedures in 40 CFR Part 86 for highway heavy-duty gasoline engines and light-duty vehicles. The procedures have been simplified (and to some extent generalized) to better fit nonroad engines. We request comment on all aspects of these proposed test procedures. We also request comment regarding whether any additional parts of the test procedures contained in 40 CFR part 86 (for highway vehicles and engines), in other parts that apply to nonroad engines, or in ISO 8178 should be incorporated into the final test procedures.

B. Laboratory Testing Equipment

The proposed regulations do not specify the type of engine or chassis dynamometer that must be used during testing. Rather, they include performance criteria that must be met during each test. These criteria are intended to ensure that deviations from the specified speed and load duty cycle are small. Steady-state testing calls for a minimal degree of sophistication in the dynamometer system.

Measuring emissions during transient operation calls for a greater degree of sophistication than steady-state testing. For chassis testing of recreational vehicles, we propose to use the specifications adopted in 40 CFR part 86 for highway engines. For Large SI engines, we based the dynamometer specifications around the capabilities of current dynamometers with enhanced control capabilities. Furthermore, we would require any EPA confirmatory testing to meet more stringent specifications than manufacturers testing their own engines.

In addition, for transient testing with recreational vehicles and any testing with Large SI engines, the proposed regulations specify that emissions be measured using a full-dilution constant-volume sampler (CVS) like those used to measure emissions from highway engines. This means that during a test, an engine's exhaust would be routed into a dilution tunnel where it would be mixed with air, and then sampled using a bag sampler system. After the test, the concentrations of HC, CO, and NO_X in the bag would be measured using conventional laboratory analyzers.

For industrial spark-ignition engines and snowmobiles, the proposed steady-state test procedures specify measuring emissions with dilute-sampling equipment. Some manufacturers have expressed a preference to continue with their established practice of using raw-sampling equipment and procedures. While we believe dilute-sampling is most appropriate for these engines, the proposed provisions for alternate testing procedures may allow for raw-sampling measurements. As specified in paragraph 1065.010(c)(3) of the proposed regulations, we would allow manufacturers to use alternate procedures that are shown to be equivalent to the proposed procedures. We request comment on this approach to emission-measurement procedures. Specifically, we request comment on the degree of equivalence that should be shown to gain approval of alternate procedures. See the final rule for 2007 heavy-duty highway engine emission standards for one approach of defining a tolerance on equivalence for alternate procedures (66 FR 5002, January, 18, 2001).

C. Laboratory Testing Procedures

We are proposing specific procedures for running the test. These procedures are outlined briefly here, with a more detailed description of the most significant aspects. Before starting the test, it would be necessary to operate the engine for some time to improve the stability of the emissions, or to make the engine more representative of in-use engines. This is called service accumulation, and may take one of two forms. In the first method, a new engine is operated for about 50 hours as a break-in period. This would be done for most or all emission-data engines (for certification). The second method is much longer (up to the full useful life), and is done to obtain deterioration factors.

Once an engine is ready for testing, it is connected to the dynamometer with its exhaust flowing into the dilution tunnel. The dynamometer is controlled to make the engine follow the specified duty cycle. A continuous sample would be collected from the dilution tunnel for each test segment or test mode using sample bags. These bags would then be analyzed to determine the concentrations of HC, CO, and NO_X.

1. Test Speeds

The definition of maximum test speed, where speed is the angular velocity of an engine's crankshaft (usually expressed in revolutions per minute, or rpm), is an important aspect of the duty cycles for testing. Until recently, we relied on engine manufacturers to declare reasonable rated speeds for their engines and then used the rated speed as the maximum test speed. However, to have a more objective measure of an engine's maximum test speed, we have established an objective procedure for measuring this engine parameter.[162]

We propose to define the maximum test speed for any engine to be the single point on an engine's maximum-power versus speed curve that lies farthest away from the zero-power, zero-speed point on a normalized maximum-power

[162] See the final rule for commercial marine diesel engines for a broader discussion of maximum test speed (64 FR 249, December 29, 1999).

versus speed plot. In other words, consider straight lines drawn between the origin (speed = 0, load = 0) and each point on an engine's normalized maximum-power versus speed curve. Maximum test speed is defined at that point where the length of this line reaches its maximum value. For constant-speed engines, maximum test speed is the engine's rated speed.

Intermediate speed for steady-state duty cycles is generally defined as the speed at which the engine generates its maximum torque value. However, in cases where the maximum torque occurs at a speed that is less than 60 percent or greater than 75 percent of the rated speed, the intermediate speed is often specified as either 60 or 75 percent of rated speed, whichever is closer to the speed of maximum torque. We propose to use this approach, using the maximum test speed described above to calculate these percentage values.

We request comment on applying this method of determining rated speed to ATVs certified to engine-based emission standards, recreational marine diesel engines, and Large SI engines.

2. Maintenance

As described in Section III.C.1, we are proposing limits on the amount of scheduled maintenance manufacturers may prescribe for their customers to ensure that engines continue to meet emission standards. If manufacturers would specify unreasonably frequent maintenance, there would be little assurance that in-use engines would continue to operate at certified emission levels. We would also apply these minimum maintenance intervals to engines the manufacturer operates for service accumulation before testing for emissions. For example, manufacturers could not install a new catalyst on a Large SI engine after 2,000 hours of operation, then select that engine for the in-use testing program. Similarly, manufacturers could not replace fuel-system components on a recreational vehicle during the course of service accumulation for establishing deterioration factors. We would not restrict scheduling of routine maintenance item such as changing engine oil and replacing oil, fuel, or air filters. We may also allow changing spark plugs, even though we are aware that spark plugs can significantly affect emissions.

IX. Projected Impacts

This section summarizes the projected impacts of the proposed emission standards. The anticipated environmental benefits are compared with the projected cost of the program for an assessment of the cost per ton of reducing emissions for this proposal.

A. Environmental Impact

To estimate nonroad engine and vehicle emission contributions, we used the latest version of our NONROAD emissions model. This model computes emission levels for a wide variety of nonroad engines, and uses information on emission rates, operating data, and population to determine annual emission levels of various pollutants. A more detailed description of the methodology used for projecting inventories and projections for additional years can be found in the Chapter 6 of the Draft Regulatory Support Document. We request comment on all aspects of the emission inventory analysis, including the usage rates and other inputs used in the analysis.

Tables IX.A–1 and IX.A–2 contain the projected emission inventories for the years 2010 and 2020, respectively, from the engines and vehicles subject to this proposal under the base case (i.e., without the proposed standards taking effect) and assuming the proposed standards take effect. The percent reductions based on a comparison of estimated emission inventories with and without the proposed emission standards are also presented.

TABLE IX.A–1.—2010 PROJECTED EMISSIONS INVENTORIES

[Thousand short tons]

Category	Exhaust CO			Exhaust NO_X			Exhaust HC**		
	Base case	With proposed standards	Percent reduction	Base case	With proposed standards	Percent reduction	Base case	With proposed standards	Percent reduction
Industrial SI >19kW	2,615	1,152	56	397	152	62	293	111	62
Snowmobiles	567	415	27	1	1	0	213	155	27
ATVs	3,901	3,380	13	21	21	0	1,098	756	31
Off-highway motorcycles	194	172	11	1	1	0	143	112	22
Recreational Marine diesel*	5	5	0	31	29	7	0.9	1.0	10
Total	7,282	5,124	30	451	204	55	1,748	1,135	35

*We also anticipate a 2 percent reduction in direct PM from a baseline of inventory of 1,184 tons in 2010 to a control inventory of 1,158 tons.
**The Industrial SI >19 kW estimate includes both exhaust and evaporative emissions.

TABLE IX.A–2.—2020 PROJECTED EMISSIONS INVENTORIES

[Thousand short tons]

Category	Exhaust CO			Exhaust NO_X			Exhaust HC**		
	Base case	With proposed standards	Percent reduction	Base case	With proposed standards	Percent reduction	Base case	With proposed standards	Percent reduction
Industrial SI >19kW	2,991	231	92	486	77	84	346	50	86
Snowmobiles	609	227	63	2	2	0	229	85	63
ATVs	4,589	3,041	34	25	25	0	1,301	205	84
Off-highway motorcycles	208	154	26	1	1	0	154	77	50
Recreational Marine diesel*	6	6	0	39	32	17	1.3	1.0	25

TABLE IX.A–2.—2020 PROJECTED EMISSIONS INVENTORIES—Continued

[Thousand short tons]

Category	Exhaust CO			Exhaust NO_X			Exhaust HC**		
	Base case	With proposed standards	Percent reduction	Base case	With proposed standards	Percent reduction	Base case	With proposed standards	Percent reduction
Total	8,404	3,658	56	552	137	75	2,032	418	79

*We also anticipate a 6 percent reduction in direct PM from a baseline of inventory of 1,470 tons in 2020 to a control inventory of 1,390 tons.
**The Industrial SI >19 kW estimate includes both exhaust and evaporative emissions.

As described in Section II, we project there would also be environmental benefits associated with reduced haze in many sensitive areas.

Finally, anticipated reductions in hydrocarbon emissions correspond with reduced emissions of the toxic air emissions referenced in Section II.

B. Economic Impact

In assessing the economic impact of setting emission standards, we have made a best estimate of the technologies and their associated costs to meet the proposed standards. In making our estimates we have relied on our own technology assessment, which includes information supplied by individual manufacturers and our own in-house testing. Estimated costs include variable costs (for hardware and assembly time) and fixed costs (for research and development, retooling, and certification). The analysis also considers total operating costs, including maintenance and fuel consumption. Cost estimates based on the projected technologies represent an expected change in the cost of engines as they begin to comply with new emission standards. All costs are presented in 2001 dollars. Full details of our cost analysis can be found in Chapter 5 of the Draft Regulatory Support Document. We request comment on this cost information, and the issues discussed below.

Cost estimates based on the current projected costs for our estimated technology packages represent an expected incremental cost of vehicles in the near term. For the longer term, we have identified factors that would cause cost impacts to decrease over time. First, we project that manufacturers will generally recover their fixed costs over a five-year period, so these costs disappear from the analysis after the fifth year of production. Second, the analysis incorporates the expectation that manufacturers and suppliers will apply ongoing research and manufacturing innovation to making emission controls more effective and less costly over time. Research in the costs of manufacturing has consistently shown that as manufacturers gain experience in production and use, they are able to apply innovations to simplify machining and assembly operations, use lower cost materials, and reduce the number or complexity of component parts.[163] (see the Draft Regulatory Support Document for additional information). The cost analysis generally incorporates this learning effect by decreasing estimated variable costs by 20 percent starting in the third year of production and an additional 20 percent starting in the sixth year of production.

Table IX.B–1 summarizes the projected costs to meet the new emission limits (retail-price equivalent). Long-term impacts on engine costs are expected to decrease as manufacturers fully amortize their fixed costs and learn to optimize their designs and production processes to meet the standards more efficiently. The tables also show our projections of reduced operating costs for some engines (calculated on a net present value basis), which generally results from substantial reductions in fuel consumption.

We estimate that the anticipated increase in the cost of producing new Large SI engines for the proposed 2004 standards is estimated to range from $550 to $800, depending on fuel type, with a composite estimated cost of $600. This cost is attributed to upgrading engines to operate with closed-loop fuel systems and three-way catalysts. These technologies also improve the overall performance of these engines, including improvements to fuel economy that result in reduced operating costs that fully offset the additional hardware cost. We further estimate additional costs of $45 for the 2007 standards, which primarily involves additional development time to optimize engines using the same closed-loop systems with three-way catalysts. While these costs are a small percentage of the cost of industrial equipment, we are aware that this is no small change in this very competitive market. Given the compelling advantages of improved performance and reduced operating expenses, however, we believe manufacturers will generally be able to recover their costs over time.[164] We request comment on whether these estimated costs associated with emission controls would affect larger or smaller engines disproportionately to the overall cost of producing the engines.

Projected costs for ATVs and off-highway motorcycles average between $50 and $150 per unit. Initial standards are based on the emission-control capability of engines four-stroke engines. Those models that convert from two-stroke to four-stroke technology will see substantial fuel savings in addition to greatly reduced emissions. The second phase of standards for ATVs is based on recalibrating four-stroke engines for lower emissions and adding a two-way catalyst or other device to further reduce emissions. With an averaging program that allows manufacturers to apply varying degrees of technology to different models, we believe they will be able to tailor emission controls in a way that reflects the marketing constraints for their products. Fuel savings and improved performance offsets the additional cost of producing most of these vehicles.

We expect that the cost of the 2006 snowmobile standards will average $55 per snowmobile. These costs are based on manufacturers leaning out the air/fuel mixture, improving carburetors for better fuel control and less production

[163] For further information on learning curves, see Chapter 5 of the Economic Impact, from Regulatory Impact Analysis—Control if Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, EPA420–R–99–023, December 1999. A copy of this document is included in Air Docket A–2000–01, at Document No. II–A–83. The interested reader should also refer to previous final rules for Tier 2 highway vehicles (65 FR 6698, February 10, 2000), marine diesel engines (64 FR 73300, December 29, 1999), nonroad diesel engines (63 FR 56968, October 23, 1998), and highway diesel engines (62 FR 54694, October 21, 1997).

[164] Chapter 5 of the Draft Regulatory Support Document describes why we believe market forces haven't already led manufacturers to add fuel-saving technologies to their products.

variation, and modifying the engine to withstand higher temperatures and potential misfire episodes attributed to enleanment. We expect that the 2010 standards will be met through the application of direct injection 2-stroke technology on a significant portion of the fleet, as well as some conversion to 4-stroke engines. We project that the cost of these controls would average $216 per snowmobile, although we believe these costs would be offset by fuel savings and improved performance.

Recreational marine diesel engines would be expected to see increased costs averaging $443 per engine in the near term. We expect manufacturers to meet the proposed standards by improving fuel injection systems and making general design changes to the geometries, configurations, and calibrations of their engines. These figures are somewhat lower than we have projected for the comparable commercial marine engines, since the recreational models generally already have some of the emission-control technologies needed to meet the proposed emission standards.

TABLE IX.B–1.—ESTIMATED AVERAGE COST IMPACTS OF PROPOSED EMISSION STANDARDS

Engine type	Standard	Increased production cost per engine*	Lifetime operating costs per engine (NPV)
Large SI	2004	$600	−$3,985
Large SI	2007	45	.....
Snowmobiles	2006	55	.....
Snowmobiles	2010	216	−509
ATVs	2006	60	−102
ATVs	2009	52	.....
Off-highway motorcycles	2006	151	−98
Marine diesel	2006	443	.....

*The estimated long-term costs decrease by about 35 percent. Costs presented for second-phase standards for Large SI and ATVs are incremental to the first-phase standards.

The above analysis presents unit cost estimates for each engine type. These costs represent the total set of costs the engine manufacturers will bear to comply with emission standards. With current and projected estimates of engine and equipment sales, we translate these costs into projected direct costs to the nation for the new emission standards in any year. A summary of the annualized costs to manufacturers by equipment type is presented in Table IX.B–2. (The annualized costs are determined over the first twenty-years that the proposed standards would be effective.) The annual cost savings due to reduced operating expenses, start slowly, then increase as greater numbers of compliant engines enter the fleet. Table IX.B–2 presents a summary of the annualized reduced operating costs as well. Overall, we project, based on information currently available to us, that the annualized net savings to the economy would be approximately $260 million per year.

TABLE IX.B–2.—ESTIMATED ANNUAL COST TO MANUFACTURERS AND ANNUAL SAVINGS FROM REDUCED OPERATING COSTS OF THE PROPOSED EMISSION STANDARDS

Engine type	Annualized cost to manufacturers (millions/year)	Annualized savings from reduced operating costs (millions/year)
Large SI	$85	$324
Snowmobiles	24	28
ATVs	59	81
Off-highway motorcycles	13	10
Marine Diesel	3	0
Aggregate	184	443

C. Cost per Ton of Emissions Reduced

We calculated the cost per ton of emission reductions for the proposed standards. For snowmobiles, this calculation is on the basis of CO emissions. For all other engines, we attributed the entire cost of the proposed program to the control of ozone precursor emissions (HC or NO_X or both). A separate calculation could apply to reduced CO or PM emissions in some cases. Assigning the full compliance costs to a narrow emissions basis leads to cost-per-ton values that underestimate of the value of the proposed program.

Table IX.C–1 presents the near-term discounted cost-per-ton estimates for the various engines covered by the proposal. (The aggregate cost-per-ton estimates are over the first 20 years of the proposed programs.) Reduced operating costs more than offset the increased cost of producing the cleaner engines for Phase 1 Large SI, Phase 1 ATV, and Phase 2 snowmobile engines. The cost to society and the associated cost-per-ton figures for these engines, and the aggregate values for all engines covered by this proposal, therefore show a net savings resulting from the proposed emission standards. The table presents these as $0 per ton, rather than calculating a negative value that has no clear meaning.

TABLE IX.C–1.—ESTIMATED COST-PER-TON OF THE PROPOSED EMISSION STANDARDS

Engine type	Standard	Discounted reductions per engine (short tons)*	Discounted cost per ton of HC+NO_X		Discounted cost per ton of CO	
			Without fuel savings	With fuel savings	Without fuel savings	With fuel savings
Large SI (Composite of all fuels)	2004	3.14	$220	$0	.....	.....
Large SI (Composite of all fuels)	2007	0.56	80	80	.....	.....
Snowmobiles	2006	1.18	.....	.....	$50	$50
Snowmobiles	2010	0.32	.....	.....	670	0
ATVs	2006	0.88	70	0	.....	.....
ATVs	2009	0.09	550	550	.....	.....
Off-highway motorcycles	2006	0.37	310	110	.....	.....
Marine diesel	2006	0.68	580	580	.....	.....
Aggregate	.....	.....	140	0	100	0

*HC+NO_X reductions, except snowmobiles which are CO reductions.

D. Additional Benefits

For most of the engine categories contained in today's proposal, we expect there will be a fuel savings as manufacturers redesign their engines to comply with the proposed standards. For ATVs and off-highway motorcycles, the fuel savings will be realized as manufacturers switch from 2-stroke to 4-stroke technologies. For snowmobiles, the fuel savings will be realized as manufacturers switch some of their engines to more fuel efficient 2-stroke technologies and some of their engines to 4-stroke technologies. For Large SI engines, the fuel savings will be realized as manufacturers adopt more sophisticated and more efficient fuel systems. This is true for all fuels. Overall, we project the fuel savings associated with the anticipated changes in technology would be about 730 million gallons per year once the program is fully phased in. These savings are factored into the calculated costs and costs per ton of reduced emissions, as described above.

The controls in this rule are a cost-effective means of obtaining reductions in NO_X, NMHC and CO emissions. A related subject concerns the value of the health and welfare benefits these reductions might produce. While we have not conducted a formal benefit-cost analysis for this rule, we believe the benefits of this rule clearly will greatly outweigh any cost.

Ozone causes a range of health problems related to breathing, including chest pain, coughing, and shortness of breath. Exposure to PM (including secondary PM formed in the atmosphere from NO_X and NMHC emissions) has been associated in epidemiological studies with premature death, increased emergency room visits, and increased respiratory symptoms, and exacerbation of existing cardio-pulmonary disease. Children, the elderly, and individuals with pre-existing respiratory conditions are most at risk regarding both ozone and PM. In addition, ozone and PM adversely affect the environment in various ways, including crop damage, acid rain, and visibility impairment. A discussion of the health and welfare effects from ozone and PM can be found in Section II of this preamble. Interested readers should also refer to Chapter 1 of the Draft Regulatory Support Document for this rule and Chapter 2 of EPA's ''Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements.''[165]

In two recent mobile-source control rules, for light-duty vehicles (the Tier 2/Gasoline Sulfur rule) and for highway heavy-duty engines and diesel fuel, we conducted a full analysis of the expected benefits once those rules are fully implemented. These rules, which primarily reduced NO_X and NMHC emissions, were seen to yield health and welfare benefits far exceeding the costs. EPA projected that besides reducing premature mortality, these rules will reduce chronic bronchitis cases, hospital admissions for respiratory and cardiovascular causes, asthma attacks and other respiratory symptoms, emergency room visits for asthma attacks, acute bronchitis, work loss days, minor restricted activity days, and decreased worker productivity.

The majority of the benefits from those recent rules were due to their NO_X and NMHC emission reductions. Given the similarities in pollutants being controlled, we would expect this rule to produce similar benefits per ton of emission reduction. Since the cost per ton of emission reduction for this rule is substantially lower than that for the two previous rules, we would expect an even more favorable benefit-cost ratio. Thus, we believe that the value of the health and welfare benefits of this rule would substantially outweigh any cost.

[165] Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements, document EPA420–R–00–026, December 2000. Docket No. 1–2000–01, Document No. II–A–13. This document is also available at *http://www.epa.gov/otaq/diesel.htm#documents.*

X. Public Participation

We request comment on all aspects of this proposal. This section describes how you can participate in this process.

A. How Do I Submit Comments?

We are opening a formal comment period by publishing this document. We will accept comments for the period indicated under **DATES** above. If you have an interest in the program described in this document, we encourage you to comment on any aspect of this rulemaking. We request comment on various topics throughout this proposal.

We attempted to incorporate all the comments received in response to the Advance Notice of Proposed Rulemaking, though not all comments are addressed directly in this document. Anyone who has submitted comments on the Advance Notice, or any previous publications related to this proposal, and feels that those comments have not been adequately addressed is encouraged to resubmit comments as appropriate.

Your comments will be most useful if you include appropriate and detailed supporting rationale, data, and analysis. If you disagree with parts of the proposed program, we encourage you to suggest and analyze alternate approaches to meeting the air quality goals described in this proposal. You should send all comments, except those containing proprietary information, to our Air Docket (see **ADDRESSES**) before the end of the comment period.

If you submit proprietary information for our consideration, you should clearly separate it from other comments

by labeling it ''Confidential Business Information.'' You should also send it directly to the contact person listed under **FOR FURTHER INFORMATION CONTACT** instead of the public docket. This will help ensure that no one inadvertently places proprietary information in the docket. If you want us to use your confidential information as part of the basis for the final rule, you should send a nonconfidential version of the document summarizing the key data or information. We will disclose information covered by a claim of confidentiality only through the application of procedures described in 40 CFR part 2. If you don't identify information as confidential when we receive it, we may make it available to the public without notifying you.

B. Will There Be a Public Hearing?

We will hold a public hearing in the Washington, DC area on October 24 and a second public hearing in Denver, CO on October 31. The hearings will start at 9:30 am and continue until everyone has had a chance to speak.

If you would like to present testimony at a public hearing, we ask that you notify the contact person listed above at least ten days before the hearing. You should estimate the time you will need for your presentation and identify any needed audio/visual equipment. We suggest that you bring copies of your statement or other material for the EPA panel and the audience. It would also be helpful if you send us a copy of your statement or other materials before the hearing.

We will make a tentative schedule for the order of testimony based on the notifications we receive. This schedule will be available on the morning of each hearing. In addition, we will reserve a block of time for anyone else in the audience who wants to give testimony.

We will conduct the hearing informally, and technical rules of evidence won't apply. We will arrange for a written transcript of the hearing and keep the official record of the hearing open for 30 days to allow you to submit supplementary information. You may make arrangements for copies of the transcript directly with the court reporter.

XI. Administrative Requirements

A. Administrative Designation and Regulatory Analysis (Executive Order 12866)

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to review by the Office of Management and Budget (OMB) and the requirements of this Executive Order. The Executive Order defines a ''significant regulatory action'' as any regulatory action that is likely to result in a rule that may:

- 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;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or
- 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 Draft Regulatory Support Document has been prepared and is available in the docket for this rulemaking and at the internet address listed under **ADDRESSES** above. This action was submitted to the Office of Management and Budget for review under Executive Order 12866. Estimated annual costs of this rulemaking, which proposes standards for engines in four distinct categories, are estimated to be $184 million per year, thus this proposed rule is considered economically significant. Written comments from OMB and responses from EPA to OMB comments are in the public docket for this rulemaking.

B. Regulatory Flexibility Act (RFA), As Amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.

1. Overview

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute 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 organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business that meet the definition for business based on SBA size standards (see table below); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. The following table provides an overview of the primary SBA small business categories potentially affected by this regulation.

PRIMARY SBA SMALL BUSINESS CATEGORIES POTENTIALLY AFFECTED BY THIS PROPOSED REGULATION

Industry	NAICS [a] codes	Defined by SBA as a small business if [b]
Motorcycles and motorcycle parts manufacturers	336991	<500 employees.
Snowmobile and ATV manufacturers	336999	<500 employees.
Independent Commercial Importers of Vehicles and parts	421110	<100 employees.
Nonroad SI engines	333618	<1,000 employees.
Internal Combustion Engines	333618	<1,000 employees.
Boat Building and Repairing	336612	<500 employees.
Fuel Tank Manufacturers	336211	<1,000 employees.

Notes:

[a] North American Industry Classification System

[b] According to SBA's regulations (13 CFR part 121), businesses with no more than the listed number of employees or dollars in annual receipts are considered ''small entities'' for purposes of a regulatory flexibility analysis.

2. Background

In accordance with Section 603 of the RFA, EPA prepared an initial regulatory flexibility analysis (IRFA) that examines the impact of the proposed rule on small entities along with regulatory alternatives that could reduce that impact. The IRFA is available for review in the docket and is summarized below.

The process of establishing standards for nonroad engines began in 1991 with a study to determine whether emissions of carbon monoxide (CO), oxides of nitrogen (NO_X), and volatile organic compounds (VOCs) from new and existing nonroad engines, equipment, and vehicles are significant contributors to ozone and CO concentrations in more than one area that has failed to attain the national ambient air quality standards for ozone and CO.[166] In 1994, EPA finalized its finding that nonroad engines as a whole ''are significant contributors to ozone or carbon monoxide concentrations'' in more than one ozone or carbon monoxide nonattainment area.[167]

Upon this finding, the Clean Air Act (CAA or the Act) requires EPA to establish standards for all classes or categories of new nonroad engines that cause or contribute to air quality nonattainment in more than one ozone or carbon monoxide (CO) nonattainment area. Since the finding in 1994, EPA has been engaged in the process of establishing programs to control emissions from nonroad engines used in many different applications. Nonroad categories already regulated include:

- Land-based compression ignition (CI) engines (e.g., farm and construction equipment),
- Small land-based spark-ignition (SI) engines (e.g., lawn and garden equipment, string trimmers).
- Marine engines (outboards, personal watercraft, CI commercial, CI engines <37kW),
- Locomotive engines.

On December 7, 2000, EPA issued an Advance Notice of Proposed Rulemaking (ANPRM). As discussed in the ANPRM, the proposal under development will be a continuation of the process of establishing standards for nonroad engines and vehicles, as required by CAA section 213(a)(3). If, as expected, standards for these engines and vehicles are established, essentially all new nonroad engines will be required to meet emissions control requirements. The proposal being developed covers compression-ignition recreational marine engines. It also covers several nonroad spark ignition (SI) engine applications, as follows:

- Land-based recreational engines (for example, engines used in snowmobiles, off-highway motorcycles, and all-terrain vehicles (ATVs)),
- Marine sterndrive and inboard (SD/I) engines and boats powered by SI marine engines,[168]
- Land-based engines rated over 19 kW (Large SI) (for example, engines used in forklifts); this category includes auxiliary marine engines, which are not used for propulsion.

EPA found that the nonroad engines described above cause or contribute to air quality nonattainment in more than one ozone or carbon monoxide (CO) nonattainment area.[169] CAA section 213 (a)(3) requires EPA to establish standards that achieve the greatest degree of emissions reductions achievable taking cost and other factors into account. EPA plans to propose emissions standards and related programs consistent with the requirements of the Act.

In addition to proposing standards for the nonroad vehicles and engines noted above, EPA also intends to review EPA requirements for highway motorcycles. The emissions standards for highway motorcycles were established twenty-three years ago. These standards allow motorcycles to emit about 100 times as much per mile as new cars and light trucks. California recently adopted new emissions standards for highway motorcycles, and new standards and testing cycles are being considered internationally. There may be opportunities to reduce emissions in a cost-effective way.

The program under consideration will cover engines and vehicles that vary in design and use, and many readers may only be interested in one or two of the applications. There are various ways EPA could group the engines and present information. For purposes of the proposed rule EPA has chosen to group engines by common applications (e.g, recreational land-based engines, marine engines, large spark ignition engines used in commercial applications).

3. Summary of Regulated Small Entities

The small entities directly regulated by this proposed rule are the following:

a. Recreational Vehicles (ATVs, snowmobiles, and off-highway motorcycles). The ATV sector has the broadest assortment of manufacturers. There are seven companies representing over 95 percent of total domestic ATV sales. The remaining 5 percent come from importers who tend to import inexpensive, youth-oriented ATVs from China and other Asian nations. We have identified 21 small companies that offer off-road motorcycles, ATVs, or both products. Annual unit sales for these companies can range from a few hundred to several thousand units per year.

Based on available industry information, four major manufacturers, Arctic Cat, Bombardier (also known as Ski-Doo), Polaris, and Yamaha, account for over 99 percent of all domestic snowmobile sales. The remaining one percent comes from very small manufacturers who tend to specialize in unique and high performance designs. We have identified three small manufacturers of snowmobiles and one potential small manufacturer who hopes to produce snowmobiles within the next year.

Two of these manufacturers (Crazy Mountain and Fast), plus the potential newcomer (Redline) specialize in high performance versions of standard recreational snowmobile types (i.e., travel and mountain sleds). The other manufacturer (Fast Trax) produces a unique design, which is a scooter-like snowmobile designed to be ridden standing up. Most of these manufacturers build less than 50 units per year.

b. Highway Motorcycles. Of the numerous manufacturers supplying the U.S. market for highway motorcycles, Honda, Harley Davidson, Yamaha, Kawasaki, Suzuki, and BMW are the largest, accounting for 95 percent or more of the total U.S. sales. All of these companies except Harley-Davidson and BMW also manufacture off-road motorcycles and ATVs for the U.S. market. Harley-Davidson is the only company manufacturing highway motorcycles exclusively in the U.S. for the U.S. market.

Since highway motorcycles have had to meet emission standards for the last

[166] ''Nonroad Engine and Vehicle Emission Study—Report and Appendices,'' EPA–21A–201, November 1991 (available in Air docket A–91–24). It is also available through the National Technical Information Service, referenced as document PB 92–126960.

[167] 59 FR 31306 (July 17, 1994).

[168] As a shorthand notation in this document, we are using ''recreational marine engines'' to mean recreational marine diesel engines and all gasoline SD/I engines, even though some SD/I applications could be commercial. We are similarly using ''recreational boats'' to mean boats powered by recreational marine diesel engines as well as all boats powered by gasoline engines, even though some gasoline engine-powered boats may be commercial.

[169] See Final Finding, ''Control of Emissions from New Nonroad Spark-Ignition Engines Rated above 19 Kilowatts and New Land-Based Recreational Spark-Ignition Engines'' elsewhere in today's **Federal Register** for EPA's finding for Large SI engines and recreational vehicles. EPA's findings for marine engines are contained in 61 FR 52088 (October 4, 1996) for gasoline engines and 64 FR 73299 (December 29, 1999) for diesel engines.

twenty years, EPA has good information on the number of companies that manufacture or market highway motorcycles for the U.S. market in each model year. In addition to the big six manufacturers noted above, EPA finds as many as several dozen more companies that have operated in the U.S. market in the last couple of model years. Most of these are U.S. companies that are either manufacturing or importing motorcycles, although a few are U.S. affiliates of larger companies in Europe or Asia. Some of the U.S. manufacturers employ only a few people and produce only a handful of custom motorcycles per year, while others may employ several hundred and produce up to several thousand motorcycles per year.

c. Marine Vessels. Marine vessels include the boat, engine, and fuel system. The evaporative emission controls discussed above may affect the boat builders and/or the fuel tank manufacturers. Exhaust emission controls including NTE requirements, as addressed in the August 29, 1999 SBAR Panel Report, would affect the engine manufacturers and may affect boat builders.

EPA has less precise information about recreational boat builders than is available about engine manufacturers. EPA has utilized several sources, including trade associations and Internet sites when identifying entities that build and/or sell recreational boats. EPA has also worked with an independent contractor to assist in the characterization of this segment of the industry. Finally, EPA has obtained a list of nearly 1,700 boat builders known to the U.S. Coast Guard to produce boats using engines for propulsion. At least 1,200 of these companies install engines that use gasoline fueled engines and would therefore be subject to the evaporative emission control program discussed above. More than 90% of the companies identified so far would be considered small businesses as defined by SBA. EPA continues to develop a more complete picture of this segment of the industry and will provide additional information as it becomes available.

Based on information supplied by a variety of recreational boat builders, fuel tanks for boats using SI marine engines are usually purchased from fuel tank manufacturers. However, some boat builders construct their own fuel tanks. The boat builder provides the specifications to the fuel tank manufacturer who helps match the fuel tank for a particular application. It is the boat builder's responsibility to install the fuel tank and connections into their vessel design. For vessels designed to be used with small outboard engines, the boat builder may not install a fuel tank; therefore, the end user would use a portable fuel tank with a connection to the engine.

EPA has determined that total sales of tanks for gasoline marine applications is approximately 550,000 units per year. The market is broken into manufacturers that produce plastic tanks and manufacturers that produce aluminum tanks. EPA has determined that there are at least seven companies that make plastic fuel tanks with total sales of approximately 440,000 units per year. EPA has determined that there at least four companies that make aluminum fuel tanks with total sales of approximately 110,000 units per year. All but one of these plastic and aluminum fuel tank manufacturers is a small business as defined under SBA.

EPA has determined that there are at least 16 companies that manufacture CI diesel engines for recreational vessels. Nearly 75 percent of diesel engines sales for recreational vessels in 2000 can be attributed to three large companies. Six of the 16 identified companies are considered small businesses as defined by SBA. Based on sales estimates for 2000, these six companies represent approximately 4 percent of recreational marine diesel engine sales. The remaining companies each comprise between two and seven percent of sales for 2000.

EPA has determined that there are at least 24 companies that manufacture SD/I gasoline engines (including airboats and jet boats) for recreational vessels. Seventeen of the identified companies are considered small businesses as defined by SBA. These 17 companies represent approximately 6 percent of recreational gasoline marine engines sales for 2000. Approximately 70–80 percent of gasoline SD/I engines manufactured in 2000 can be attributed to one company. The next largest company is responsible for about 10–20 percent of 2000 sales.

d. Large Spark Ignition Engines. EPA is aware of one engine manufacturer of Large SI engines that qualifies as a small business. This company plans to produce engines that meet the standards adopted by CARB in 2004, with the possible exception of one engine family. If EPA adopts long-term standards, this would require manufacturers to do additional calibration and testing work. If EPA adopts new test procedures (including transient operation), there may also be a cost associated with upgrading test facilities.

4. Potential Reporting, Record Keeping, and Compliance

For any emission control program, EPA must have assurances that the regulated engines will meet the standards. Historically, EPA programs have included provisions placing manufacturers responsible for providing these assurances. The program that EPA is considering for manufacturers subject to this proposal may include testing, reporting, and record keeping requirements. Testing requirements for some manufacturers may include certification (including deterioration testing), and production line testing. Reporting requirements would likely include test data and technical data on the engines including defect reporting. Manufacturers would likely have to keep records of this information.

5. Related Federal Rules

The Panel is aware of several other current Federal rules that relate to the proposed rule under development. During the Panel's outreach meeting, SERs specifically pointed to Consumer Product Safety Commission (CPSC) regulations covering ATVs, and noted that they may be relevant to crafting an appropriate definition for a competition exclusion in this category. The Panel recommends that EPA continue to consult with the CPSC in developing a proposed and final rule in order to better understand the scope of the Commission's regulations as they may relate to the competition exclusion.

Other SERs, representing manufacturers of marine engines, noted that the U.S. Coast Guard regulates vessel tanks, most notably tank pressure and anti-siphoning requirements for carburetted engines. Tank manufacturers would have to take these requirements into account in designing evaporative control systems. The Panel recommends that EPA continue to work with the Coast Guard to evaluate the safety implications of any proposed evaporative emissions standards and to avoid interference with Coast Guard safety regulations.

The Panel is also aware of other Federal rules that relate to the categories that EPA would address with the proposed rule, but are not likely to affect policy considerations in the rule development process. For example, there are now EPA noise standards covering off-road motorcycles; however, EPA expects that most emission control devices are likely to reduce, rather than increase, noise, and that therefore the noise standards are not likely to be important in developing a proposed rule.

OTAQ is currently developing a proposal that would revise the rule assigning fees to be paid by parties required to certify engines in return for continuing Government oversight and testing. Among other options, EPA could propose to extend the fee structure to several classes of non-road engines for which requirements are being established for the first time under the Recreation Rule. The Panel understands that EPA will carefully examine the potential impacts of the Fees Rule on small businesses. The Panel also notes that EPA's Office of Air Quality, Planning, and Standards (OAQPS) is preparing a Maximum Achievable Control Technology (MACT) standard for Engine Testing Facilities, which is a related matter.

6. Significant Panel Findings

The Panel considered a wide range of options and regulatory alternatives for providing small businesses with flexibility in complying with the proposed emissions standards and related requirements. As part of the process, the Panel requested and received comment on several ideas for flexibility that were suggested by SERs and Panel members. The major options recommended by the Panel are summarized below. The complete set of recommendations can be found in Section 9 of the Panel's full Report.

Many of the flexible approaches recommended by the Panel can be applied to several of the equipment categories that would potentially be affected by the proposed rule EPA is developing. These approaches are identified in Table 1. *First Tier Flexibilities:* Based on consultations with SERs, the Panel believes that the first four provisions in Table 1 are likely to provide the greatest flexibility for many small entities. These provisions are likely to be most valuable because they either provide more time for compliance (e.g., additional leadtime and hardship provisions) or allow for certification of engines based on particular engine designs or certification to other EPA programs. *Second Tier Flexibilities:* The remaining four approaches have the potential to reduce near-term and even long-term costs once a small entity has a product it is preparing to certify. These are important in that the costs of testing multiple engine families, testing a fraction of the production line, and/or developing deterioration factors can be significant. Small businesses could also meet an emission standard on average or generate credits for producing engines which emit at levels below the standard; these credits could then be sold to other manufacturers for compliance or banked for use in future model years.

During the consultation process, it became evident that, in a few situations, it could be helpful to small entities if unique provisions were available. Five such provisions are described below.

a. Snowmobiles. The Panel recommends EPA seek comment on a provision which would allow small snowmobile manufacturers to petition EPA for a relaxed standard for one or more engine families, up to 300 engines per year, until the family is retired or modified, if such a standard is justifiable based on the criteria described in the Panel report.

b. ATVs and Off-road Motorcycles. The Panel recommends that the hardship provision for ATVs and off-road motorcycles allow hardship relief to be reviewed annually for a period that EPA anticipates will likely be no more than two years in order for importers to obtain complying products.

c. Large SI. The Panel recommends that small entities be granted the flexibility initially to reclassify a small number of their small displacement engines into EPA's small spark-ignition engine program (40 CFR 90). Small entities would be allowed to use those requirements in lieu of the requirements EPA intends to propose for large entities.

d. Marine Vessel Tanks. Most of this sector involves small fuel tank manufacturers and small boat builders. The Panel recommends that the program be structured with longer lead times and an early credit generation program to enable the fuel tank manufacturers to implement controls on tanks on a schedule consistent with their normal turnover of fuel tank molds.

e. Highway Motorcycles. The California Air Resources Board (CARB) has found that California's Tier 2 standard is potentially infeasible for small manufacturers. Therefore, the Panel recommends that EPA delay making decisions on the applicability to small businesses of Tier 2 or other such revisions to the federal regulations until California's 2006 review is complete.

7. Summary of SBREFA Process and Panel Outreach

As required by section 609(b) of the RFA, as amended by SBREFA, EPA conducted outreach to small entities and convened a Small Business Advocacy Review Panel to obtain advice and recommendations of representatives of the small entities that potentially would be subject to the rule's requirements.

On May 3, 2001, EPA's Small Business Advocacy Chairperson convened this Panel under Section 609(b) of the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA). In addition to the Chair, the Panel consisted of the Director of the Assessment and Standards Division (ASD) within EPA's Office of Transportation and Air Quality, the Chief Counsel for Advocacy of the Small Business Administration, and the Deputy Administrator of the Office of Information and Regulatory Affairs within the Office of Management and Budget. As part of the SBAR process, the Panel met with small entity representatives (SERs) to discuss the potential emission standards and, in addition to the oral comments from SERs, the Panel solicited written input. In the months preceding the Panel process, EPA conducted outreach with small entities from each of the five sectors as described above. On May 18, 2001, the Panel distributed an outreach package to the SERs. On May 30 and 31, 2001, the Panel met with SERs to hear their comments on preliminary alternatives for regulatory flexibility and related information. The Panel also received written comments from the SERs in response to the discussions at this meeting and the outreach materials. The Panel asked SERs to evaluate how they would be affected under a variety of regulatory approaches, and to provide advice and recommendations regarding early ideas for alternatives that would provide flexibility to address their compliance burden.

SERs representing companies in each of the sectors addressed by the Panel raised concerns about the potential costs of complying with the rules under development. For the most part, their concerns were focused on two issues: (1) The difficulty (and added cost) that they would face in complying with certification requirements associated with the standards EPA is developing, and (2) the cost of meeting the standards themselves. SERs observed that these costs would include the opportunity cost of deploying resources for research and development, expenditures for tooling/retooling, and the added cost of new engine designs or other parts that would need to be added to equipment in order to meet EPA emission standards. In addition, in each category, the SERs noted that small manufacturers (and in the case of one category, small importers) have fewer resources and are therefore less well equipped to undertake these new activities and expenditures. Furthermore, because their product lines tend to be smaller,

any additional fixed costs must be recovered over a smaller number of units. Thus, absent any provisions to address these issues, new emission standards are likely to impose much more significant adverse effects on small entities than on their larger competitors.

The Panel discussed each of the issues raised in the outreach meetings and in written comments by the SERs. The Panel agreed that EPA should consider the issues raised by the SERs and that it would be appropriate for EPA to propose and/or request comment on various alternative approaches to address these concerns. The Panel's key discussions centered around the need for and most appropriate types of regulatory compliance alternatives for small businesses. The Panel considered a variety of provisions to reduce the burden of complying with new emission standards and related requirements. Some of these provisions would apply to all companies (e.g., averaging, banking, and trading), while others would be targeted at the unique circumstances faced by small businesses. A complete discussion of the regulatory alternatives recommended by the Panel can be found in the Final Panel Report. Copies of the Final Report can be found in the docket for this rulemaking or at *www.epa.gov/sbrefa.* Summaries of the Panel's recommended alternatives for each of the sectors subject to this action can be found in the respective sections of the preamble.

As required by section 609(b) of the RFA, as amended by SBREFA, EPA also conducted outreach to small entities and convened a Small Business Advocacy Review Panel to obtain advice and recommendations of representatives of the small entities that potentially would be subject to the rule's requirements. EPA's Small Business Advocacy Chairperson convened this on May 3, 2001. In addition to the Chair, the Panel consisted of the Director of the Assessment and Standards Division (ASD) within EPA's Office of Transportation and Air Quality, the Chief Counsel for Advocacy of the Small Business Administration, and the Deputy Administrator of the Office of Information and Regulatory Affairs within the Office of Management and Budget.

The proposal being developed covers diesel engines used in recreational marine applications. It also covers several nonroad spark ignition (SI) engine applications, as follows:

- Land-based recreational engines (for example, engines used in snowmobiles, off-highway motorcycles, and all-terrain vehicles (ATVs)),
- Marine sterndrive and inboard (SD/I) engines and boats powered by SI marine engines,
- Land-based engines rated over 19 kW (Large SI) (for example, engines used in forklifts); this category includes auxiliary marine engines, which are not used for propulsion.

In addition to the nonroad vehicles and engines noted above, EPA also intends to update EPA requirements for highway motorcycles. Finally, the proposal being developed included evaporative emission control requirements for gasoline fuel tanks and systems used on marine vessels.

The Panel met with Small Entity Representatives (SERs) to discuss the potential emissions standards and, in addition to the oral comments from SERs, the Panel solicited written input. In the months preceding the Panel process, EPA conducted outreach with small entities from each of the five sectors as described above. On May 18, 2001, the Panel distributed an outreach package to the SERs. On May 30 and 31, 2001, the Panel met with SERs to hear their comments on preliminary options for regulatory flexibility and related information. The Panel also received written comments from the SERs in response to the discussions at this meeting and the outreach materials. The Panel asked SERs to evaluate how they would be affected under a variety of regulatory approaches, and to provide advice and recommendations regarding early ideas to provide flexibility. See Section 8 of the Panel Report for a complete discussion of SER comments, and Appendices A and B for summaries of SER oral comments and SER written comments.

Consistent with the RFA/SBREFA requirements, the Panel evaluated the assembled materials and small-entity comments on issues related to the elements of the IRFA. A copy of the Panel report is included in the docket for this proposed rule. The following are Panel recommendations adopted by the Agency. Please note *all* Panel recommendations were adopted for this proposal.

a. *Related Federal Rules.* The Panel recommends that EPA continue to consult with the CPSC in developing a proposed and final rule in order to better understand the scope of the Commission's regulations as they may relate to the competition exclusion. In addition, the Panel recommends that EPA continue to work with the Coast Guard to evaluate the safety implications of any proposed evaporative emissions standards and to avoid interference with Coast Guard safety regulations.

b. Regulatory Flexibility Alternatives. The Panel recommends that EPA consider and seek comments on a wide range of alternatives, including the flexibility options described below.

c. Large SI Engines. The Panel recommends that EPA propose several possible provisions to address concern that the new EPA standards could potentially place small businesses at a competitive disadvantage to larger entities in the industry. These provisions are described below.

Using Certification and Emissions Standards from Other EPA Programs. The Panel made several recommendations for this provision. First, the Panel recommends that EPA temporarily expand this arrangement to allow small numbers of constant-speed engines up to 2.5 liters (up to 30 kW) to be certified to the Small SI standards. Second, the Panel further recommends that EPA seek comment on the appropriateness of limiting the sales level of 300. Third, the Panel recommends that EPA request comment on the anticipated cap of 30 kW on the special treatment provisions outlined above, or whether a higher cap on power rating is appropriate. Finally, the Panel recommends that EPA propose to allow small-volume manufacturers producing engines up to 30 kW to certify to the small SI standards during the first 3 model years of the program. Thereafter, the standards and test procedures which could apply to other companies at the start of the program would apply to small businesses.

Delay of Proposed Standards. If EPA includes a second phase of standards in its proposal, the Panel recommends that EPA propose to delay the applicability of these standards to small-volume manufacturers for three years beyond the date at which they would generally apply to accommodate the possibility that small companies need to undertake further design work to adequately optimize their designs and to allow them to recover the costs associated with the Phase 1 emission standards that EPA is contemplating.

Production Line Testing. The Panel made several recommendations for this provision. First, the Panel recommends that EPA adopt provisions that allow more flexibility than is available under the California Large SI program or other EPA programs generally to address the concern that production-line testing is another area where small-volume manufacturers typically face a difficult testing burden. Second, the Panel recommends that EPA allow small-volume manufacturers to have a reduced testing rate if they have consistently good test results from

testing production-line engines. Finally, the Panel recommends that EPA allow small-volume manufacturers to use alternative low-cost testing options to show that production-line engines meet emission standards.

Deterioration Factors. The Panel recommends that EPA allow small-volume manufacturers to develop a deterioration factor based on available emissions measurements and good engineering judgement.

Hardship Provision. The Panel recommends that EPA propose two types of hardship provisions for Large SI engines. First the Panel recommends that EPA allow small businesses to petition EPA for additional lead time (e.g., up to 3 years) to comply with the standards. Second, the Panel recommends that EPA allow small businesses to apply for hardship relief if circumstances outside their control cause the failure to comply (i.e., supply contract broken by parts supplier) and if the failure to sell the subject engines would have a major impact on the company's solvency.

d. Off-Road Motorcycles and All-Terrain Vehicles (ATVs). The Panel made the following recommendations for this subcategory.

The Panel recommends that EPA propose to apply the flexibilities described below to engines produced or imported by small entities with combined off-road motorcycle and ATV annual sales of less than 5,000 units per model year.

The Panel recommends that EPA request comment on the appropriateness of the 5,000 unit per model year threshold.

The Panel recommends that EPA request comment on allowing small entities with sales in excess of 5,000 units to certify using the flexible approaches described below for a number of engines equal to their 2000 or 2001 sales level.

The Panel recommends that EPA describe and seek comment on the effect of the proposed standard on these entities, including a request for any data and/or related studies to estimate the extent to which sales of their products are likely to be reduced as a result of changes in product price that are attributable to the proposed standards.

The Panel recommends that, in the final rule, EPA assess any information received in response to this request for purposes of informing the final rule decision making process on whether additional flexibility (beyond that considered in this report) is warranted.

Additional Lead-time to Meet the Proposed Standards. First, the Panel recommends that EPA propose at least a two year delay, but seek comment on whether a larger time period is appropriate given the costs of compliance for small businesses and the relationship between importers and their suppliers. Second, the Panel recommends that EPA provide additional time for small volume manufacturers to revise their manufacturing process, and would allow importers to change their supply chain to acquire complying products. Third, the Panel recommends that EPA request comment on the appropriate length for a delay (lead-time).

Design Certification. First, the Panel recommends that EPA propose to permit small entities to use design certification. Second, the Panel recommends that EPA work with the Small Entity Representatives and other members of the industry to develop appropriate criteria for such design based certification.

Broaden Engine Families. The Panel recommends that EPA request comment on engine family flexibility and conducting design-based certification emissions testing.

Production Line Testing Waiver. The Panel recommends that EPA propose to provide small manufacturers and small importers a waiver from manufacturer production line testing. The Panel also recommends that EPA request comment on whether limits or the scope of this waiver are appropriate.

Use of Assigned Deterioration Factors During Certification. The Panel recommends that EPA propose to provide small business with the option to use assigned deterioration factors.

Using Certification and Emissions Standards from Other EPA Programs. The Panel recommends that EPA propose to provide small business with this flexibility through the fifth year of the proposed program and request comment on which of the already established standards and programs are believed to be a useful certification option for the small businesses.

Averaging, Banking, and Trading. The Panel recommends that EPA propose to provide small business with the same averaging, banking, and trading program flexibilities proposed for large manufacturers and request comment on how the provisions could be enhanced for small business to make them more useful.

Hardship Provisions. The Panel recommends that EPA propose two types of hardship program for off-road motorcycles and ATVs: (1) EPA should allow small manufacturers and small importers to petition EPA for limited additional lead-time to comply with the standards; and (2) allow small manufacturers and small importers to apply for hardship relief if circumstances outside their control cause the failure to comply (i.e. supply contract broken by parts supplier) and if failure to sell the subject engines or vehicles would have a major impact on the company's solvency.

The Panel also recommends that EPA propose both aspects of the hardship provisions for small off-road motorcycle and ATV manufacturers and importers and seek comment on the implementation provisions.

e. Marine Vessels. Burden Reduction Approaches Designed for Small Boat Builders and Fuel Tank Manufacturers.

Smooth Transition to Proposed Standards. The Panel recommends that EPA propose an approach that would implement any evaporative standards five years after a regulation for marine engines takes effect. The Panel also recommends that EPA seek comment on this five year period and on whether there are small entities whose product line is dominated by tanks that turn over at a time rate slower time than five years.

Design-Based Certification. The Panel recommends that EPA propose to grant small businesses the option of certifying to the evaporative emission performance requirements based on fuel tank design characteristics that reduce emissions. The Panel also recommends that EPA seek comment on and consider proposing an approach that would allow manufacturers to use this averaging approach with designs other than those listed in the final rule.

ABT of Emission Credits with Design-Based Certification. The Panel recommends that EPA allow manufacturers using design-based certification to generate credits. The Panel also recommends that EPA provide adequately detailed design specifications and associated emission levels for several technology options that could be used to certify.

Broadly Defined Product Certification Families. The Panel recommends that EPA take comment on the need for broadly defined emission families and how these families should be defined.

Hardship Provisions. The Panel recommends that EPA propose two types of hardship programs for marine engine manufacturers and fuel tank manufacturers: (1) Allow small businesses to petition EPA for additional lead time to comply with the standards; and (2) allow small businesses to apply for hardship relief if circumstances outside their control cause the failure to comply (i.e. supply contract broken by parts supplier) and if the failure to sell the subject fuel tanks

or boats would have a major impact on the company's solvency. The Panel also recommends that EPA work with small manufacturers to develop these criteria and how they would be used.

Burden Reduction Approaches Designed for Small Marinizers of Marine Engines with Respect to NTE Provisions. The Panel recommends that EPA propose to specifically include NTE in this design-based approach, if EPA proposes a standard that includes NTE for small marinizers.

f. Snowmobiles. Delay of Proposed Standards. The Panel recommends that EPA propose to delay the standards for small snowmobile manufacturers by two years from the date at which other manufacturers would be required to comply. The Panel also recommends that EPA propose that the emission standards for small snowmobile manufacturers be phased in over an additional two year (four years to fully implement the standard).

Design-Based Certification. The Panel recommends that EPA take comment on how a design-based certification could be applied to small snowmobile manufacturers and that EPA work with the small entities in the design and implementation of this concept.

Broader Engine Families. The Panel recommends that EPA propose a provision for small snowmobile manufactures that would use relaxed criteria for what constitutes an engine or vehicle family.

Elimination of Production Line Testing Requirements. The Panel recommends that EPA propose that small snowmobile manufacturers not be subject to production line testing requirements.

Use of Assigned DF During Certification. The Panel recommends that EPA propose to allow small snowmobile manufacturers to elect to use deterioration factors determined by EPA to demonstrate end of useful life emission levels, thus reducing development/testing burden rather than performing a durability demonstration for each engine family as part of the certification testing requirement.

Using Certification and Emission Standards from Other EPA Programs. If the manufacturer were to change the bore or stroke of the engine, it is likely that the engine would no longer qualify as emissions could increase, allow this option for small snowmobile manufacturers.

Averaging, Banking and Trading. The Panel recommends that EPA propose an averaging, banking and trading program for snowmobiles, and seek comment on additional ABT flexibilities it should consider for small snowmobile manufacturers.

Hardship Provisions. The Panel recommends that EPA propose two types of hardship programs for small snowmobile manufacturers: (1) Allow small snowmobile manufacturers to petition EPA for additional lead time to comply with the standards; and (2) allow small snowmobile manufacturers to apply for hardship relief if circumstances outside their control cause the failure to comply (i.e. supply contract broken by parts supplier) and if failure to sell the subject engines or vehicles would have a major impact on the company's solvency.

Unique Snowmobile Engines. The Panel recommends that EPA seek comment on an additional provision, which would allow a small snowmobile manufacturer to petition EPA for relaxed standards for one or more engine families. The Panel also recommends that EPA allow a provision for EPA to set an alternative standard at a level between the prescribed standard and the baseline level until the engine family is retired or modified in such a way as to increase emission and for the provision to be extended for up to 300 engines per year per manufacturer would assure it is sufficiently available for those manufacturers for whom the need is greatest. Finally, the Panel recommends that EPA seek comment on initial and deadline dates for the submission of such petitions.

g. Highway Motorcycles. The Panel recommends that EPA include the flexibilities described below for small entities with highway motorcycle annual sales of less than 3,000 units per model year (combined Class I, II, and III motorcycles) and fewer than 500 employees.

Delay of Proposed Standards. The Panel recommends that EPA propose to delay compliance with the Tier 1 standard of 1.4 g/km $HC+NO_X$ until the 2008 model year for small volume manufacturers. The Panel also recommends that EPA seek comment on whether additional time is needed for small businesses to comply with the Federal program. The Panel recommends that EPA participate with CARB in the 2006 progress review as these provisions are revisited, and delay making decisions on the applicability to small businesses of Tier 2 or other revisions to the federal regulations that are appropriate following the review. The Panel also recommends that any potential Tier 2 requirements for small manufacturer motorcycles consider potential test procedure changes arising from the ongoing World Motorcycle Test Cycle work described in the Panel Report.

Broader Engine Families. The Panel recommends that EPA deep the current existing regulations for small volume highway motorcycle manufacturers.

Exemption from Production Line Testing. The Panel recommends that EPA keep the current provisions for no mandatory production line testing requirement for highway motorcycles and allow the EPA to request production vehicles from any certifying manufacturer for testing.

Averaging, Banking, and Trading (ABT). The Panel recommends that EPA propose an ABT program for highway motorcycles.

Hardship Provisions. The Panel recommends that EPA propose two types of hardship programs for highway motorcycles: (1) Allow small businesses to petition EPA for additional lead time to comply with the standards; and (2) allow small businesses to apply for hardship relief if circumstances outside their control cause the failure to comply (i.e. supply contract broken by parts supplier) and if failure to sell the subject engines or vehicles would have a major impact on the company's solvency. The Panel also recommends that EPA request comment on the California requirements, which do not include hardship provisions.

Reduced Certification Data Submittal and Testing Requirements. The Panel recommends that EPA keep current EPA regulations allow significant flexibility for certification by manufacturers who project fewer than 10,000 unit sales of combined Class I, II, and III motorcycles.

We invite comments on all aspects of the proposal and its impacts on small entities.

C. Paperwork Reduction Act

The information collection requirements (ICR) in this proposed rule will be submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* We will announce in a separate **Federal Register** Notice that the ICR has been submitted to OMB and will take comments on the proposed ICR at that time.

The Agency may not conduct or sponsor an information collection, and a person is not required to respond to a request for information, unless the information collection request displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.

D. Intergovernmental Relations

1. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for federal agencies to assess the effects of their regulatory actions on state, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''federal mandates'' that may result in expenditures to state, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

This rule contains no federal mandates for state, local, or tribal governments as defined by the provisions of Title II of the UMRA. The rule imposes no enforceable duties on any of these governmental entities. Nothing in the rule would significantly or uniquely affect small governments.

EPA has determined that this rule contains federal mandates that may result in expenditures of more than $100 million to the private sector in any single year. EPA believes that the proposal represents the least costly, most cost-effective approach to achieve the air quality goals of the rule. The costs and benefits associated with the proposal are discussed in Section IX and in the Draft Regulatory Support Document, as required by the UMRA.

2. Consultation and Coordination With Indian Tribal Governments (Executive Order 13084)

On January 1, 2001, Executive Order 13084 was superseded by Executive Order 13175. However, the proposed rule was developed during the period when Executive Order 13084 was still in force, and so tribal considerations were addressed under Executive Order 13084. Development of the final rule will address tribal considerations under Executive Order 13175.

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

This proposal does not significantly or uniquely affect the communities of Indian Tribal governments. The proposed emission standards and other related requirements for private businesses in this proposal would have national applicability, and thus would not uniquely affect the communities of Indian Tribal Governments. Further, no circumstances specific to such communities exist that would cause an impact on these communities beyond those discussed in the other sections of this proposal. Thus, EPA's conclusions regarding the impacts from the implementation of this proposed rule discussed in the other sections are equally applicable to the communities of Indian Tribal governments. Accordingly, the requirements of Section 3(b) of Executive Order 13084 do not apply to this rule.

E. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, Section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This proposed rule involves technical standards. The following paragraphs describe how we specify testing procedures for engines subject to this proposal.

The International Organization for Standardization (ISO) has a voluntary consensus standard that can be used to test Large SI engines. However, the current version of that standard (ISO 8178) is applicable only for steady-state testing, not for transient testing. As described in the Draft Regulatory Support Document, transient testing is an important part of the proposed emission-control program for these engines. We are therefore not proposing to adopt the ISO procedures in this rulemaking.

Underwriters Laboratories (UL) has adopted voluntary consensus standards for forklifts that are relevant to the proposed requirements for Large SI engines. UL sets a maximum temperature specification for gasoline and, for forklifts used in certain applications, defines requirements to avoid venting from gasoline fuel tanks. We are proposing a different temperature limit, because the maximum temperature specified by UL does not prevent fuel boiling. We are proposing separate measures to address venting of gasoline vapors, because of UL's provisions to allow venting with an orifice up to 1.78 mm (0.070 inches). We believe forklifts with such a vent would have unnecessarily high evaporative emissions. If the UL standard is revised to address these technical concerns, the UL standards would appropriate to reference in our regulations. An additional concern relates to the fact that the UL requirements apply only to forklifts (and not all forklifts in the case of the restriction on vapor venting). EPA

regulations would therefore need to, at a minimum, extend any published UL standards to other engines and equipment to which the UL standards would otherwise not apply.

We are proposing to test off-highway motorcycles and all-terrain vehicles with the Federal Test Procedure, a chassis-based transient test. There is no voluntary consensus standard that would adequately address engine or vehicle operation for suitable emission measurement. Furthermore, we are interested in pursuing an engine-based test procedure for all-terrain vehicles. We would need to develop a new duty cycle for this, because there is no acceptable engine duty cycle today that would adequately represent the way these engines operate. For snowmobiles, we are proposing test procedures based on work that has been published, but not yet adopted as a voluntary consensus standard.

For recreational marine diesel engines, we are proposing the same test procedures that we have adopted for commercial marine diesel engines (with a new duty cycle appropriate for recreational applications). We are again proposing these procedures in place of the ISO 8178 standard that would apply to these engines. We believe that ISO 8178 relies too heavily on reference testing conditions. Because our test procedures need to represent in-use operation typical of operation in the field, they must be based on a range of ambient conditions. We determined that the ISO procedures are not broadly usable in their current form, and therefore should not be adopted by reference. We remain hopeful that future ISO test procedures will be developed that are usable and accurate for the broad range of testing needed, and that such procedures could then be adopted. We expect that any such development of revised test procedures will be done in accordance with ISO procedures and in a balanced and transparent manner that includes the involvement of all interested parties, including industry, U.S. EPA, foreign government organizations, state governments, and environmental groups. In so doing, we believe that the resulting procedures would be ''global'' test procedures that can facilitate the free flow of international commerce for these products.

F. Protection of Children (Executive Order 13045)

Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that (1) is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, Section 5–501 of the Order directs the Agency to evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This proposed rule is not subject to the Executive Order because it does not involve decisions on environmental health or safety risks that may disproportionately affect children.

The effects of ozone and PM on children's health were addressed in detail in EPA's rulemaking to establish the NAAQS for these pollutants, and EPA is not revisiting those issues here. EPA believes, however, that the emission reductions from the strategies proposed in this rulemaking will further reduce air toxics and the related adverse impacts on children's health.

G. Federalism (Executive Order 13132)

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

Section 4 of the Executive Order contains additional requirements for rules that preempt State or local law, even if those rules do not have federalism implications (i.e., the rules will not have substantial direct effects on the States, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government). Those requirements include providing all affected State and local officials notice and an opportunity for appropriate participation in the development of the regulation. If the preemption is not based on express or implied statutory authority, EPA also must consult, to the extent practicable, with appropriate State and local officials regarding the conflict between State law and Federally protected interests within the agency's area of regulatory responsibility.

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132.

Although Section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with representatives of various State and local governments in developing this rule. EPA has also consulted representatives from STAPPA/ALAPCO, which represents state and local air pollution officials.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed rule from State and local officials.

H. Energy Effects (Executive Order 13211)

This rule is not a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution or use of energy. The proposed standards have for their aim the reduction of emission from certain nonroad engines, and have no effect on fuel formulation, distribution, or use. Generally, the proposed program leads to reduced fuel usage due to the improvements in engine control technologies.

I. Plain Language

This document follows the guidelines of the June 1, 1998 Executive Memorandum on Plain Language in Government Writing. To read the text of

the regulations, it is also important to understand the organization of the Code of Federal Regulations (CFR). The CFR uses the following organizational names and conventions.

Title 40—Protection of the Environment

Chapter I—Environmental Protection Agency

Subchapter C—Air Programs. This contains parts 50 to 99, where the Office of Air and Radiation has usually placed emission standards for motor vehicle and nonroad engines.

Subchapter U—Air Programs Supplement. This contains parts 1000 to 1299, where we intend to place regulations for air programs in future rulemakings.

Part 1048—Control of Emissions from New, Large, Nonrecreational, Nonroad Spark-ignition Engines. Most of the provisions in this part apply only to engine manufacturers.

Part 1051—Control of Emissions from Recreational Engines and Vehicles.

Part 1065—General Test Procedures for Engine Testing. Provisions of this part apply to anyone who tests engines to show that they meet emission standards.

Part 1068—General Compliance Provisions for Engine Programs. Provisions of this part apply to everyone.

Each part in the CFR has several subparts, sections, and paragraphs. The following illustration shows how these fit together.

Part 1048
Subpart A
Section 1048.001
(a)
(b)
(1)
(2)
(i)
(ii)
(A)
(B)

A cross reference to § 1048.001(b) in this illustration would refer to the parent paragraph (b) and all its subordinate paragraphs. A reference to ''§ 1048.001(b) introductory text'' would refer only to the single, parent paragraph (b).

List of Subjects

40 CFR Part 89

Environmental protection, Administrative practice and procedure, Confidential business information, Imports, Labeling, Motor vehicle pollution, Reporting and recordkeeping requirements, Research, Vessels, Warranties.

40 CFR Part 90

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

40 CFR Parts 91 and 1051

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

40 CFR Parts 94

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Penalties, Reporting and recordkeeping requirements, Vessels, Warranties.

40 CFR Part 1048

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

40 CFR Part 1065

Environmental protection, Administrative practice and procedure, Reporting and recordkeeping requirements, Research.

40 CFR Part 1068

Environmental protection, Administrative practice and procedure, Confidential business information, Imports, Motor vehicle pollution, Penalties, Reporting and recordkeeping requirements, Warranties.

Dated: September 14, 2001.

Christine Todd Whitman,

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 set forth below.

PART 89—CONTROL OF EMISSIONS FROM NEW AND IN-USE NONROAD COMPRESSION-IGNITION ENGINES

1. The authority for part 89 continues to read as follows:

Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7545, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

2. Section 89.2 is amended by adding definitions for ''Aircraft'' and ''Spark-ignition'' in alphabetic order and revising the definition of ''Compression-ignition'' to read as follows:

§ 89.2 Definitions.

* * * * *

Aircraft means any vehicle capable of sustained air travel above treetop heights.

* * * * *

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

* * * * *

Spark-ignition means relating to a type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark-ignition engines usually use a throttle to regulate intake air flow to control power during normal operation.

* * * * *

PART 90—CONTROL OF EMISSIONS FROM NONROAD SPARK-IGNITION ENGINES AT OR BELOW 19 KILOWATTS

3. The heading to part 90 is revised to read as set forth above.

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

Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

5. Section 90.1 is revised to read as follows:

§ 90.1 Applicability.

(a) This part applies to new nonroad spark-ignition engines and vehicles with gross power output at or below 19 kilowatts (kW) used for any purpose, unless we exclude them under paragraph (c) of this section.

(b) This part also applies to engines with a gross power output above 19 kW if the manufacturer uses the provisions of 40 CFR 1048.615 or 1048.145 to exempt them from the requirements of 40 CFR part 1048. Compliance with the provisions of this part is a required condition of that exemption.

(c) The following nonroad engines and vehicles are not subject to the provisions of this part:

(1) Engines used in snowmobiles, all-terrain vehicles, or off-highway motorcycles and regulated in 40 CFR part 1051. This part nevertheless applies to engines used in all-terrain vehicles or off-highway motorcycles if the manufacturer uses the provisions of 40 CFR 1051.615 to exempt them from the requirements of 40 CFR part 1051. Compliance with the provisions of this part is a required condition of that exemption.

(2) Engines used in highway motorcycles. See 40 CFR part 86, subpart E.

(3) Propulsion marine engines. See 40 CFR parts 91 and 1045. This part applies with respect to auxiliary marine engines.

(4) Engines used in aircraft. See 40 CFR part 87.

(5) Engines certified to meet the requirements of 40 CFR part 1048.

(6) Hobby engines.

(7) 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.

(d) 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.

(e) 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.

6. Section 90.2 is amended by adding a new paragraph (c) to read as follows:

§ 90.2 Effective dates.

* * * * *

(c) Notwithstanding paragraphs (a) and (b) of this section, engines used in recreational vehicles with engine rated speed greater than or equal to 5,000 rpm and with no installed speed governor are not subject to the provisions of this part through the 2005 model year. Starting with the 2006 model year, all the requirements of this part apply to engines used in these vehicles if they are not included in the scope of 40 CFR part 1051.

7. Section 90.3 is amended by adding definitions for ''Aircraft'', ''Hobby engines'', ''Marine engine'', ''Marine vessel'', ''Recreational'', and ''United States'' in alphabetical order, to read as follows:

§ 90.3 Definitions.

* * * * *

Aircraft means any vehicle capable of sustained air travel above treetop heights.

* * * * *

Hobby engines means engines used in reduced-scale models of vehicles that are not capable of transporting a person (for example, model airplanes).

Marine engine means an engine that someone installs or intends to install on a marine vessel.

Marine vessel means a vehicle that is capable of operation in water but is not capable of operation out of water. Amphibious vehicles are not marine vessels.

* * * * *

Recreational means, for purposes of this part, relating to a vehicle intended by the vehicle manufacturer to be operated primarily for pleasure. Note that snowmobiles, all-terrain vehicles, and off-highway motorcycles are recreational vehicles that we regulate under 40 CFR part 1051.

* * * * *

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

* * * * *

Subpart B—[Amended]

8. Section 90.103 is amended by redesignating paragraph (a)(2)(v) as paragraph (a)(2)(vi) and adding a new paragraph (a)(2)(v) to read as follows:

§ 90.103 Exhaust emission standards.

(a) * * *

(2) * * *

(v) The engine must be used in a recreational application, with a combined total vehicle dry weight under 20 kilograms;

* * * * *

PART 91—CONTROL OF EMISSIONS FROM MARINE SPARK-IGNITION ENGINES

9. The authority for part 91 continues to read as follows:

Authority: 42 U.S.C. 7521, 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7547, 7549, 7550, and 7601(a).

Subpart A—[Amended]

10. Section 91.3 is amended by adding the definition for United States in alphabetical order to read as follows:

§ 91.3 Definitions.

* * * * *

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

* * * * *

Subpart E—[Amended]

11. Section 91.419 is amended in paragraph (b) by revising the equations for M_{HCexh} and M_{exh} to read as follows:

§ 91.419 Raw emission sampling calculations.

* * * * *

(b) * * *

$M_{HCexh}=12.01+1.008\times\alpha$

* * * * *

$$M_{exh}=\frac{M_{HC_{exh}}\times WHC}{10^6}+\frac{28.01\times WCO}{10^2}+\frac{44.1\times WCO_2}{10^2}+\frac{46.01\times WNO_x}{10^6}+\frac{2.016\times WH_2}{10^2}+18.01\times(1-K)+28.01\times\frac{\left[100-\frac{WHC}{10^4}-WCO-WCO_2-\frac{WNO_X}{10^4}-WH_2-100\times(1-K)\right]}{10^2}$$

* * * * *

Subpart G—[Amended]

12. Appendix A to Subpart G of part 91 is amended by revising Table 1 to read as follows:

Appendix A to Subpart G of Part 91—Sampling Plans for Selective Enforcement Auditing of Marine Engines

TABLE 1.—SAMPLING PLAN CODE LETTER

Annual engine family sales	Code letter
20–50	AA1 [1]
20–99	A [1]
100–299	B
300–499	C
500 or greater	D

[1] A manufacturer may optionally use either the sampling plan for code letter ''AA'' or sampling plan for code letter ''A'' for Selective Enforcement Audits of engine families with annual sales between 20 and 50 engines. Additional, the manufacturers may switch between these plans during the audit.

* * * * *

Subpart I—[Amended]

13. Section 91.803 is amended by revising paragraph (a) to read as follows:

§ 91.803 Manufacturer in-use testing program.

(a) EPA shall annually identify engine families and those configurations within families which the manufacturers must then subject to in-use testing. For each model year, EPA may identify the following number of engine families for testing, based on the manufacturer's total number of engine families to which this subpart is applicable produced in that model year:

(1) For manufactures with three or fewer engine families, EPA may identify a single engine family.

(2) For manufacturers with four or more engine families, EPA may identify a number of engine families that is no greater than twenty-five percent of the manufacturer's total number of engine families.

* * * * *

PART 94—CONTROL OF EMISSIONS FROM MARINE COMPRESSION-IGNITION ENGINES

14. The heading to part 94 is revised to read as set forth above.

15. The authority citation for part 94 continues to read as follows:

Authority: 42 U.S.C. 7522, 7523, 7524, 7525, 7541, 7542, 7543, 7545, 7547, 7549, 7550 and 7601(a).

Subpart A—[Amended]

16. Section 94.1 is revised to read as follows:

§ 94.1 Applicability.

(a) Except as noted in paragraphs (b) and (c) of this section, the provisions of this part apply to manufacturers (including post-manufacture marinizers and dressers), rebuilders, owners and operators of:

(1) Marine engines that are compression-ignition engines manufactured (or that otherwise become new) on or after January 1, 2004;

(2) Marine vessels manufactured (or that otherwise become new) on or after January 1, 2004 and which include a compression-ignition marine engine.

(b) Notwithstanding the provision of paragraph (c) of this section, the requirements and prohibitions of this part do not apply to three types of marine engines:

(1) Category 3 marine engines;

(2) Marine engines with rated power below 37 kW; or

(3) Marine engines on foreign vessels.

(c) The provisions of Subpart L of this part apply to everyone with respect to the engines identified in paragraph (a) of this section.

17. Section 94.2 is amended by revising paragraph (b) introductory text, removing the definition for ''Commercial marine engine'', revising definitions for ''Compression-ignition'', ''Designated officer'', ''Passenger'', ''Recreational marine engine'', ''Recreational vessel'', and ''United States'', and adding new definitions for ''Commercial'', ''Small-volume boat builder'', ''Small-volume manufacturer'', and ''Spark-ignition'' in alphabetical order to read as follows:

§ 94.2 Definitions.

* * * * *

(b) As used in this part, all terms not defined in this section shall have the meaning given them in the Act:

* * * * *

Commercial means relating to an engine or vessel that is not a recreational marine engine or a recreational vessel.

* * * * *

Compression-ignition means relating to an engine that is not a *spark-ignition* engine.

* * * * *

Designated Officer means the Manager, Engine Programs Group (6403–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

* * * * *

Passenger has the meaning given by 46 U.S.C. 2101 (21) and (21a). This generally means that a passenger is a person that pays to be on the vessel.

* * * * *

Recreational marine engine means a Category 1 propulsion marine engine that is intended by the manufacturer to be installed on a recreational vessel, and which is permanently labeled as follows: ''THIS ENGINE IS CATEGORIZED AS A RECREATIONAL MARINE ENGINE UNDER 40 CFR PART 94. INSTALLATION OF THIS ENGINE IN ANY NONRECREATIONAL VESSEL IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.''.

Recreational vessel has the meaning given in 46 U.S.C 2101 (25), but excludes ''passenger vessels'' and ''small passenger vessels'' as defined by 46 U.S.C. 2101 (22) and (35) and excludes vessels used solely for competition. In general, for this part, ''recreational vessel'' means a vessel that is intended by the vessel manufacturer to be operated primarily for pleasure or leased, rented or chartered to another for the latter's pleasure, excluding the following vessels:

(1) Vessels of less than 100 gross tons that carry more than 6 passengers (as defined in this section).

(2) Vessels of 100 gross tons or more that carry one or more passengers (as defined in this section).

(3) Vessels used solely for competition.

* * * * *

Small-volume boat builder means a boat manufacturer with fewer than 500 employees and with annual U.S.-directed production of fewer than 100 boats. For manufacturers owned by a parent company, these limits apply to the combined production and number of employees of the parent company and all its subsidiaries.

Small-volume manufacturer means a manufacturer with annual U.S.-directed production of fewer than 1,000 internal combustion engines (marine and nonmarine). For manufacturers owned by a parent company, the limit applies to the production of the parent company and all its subsidiaries.

Spark-ignition means relating to a type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark-ignition engines usually use a throttle to regulate

intake air flow to control power during normal operation.

* * * * *

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

* * * * *

18. Section 94.7 is amended by revising paragraph (e) to read as follows:

§ 94.7 General standards and requirements.

* * * * *

(e) Electronically controlled engines subject to the emission standards of this part shall broadcast on engine's controller area networks engine torque (as percent of maximum at that speed) and engine speed.

19. Section 94.8 is amended by revising paragraphs (a), (e), (f) introductory text, and (f)(1) to read as follows:

§ 94.8 Exhaust emission standards.

(a) Exhaust emissions from marine compression-ignition engines shall not exceed the applicable exhaust emission standards contained in Table A–1 as follows:

TABLE A–1.—PRIMARY TIER 2 EXHAUST EMISSION STANDARDS (g/kW-hr)

Engine size liters/cylinder, rated power	Category	Model year[a]	THC+ NO_x g/kW-hr	CO g/kW-hr	PM g/kW-hr
disp. < 0.9 and power ≥ 37 kW	Category 1 Commercial Category Recreational 1	2005 2007	7.5 7.5	5.0 5.0	0.40 0.40
0.9 ≤ disp. < 1.2 all power levels	Category 1 Commercial Category 1 Recreational	2004 2006	7.2 7.2	5.0 5.0	0.30 0.30
1.2 ≤ disp. < 2.5 all power levels	Category 1 Commercial Category 1 Recreational	2004 2006	7.2 7.2	5.0 5.0	0.20 0.20
2.5 ≤ disp. < 5.0 all power levels	Category 1 Commercial Category 1 Recreational	2007 2009	7.2 7.2	5.0 5.0	0.20 0.20
5.0 ≤ disp. < 15.0 all power levels	Category 2	2007	7.8	5.0	0.27
15.0 ≤ disp. < 20.0 power < 3300 kW	Category 2	2007	8.7	5.0	0.50
15.0 ≤ disp. < 20.0 power ≥ 3300 kW	Category 2	2007	9.8	5.0	0.50
20.0 ≤ disp. < 25.0 all power levels	Category 2	2009	9.8	5.0	0.50
25.0 ≤ disp. < 30.0	Category 2	2007	11.0	5.0	0.50

[a] The model years listed indicate the model years for which the specified standards start.

* * * * *

(e) Exhaust emissions from propulsion engines subject to the standards (or FELs) in paragraph (a), (c), or (f) of this section shall not exceed:

(1) *Commercial marine engines.* (i) 1.20 times the applicable standards (or FELs) when tested in accordance with the supplemental test procedures specified in § 94.106 at loads greater than or equal to 45 percent of the maximum power at rated speed or 1.50 times the applicable standards (or FELs) at loads less than 45 percent of the maximum power at rated speed.

(ii) As an option, the manufacturer may choose to comply with limits of 1.25 times the applicable standards (or FELs) when tested over the whole power range in accordance with the supplemental test procedures specified in § 94.106, instead of the limits in paragraph (e)(1)(i) of this section.

(2) *Recreational marine engines.* (i) 1.20 times the applicable standards (or FELs) when tested in accordance with the supplemental test procedures specified in § 94.106 at loads greater than or equal to 45 percent of the maximum power at rated speed and speeds less than 95 percent of maximum test speed, or 1.50 times the applicable standards (or FELs) at loads less than 45 percent of the maximum power at rated speed, or 1.50 times the applicable standards (or FELs) at any loads for speeds greater than or equal to 95 percent of the maximum test speed.

(ii) As an option, the manufacturer may choose to comply with limits of 1.25 times the applicable standards (or FELs) when tested over the whole power range in accordance with the supplemental test procedures specified in § 94.106, instead of the limits in paragraph (e)(2)(i) of this section.

(f) The following defines the requirements for low emitting Blue Sky Series engines:

(1) *Voluntary standards.* Engines may be designated ''Blue Sky Series'' engines through the 2010 model year by meeting the voluntary standards listed in Table A–2, which apply to all certification and in use testing, as follows:

TABLE A–2.—VOLUNTARY EMISSION STANDARDS (g/kW-hr)

Rated brake power (kW)	THC+ NO_x	PM
Power ≥ 37 kW, and displ.<0.9	4.0	0.24
0.9≤displ.<1.2	4.0	0.18
1.2≤displ.<2.5	4.0	0.12
2.5≤displ.<5	5.0	0.12
5≤displ.<15	5.0	0.16
15 ≤ disp. < 20, and power < 3300 kW	5.2	0.30
15 ≤ disp. < 20, and power ≥ 3300 kW	5.9	0.30
20 ≤ disp. < 25	5.9	0.30
25 ≤ disp. < 30	6.6	0.30

* * * * *

20. Section 94.9 is amended by revising paragraphs (a) introductory text and (a)(1) to read as follows:

§ 94.9 Compliance with emission standards.

(a) The general standards and requirements in § 94.7 and the emission standards in § 94.8 apply to each new engine throughout its useful life period. The useful life is specified both in years and in hours of operation, and ends when either of the values (hours of operation or years) is exceeded.

(1) The minimum useful life is:

(i) 10 years or 1,000 hours of operation for recreational Category 1 engines;

(ii) 10 years or 10,000 hours of operation for commercial Category 1 engines;

(iii) 10 years or 20,000 hours of operation for Category 2 engines.

* * * * *

21. Section 94.12 is amended by revising the introductory text and paragraphs (a) and (b)(1) and adding a new paragraph (f) to read as follows:

§ 94.12 Interim provisions.

This section contains provisions that apply for a limited number of calendar years or model years. These provisions apply instead of the other provisions of this part.

(a) *Compliance date of standards.* Certain companies may delay compliance with emission standards. Companies wishing to take advantage of this provision must inform the Designated Officer of their intent to do so in writing before the date that compliance with the standards would otherwise be mandatory.

(1) Post-manufacture marinizers may elect to delay the model year of the Tier 2 standards for commercial engines as specified in § 94.8 by one year for each engine family.

(2) Small-volume manufacturers may elect to delay the model year of the Tier 2 standards for recreational engines as specified in § 94.8 by five years for each engine family.

(b) *Early banking of emission credits.* (1) A manufacturer may optionally certify engines manufactured before the date the Tier 2 standards take effect to earn emission credits under the averaging, banking, and trading program. Such optionally certified engines are subject to all provisions relating to mandatory certification and enforcement described in this part. Manufacturers may begin earning credits for recreational engines on [date 30 days after publication of the final rule in the **Federal Register**].

* * * * *

(f) *Flexibility for small-volume boat builders.* Notwithstanding the other provisions of this part, manufacturers may sell uncertifed recreational engines to small-volume boat builders during the first five years for which the emission standards in § 94.8 apply, subject to the following provisions:

(1) The U.S.-directed production volume of boats from any small-volume boat builder using uncertified engines during the total five-year period may not exceed 80 percent of the manufacturer's average annual production for the three years prior to the general applicability of the recreational engine standards in § 94.8, except as allowed in paragraph (f)(2) of this section.

(2) Small-volume boat builders may exceed the production limits in paragraph (f)(1) of this section, provided it does not exceed 20 boats during the five-year period or 10 boats in any single calendar year. This does not apply to boats powered by engines with displacement greater than 2.5 liters per cylinder.

(3) Small-volume boat builders must keep records of all the boats and engines produced under this paragraph (f), including boat and engine model numbers, serial numbers, and dates of manufacture. Records must also include information verifying compliance with the limits in paragraph (f)(1) or (f)(2) of this section. Keep these records until at least two full years after you no longer use the provisions in this paragraph (f).

Subpart B—[Amended]

22. Section 94.104 is amended by redesignating paragraph (c) as paragraph (d) and adding a new paragraph (c) to read as follows:

§ 94.104 Test procedures for Category 2 marine engines.

* * * * *

(c) Conduct testing at ambient temperatures from 13° C to 30° C.

23. Section 94.105 is amended by revising paragraph (b) text preceding Table B–1, revising ''#'' to read ''±'' in footnotes 1 and 2 in the tables in paragraphs (b), (c)(1), (c)(2), and (d)(1), and adding a new paragraph (e) to read as follows:

§ 94.105 Duty cycles.

* * * * *

(b) *General cycle.* Propulsion engines that are used with (or intended to be used with) fixed-pitch propellers, and any other engines for which the other duty cycles of this section do not apply, shall be tested using the duty cycle described in the following Table B–1:

* * * * *

(e) *Recreational.* For the purpose of determining compliance with the emission standards of § 94.8, recreational engines shall be tested using the duty cycle described in Table B–5, which follows:

TABLE B–5.—RECREATIONAL MARINE DUTY CYCLE

Mode No.	Engine speed [1] (percent of maximum test speed)	Percent of maximum test power [2]	Minimum time in mode (minutes)	Weighting factors
1	100	100	5.0	0.08
2	91	75	5.0	0.13
3	80	50	5.0	0.17
4	63	25	5.0	0.32
5	idle	0	5.0	0.30

[1] Engine speed: ± 2 percent of point.
[2] Power: ±2 percent of engine maximum value.

24. Section 94.106 is amended by revising paragraphs (b) introductory text, (b)(1) introductory text, (b)(2) introductory text, and (b)(3) introductory text and adding a new paragraph (b)(5) to read as follows:

§ 94.106 Supplemental test procedures.

* * * * *

(b) The specified Not to Exceed Zones for marine engines are defined as follows. These Not to Exceed Zones apply, unless a modified zone is established under paragraph (c) of this section.

(1) For commercial Category 1 engines certified using the duty cycle specified in § 94.105(b), the Not to Exceed zones are defined as follows:

* * * * *

(2) For Category 2 engines certified using the duty cycle specified in § 94.105(b), the Not to Exceed zones are defined as follows:

* * * * *

(3) For engines certified using the duty cycle specified in § 94.105(c)(2), the Not to Exceed zones are defined as follows:

* * * * *

(5) For recreational marine engines certified using the duty cycle specified in § 94.105(e), the Not to Exceed zones are defined as follows:

(i) The Not to Exceed zone is the region between the curves power = $1.15 \times SPD^2$ and power = $0.85 \times SPD^4$, excluding all operation below 25% of maximum power at rated speed and excluding all operation below 63% of maximum test speed.

(ii) This zone is divided into three subzones, one below 45% of maximum power at maximum test speed; one above 95% of maximum test speed; and a third area including all of the remaining area of the NTE zone.

(iii) SPD in paragraph (b)(3)(i) of this section refers to percent of maximum test speed.

(iv) See Figure B–4 for an illustration of this Not to Exceed zone as follows:

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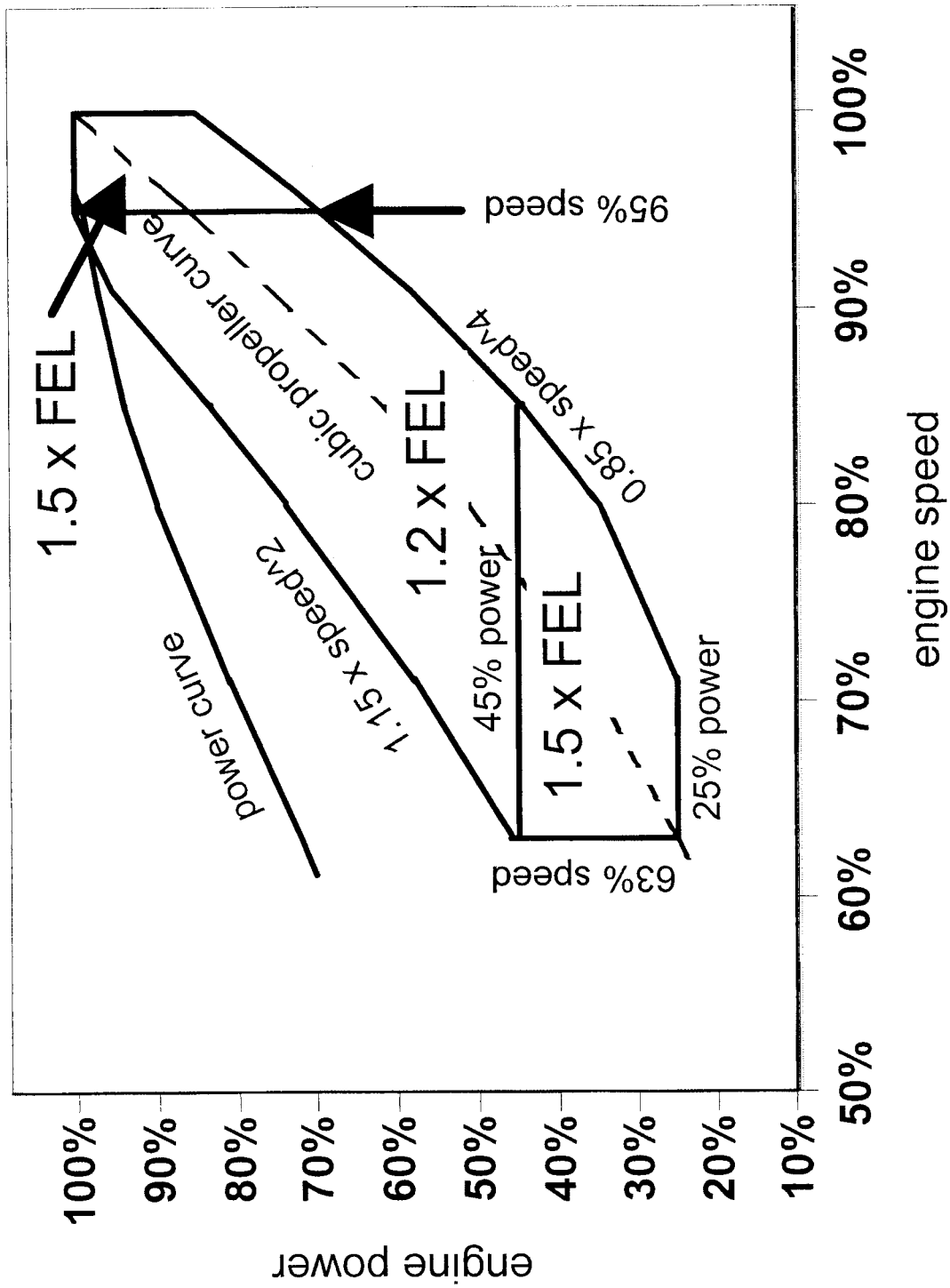

Figure B-4

BILLING CODE 6560–50–C

25. Section 94.108 is amended in paragraph (a)(1) by revising footnote 1 in Table B–5 to read as follows:

§ 94.108 Test fuels.

(a) * * * (1) * * *

TABLE B–5.—FEDERAL TEST FUEL SPECIFICATIONS

TABLE B–5.—FEDERAL TEST FUEL SPECIFICATIONS—Continued

* * * * *

[1] All ASTM procedures in this table have been incorporated by reference. See § 94.5.

* * * * *

Subpart C—[Amended]

26. Section 94.203 is amended by revising paragraphs (d)(14) and (d)(16) to read as follows:

§ 94.203 Application for certification.

* * * * *

(d) * * *

(14) A statement that all the engines included in the engine family comply with the Not To Exceed standards

specified in § 94.8(e) when operated under all conditions which may reasonably be expected to be encountered in normal operation and use; the manufacturer also must provide a detailed description of all testing, engineering analyses, and other information which provides the basis for this statement.

* * * * *

(16) A statement indicating duty-cycle and application of the engine (e.g., used to propel planing vessels, use to propel vessels with variable-pitch propellers, constant-speed auxiliary, recreational, etc.).

* * * * *

27. Section 94.204 is amended by removing ''and'' at the end of paragraph (b)(9), adding ''; and'' at the end of paragraph (b)(10), adding a new paragraph (b)(11), and revising paragraph (e) to read as follows:

§ 94.204 Designation of engine families.

* * * * *

(b) * * *

(11) Class (commercial or recreational).

* * * * *

(e) Upon request by the manufacturer, the Administrator may allow engines that would be required to be grouped into separate engine families based on the criteria in paragraph (b) or (c) of this section to be grouped into a single engine family if the manufacturer demonstrates that the engines will have similar emission characteristics; however, recreational and commercial engines may not be grouped in the same engine family. This request must be accompanied by emission information supporting the appropriateness of such combined engine families.

28. Section 94.209 is revised to read as follows:

§ 94.209 Special provisions for post-manufacture marinizers and small-volume manufacturers.

(a) *Broader engine families.* Instead of the requirements of § 94.204, an engine family may consist of any engines subject to the same emission standards. This does not change any of the requirements of this part for showing that an engine family meets emission standards. To be eligible to use the provisions of this paragraph (a), the manufacturer must demonstrate one of the following:

(1) It is a post-manufacture marinizer and that the base engines used for modification have a valid certificate of conformity issued under 40 CFR part 89 or 40 CFR part 92 or the heavy-duty engine provisions of 40 CFR part 86.

(2) It is a small-volume manufacturer.

(b) *Hardship relief.* Post-manufacture marinizers, small-volume manufacturers, and small-volume boat builders may take any of the otherwise prohibited actions identified in § 94.1103(a)(1) if approved in advance by the Administrator, subject to the following requirements:

(1) Application for relief must be submitted to the Designated Officer in writing prior to the earliest date in which the applying manufacturer would be in violation of § 94.1103. The manufacturer must submit evidence showing that the requirements for approval have been met.

(2) The conditions causing the impending violation must not be substantially the fault of the applying manufacturer.

(3) The conditions causing the impending violation must jeopardize the solvency of the applying manufacturer if relief is not granted.

(4) The applying manufacturer must demonstrate that no other allowances under this part will be available to avoid the impending violation.

(5) Any relief may not exceed one year beyond the date relief is granted.

(6) The Administrator may impose other conditions on the granting of relief including provisions to recover the lost environmental benefit.

(c) *Extension of deadlines.* Small-volume manufacturers may use the provisions of 40 CFR 1068.241 to ask for an extension of a deadline to meet emission standards. We may require that you use available base engines that have been certified to emission standards for land-based engines until you are able to produce engines certified to the requirements of this part.

29. Section 94.212 is amended by revising paragraph (b)(10) to read as follows:

§ 94.212 Labeling.

* * * * *

(b) *Engine labels.* * * *

(10) The application for which the engine family is certified. (For example: constant-speed auxiliary, variable-speed propulsion engines used with fixed-pitch propellers, recreational, etc.)

* * * * *

30. Section 94.218 is amended by adding a new paragraph (d)(2)(iv) to read as follows:

§ 94.218 Deterioration factor determination.

* * * * *

(d) * * *

(2) * * *

(iv) *Assigned deterioration factors.* Small-volume manufacturers may use deterioration factors established by EPA.

Subpart D—[Amended]

31. Section 94.304 is amended by revising paragraph (k) to read as follows:

§ 94.304 Compliance requirements.

* * * * *

(k) The following provisions limit credit exchanges between different types of engines:

(1) Credits generated by Category 1 engine families may be used for compliance by Category 1 or Category 2 engine families. Credits generated from Category 1 engine families for use by Category 2 engine families must be discounted by 25 percent.

(2) Credits generated by Category 2 engine families may be used for compliance only by Category 2 engine families.

(3) Credits may not be exchanged between recreational and commercial engines.

* * * * *

Subpart F—[Amended]

32. Section 94.501 is amended by revising paragraph (a) to read as follows:

§ 94.501 Applicability.

(a) The requirements of this subpart are applicable to manufacturers of engines subject to the provisions of Subpart A of this part, excluding small-volume manufacturers.

* * * * *

33. Section 94.503 is amended by adding a new paragraph (d) to read as follows:

§ 94.503 General requirements.

* * * * *

(d) If you certify an engine family with carryover emission data, as described in § 94.206(c), and these equivalent engine families consistently meet the emission standards with production-line testing over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. The minimum testing rate is one engine per engine family. If we reduce your testing rate, we may limit our approval to a single model year.

Subpart J—[Amended]

34. Section 94.907 is amended by revising paragraphs (d) and (g) to read as follows:

§ 94.907 Engine dressing exemption.

* * * * *

(d) New marine engines that meet all the following criteria are exempt under this section:

(1) You must produce it by marinizing an engine covered by a valid certificate

of conformity from one of the following programs:

(i) Heavy-duty highway engines (40 CFR part 86).

(ii) Land-based nonroad diesel engines (40 CFR part 89).

(iii) Locomotive engines (40 CFR part 92).

(2) The engine must have the label required under 40 CFR part 86, 89, or 92.

(3) You must not make any changes to the certified engine that could reasonably be expected to increase its emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for the engine dressing exemption:

(i) Changing any fuel system parameters from the certified configuration.

(ii) Replacing an original turbocharger, except that small-volume manufacturers of recreational engines may replace an original turbocharger with one that matches the performance of the original turbocharger.

(iii) Modify or design the marine engine cooling or aftercooling system so that temperatures or heat rejection rates are outside the original engine manufacturer's specified ranges.

(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in marine applications.

* * * * *

(g) If your engines do not meet the criteria listed in paragraphs (d)(2) through (d)(4) of this section, they will be subject to the standards and prohibitions of this part. Marinization without a valid exemption or certificate of conformity would be a violation of § 94.1103(a)(1) and/or the tampering prohibitions of the applicable land-based regulations (40 CFR part 86, 89, or 92).

* * * * *

Subpart K—[Amended]

35. Section 94.1103 is amended by revising paragraph (a)(5) to read as follows:

§ 94.1103 Prohibited acts.

(a) * * *

(5) For a manufacturer of marine vessels to distribute in commerce, sell, offer for sale, or deliver for introduction into commerce a new vessel containing an engine not covered by a certificate of conformity applicable for an engine model year the same as or later than the calendar year in which the manufacture of the new vessel is initiated. (Note: For the purpose of this paragraph (a)(5), the manufacture of a vessel is initiated when the keel is laid, or the vessel is at a similar stage of construction.) In general, you may use up your normal inventory of engines not certified to new emission standards if they were built before the date of the new standards. However, we consider stockpiling of these engines to be a violation of paragraph (a)(1)(i)(A) of this section.

* * * * *

37. A new subchapter U is added to read as follows:

SUBCHAPTER U—AIR POLLUTION CONTROLS

PART 1048—CONTROL OF EMISSIONS FROM NEW, LARGE NONROAD SPARK-IGNITION ENGINES

Subpart A—Determining How To Follow This Part

Sec.

Subpart B—Emission Standards and Related Requirements

Subpart C—Certifying Engine Families

Subpart D—Testing Production-line Engines

Subpart E—Testing In-Use Engines

Subpart F—Test Procedures

Subpart G—Compliance Provisions

Authority: 42 U.S.C. 7401–7671(q).

Subpart A—Determining How to Follow This Part

§ 1048.1 Does this part apply to me?

(a) This part applies to you if you manufacture or import new, spark-ignition, nonroad engines (defined in § 1048.701) with rated power above 19 kW, unless we exclude them under § 1048.5.

(b) If you manufacture or import engines with rated power at or below 19 kW that would otherwise be covered by 40 CFR part 90, you may choose to meet the requirements of this part instead. In this case, all the provisions of this part apply for those engines.

(c) Note in subpart G of this part that 40 CFR part 1068 applies to everyone, including anyone who manufactures, installs, owns, operates, or rebuilds any of the engines this part covers or equipment containing these engines.

(d) You need not follow this part for engines you produce before the 2004 model year, unless you certify voluntarily. See § 1048.100, § 1048.145, and the definition of model year in § 1048.701 for more information about the timing of new requirements.

(e) See §§ 1048.701 and 1048.705 for definitions and acronyms that apply to this part.

§ 1048.5 May I exclude any engines from this part's requirements?

(a) You may exclude the following nonroad engines:

(1) Engines used in snowmobiles, all-terrain vehicles, or off-highway motorcycles and regulated in 40 CFR part 1051.

(2) Propulsion marine engines. See 40 CFR part 91. This part applies with respect to auxiliary marine engines.

(b) You may exclude engines used in aircraft. See 40 CFR part 87.

(c) You may exclude stationary engines, except that you must meet the requirements in § 1048.20. In addition, the prohibitions in 40 CFR 1068.101 restrict the use of stationary engines for non-stationary purposes.

(d) See subpart G of this part and 40 CFR part 1068, subpart C, for exemptions of specific engines.

(e) Send the Designated Officer a written request if you want us to determine whether this part covers or excludes certain engines. Excluding engines from this part's requirements does not affect other requirements that may apply to them.

§ 1048.10 What main steps must I take to comply with this part?

(a) You must have a certificate of conformity from us for each engine family before you do any of the following with a new engine covered by this part: Sell, offer for sale, introduce into commerce, distribute or deliver for introduction into commerce, or import it into the United States. ''New'' engines may include some already placed in service (see the definition of ''new nonroad engine'' and ''new nonroad equipment'' in § 1048.701). You must get a new certificate of conformity for each new model year.

(b) To get a certificate of conformity and comply with its terms, you must do five things:

(1) Meet the emission standards and other requirements in subpart B of this part.

(2) Apply for certification (see subpart C of this part).

(3) Do routine emission testing on production engines (see subpart D of this part).

(4) Do emission testing on in-use engines, as we direct (see subpart E of this part).

(5) Follow our instructions throughout this part.

(c) Subpart F of this part and 40 CFR part 1065 describe the procedures you must follow to test your engines.

(d) Subpart G of this part and 40 CFR part 1068 describe requirements and prohibitions that apply to engine manufacturers, equipment manufacturers, owners, operators, rebuilders, and all others.

§ 1048.15 Do any other regulation parts affect me?

(a) Part 1065 of this chapter describes procedures and equipment specifications for testing engines. Subpart F of this part describes how to apply the provisions of part 1065 of this chapter to show you meet the emission standards in this part.

(b) Part 1068 of this chapter describes general provisions, including these seven areas:

(1) Prohibited acts and penalties for engine manufacturers, equipment manufacturers, and others.

(2) Rebuilding and other aftermarket changes.

(3) Exemptions for certain engines.

(4) Importing engines.

(5) Selective enforcement audits of your production.

(6) Defect reporting and recall.

(7) Procedures for public hearings.

(c) Other parts of this chapter affect you if referenced in this part.

§ 1048.20 What requirements from this part apply to my excluded engines?

(a) Manufacturers of stationary engines that would otherwise need to meet the requirements of this part must add a permanent label or tag identifying each engine. This applies equally to importers. To meet labeling requirements, you must do the following things:

(1) Attach the label or tag in one piece so no one can remove it without destroying or defacing it.

(2) Make sure it is durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.

(4) Write it in block letters in English.

(5) Instruct equipment manufacturers that they must place a duplicate label as described in § 1068.105 of this chapter if they obscure the engine's label.

(b) Engine labels or tags required under this section must have the following information:

(1) Include the heading ''Emission Control Information.''

(2) Include your full corporate name and trademark.

(3) State the engine displacement (in liters) and rated power.

(4) State: ''THIS ENGINE IS EXCLUDED FROM THE REQUIREMENTS OF 40 CFR PART 1048 AS A ''STATIONARY ENGINE.'' INSTALLING OR USING THIS ENGINE IN ANY OTHER APPLICATION MAY BE A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.''.

Subpart B—Emission Standards and Related Requirements

§ 1048.101 What exhaust emission standards must my engines meet?

(a) The exhaust emission standards in Table 1 of § 1048.101 apply for steady-state measurement of emissions with the duty-cycle test procedures in subpart F of this part:

TABLE 1 OF § 1048.101.—STEADY-STATE DUTY-CYCLE EMISSION STANDARDS (g/kW-hr)

Model year	Emission standards		Alternate emission standards	
	$HC+NO_X$	CO	$HC+NO_X$	CO
2004–2006	4.0	50.0	.....	.....
2007 and later	3.4	3.4	1.3	27.0

(b) The exhaust emission standards in Table 2 of § 1048.101 apply for transient measurement of emissions with the duty-cycle test procedures in subpart F of this part:

TABLE 2 OF § 1048.101.—TRANSIENT DUTY-CYCLE EMISSION STANDARDS (g/kW-hr)

Model year	Emission standards		Alternate emission standards	
	$HC+NO_X$	CO	$HC+NO_X$	CO
2007 and later	3.4	3.4	1.3	27.0

(c) The exhaust emission standards in Table 3 of § 1048.101 apply for emission measurements with the field-test procedures in subpart F of this part:

TABLE 3 OF § 1048.101.—FIELD-TESTING EMISSION STANDARDS (g/kW-hr)

Model year	Emission standards		Alternate emission standards	
	$HC+NO_X$	CO	$HC+NO_X$	CO
2007 and later	4.7	5.0	1.8	41.0

(d) You may choose to meet the alternate emission standards instead of the regular emission standards, as described in paragraphs (a) through (c) of this section.

(e) The standards apply for the model years listed in the tables in this section. You may choose to certify earlier model years.

(f) Apply the exhaust emission standards in this section for engines using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for engines powered by the following fuels:

(1) Gasoline- and LPG-fueled engines: THC emissions.

(2) Natural gas-fueled engines: NMHC emissions (for testing to show that these engines meet the emission standards in paragraph (c) of this section, disregard hydrocarbon emissions).

(3) Alcohol-fueled engines: THCE emissions.

(g) Certain engines with total displacement at or below 1000 cc may comply with the requirements of 40 CFR part 90 instead of complying with the emission standards in this section, as described in § 1048.615.

(h) You must show in your certification application that your engines meet the exhaust emission standards in paragraphs (a) through (c) of this section over their full useful life. The minimum useful life is 5,000 hours of operation or seven years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your engine to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(i) Refer to § 1048.240 to apply deterioration factors.

(j) Apply this subpart to all testing, including production-line and in-use testing, as described in subparts D and E of this part.

§ 1048.105 What steps must I take to address evaporative emissions?

(a) Starting in the 2007 model year, if you produce an engine that runs on a volatile liquid fuel (such as gasoline), you must take the following steps to address evaporative emissions:

(1) Specify and incorporate design features to avoid venting fuel vapors directly to the atmosphere. Evaporative hydrocarbon emissions must be less than 0.2 grams per gallon of fuel tank capacity during a nine-hour period of gradually increasing ambient temperatures from 22 to 36° C with fuel meeting the specifications in 40 CFR 1065.210, when measured from an engine with a complete fuel system using the equipment and procedures specified in 40 CFR 86.107–96 and 86.133–96. You may rely on any of the following designs instead of doing emission tests to show that you meet this requirement:

(i) Use a tethered or self-closing gas cap on a fuel tank that stays sealed up to a positive pressure of 24.5 kPa (3.5 psi) or a vacuum pressure of 10.5 kPa (1.5 psi).

(ii) Use a tethered or self-closing gas cap on a fuel tank that stays sealed up to a positive or vacuum pressure of 7 kPa (1 psi). Use an inflatable, nonpermeable bag that occupies the vapor space inside the fuel tank, exchanging air with the ambient as needed to prevent pressure buildup in the tank. The volume of the inflatable bag must be at least 30 percent of the total tank volume.

(iii) Use a tethered or self-closing gas cap on a fuel tank that stays sealed except for venting to a charcoal canister. The engine must be designed to draw hydrocarbons from the canister into the engine's combustion chamber as needed to prevent evaporative emissions during normal operation.

(iv) Use a tethered or self-closing gas cap on a collapsible bladder tank. A collapsible bladder tank is one that

changes in volume as needed to accommodate the changing amount of liquid fuel, thus eliminating the vapor space.

(2) For nonmetallic fuel lines, specify and use products that meet the Category 1 specifications in SAE J2260 ''Nonmetallic Fuel System Tubing with One or More Layers,'' November 1996 (incorporated by reference in § 1048.710).

(3) Liquid fuel in the fuel tank may not reach boiling during continuous engine operation in the final installation at an ambient temperature of 30° C. Gasoline with a volatility of 9 RVP begins to boil at about 53° C. You may satisfy this requirement by specifying and incorporating design features to prevent fuel boiling under all normal operation.

(b) If other companies install your engines in their equipment, give them any appropriate instructions, as described in § 1048.130.

§ 1048.110 How must my engines diagnose malfunctions?

(a) *Equip your engines with a diagnostic system.* Starting in the 2007 model year, make sure your system will detect significant malfunctions in its emission-control system using one of the following protocols:

(1) If your emission-control strategy depends on maintaining air-fuel ratios at stoichiometry, an acceptable diagnostic design would identify malfunction whenever the air-fuel ratio does not cross stoichiometry for one minute. You may use other diagnostic strategies if we approve them in advance.

(2) If the protocol described in paragraph (a)(1) of this section does not apply to your engine, you must use an alternative approach that we approve in advance.

(b) *Use a malfunction-indicator light (MIL).* Make sure the MIL is readily visible to the operator; it may be any color except red. When the MIL goes on, it must display ''Check Engine,'' ''Service Engine Soon,'' or a similar message that we approve. You may use sound in addition to the light signal. The MIL must go on under each of these circumstances:

(1) When a malfunction occurs, as described in paragraph (a) of this section.

(2) When the diagnostic system cannot send signals to meet the requirement of paragraph (b)(1) of this section.

(3) When the engine's ignition is in the ''key-on'' position before starting or cranking. The MIL should go out after engine starting if the system detects no malfunction.

(c) *Control when the MIL can go out.* If the MIL goes on to show a malfunction, it must remain on during all later engine operation until servicing corrects the malfunction. If the engine is not serviced, but the malfunction does not recur for three consecutive engine starts during which the malfunctioning system is evaluated and found to be working properly, the MIL may stay off during later engine operation.

(d) *Store trouble codes in computer memory.* Record and store in computer memory any diagnostic trouble codes showing a malfunction that should illuminate the MIL. The stored codes must identify the malfunctioning system or component as uniquely as possible. Make these codes available through the data link connector as described in paragraph (g) of this section. You may store codes for conditions that do not turn on the MIL. The system must store a separate code to show when the diagnostic system is disabled (from malfunction or tampering).

(e) *Make data, access codes, and devices accessible.* Make all required data accessible to us without any access codes or devices that only you can supply. Ensure that anyone servicing your engine can read and understand the diagnostic trouble codes stored in the onboard computer with generic tools and information.

(f) *Consider exceptions for certain conditions.* Your diagnostic systems may disregard trouble codes for the first three minutes after engine starting. You may ask us to approve diagnostic-system designs that disregard trouble codes under other conditions that would produce an unreliable reading, damage systems or components, or cause other safety risks. This might include operation at altitudes over 8,000 feet.

(g) *Follow standard references for formats, codes, and connections.* Follow conventions defined in the following documents (incorporated by reference in § 1048.710), or ask us to approve using updated versions of these documents:

(1) ISO 9141–2 February 1994, Road vehicles—Diagnostic systems Part 2.

(2) ISO 14230–4 June 2000, Road vehicles—Diagnostic systems—KWP 2000 requirements for emission-related systems.

§ 1048.115 What other requirements must my engines meet?

Your engines must meet the following requirements:

(a) *Closed crankcase.* Design and produce your engines so they release no crankcase emissions into the atmosphere.

(b) *Torque broadcasting.* Electronically controlled engines must broadcast their speed and output shaft torque (in newton-meters) on their controller area networks. Engines may alternatively broadcast a surrogate value for torque that can be read with a remote device. This information is necessary for testing engines in the field (see § 1065.515 of this chapter). This requirement applies beginning in the 2007 model year.

(c) *EPA access to broadcast information.* If we request it, you must provide us any hardware or tools we would need to readily read, interpret, and record all information broadcast by an engine's on-board computers and electronic control modules. If you broadcast a surrogate parameter for torque values, you must provide us what we need to convert these into torque units. We will not ask for hardware or tools if they are readily available commercially.

(d) *Emission sampling capability.* Produce all your engines to allow sampling of exhaust emissions in the field. This sampling requires either exhaust ports downstream of any aftertreatment devices or the ability to extend the exhaust pipe by 20 cm. This is necessary to minimize any diluting effect from ambient air at the end of the exhaust pipe.

(e) *Adjustable parameters.* If your engines have adjustable parameters, make sure they meet all the requirements of this part for any adjustment in the physically available range.

(1) We do not consider an operating parameter adjustable if you permanently seal it or if ordinary tools cannot readily access it.

(2) We may require that you set adjustable parameters to any specification within the adjustable range during certification testing, production-line testing, selective enforcement auditing, or any required in-use testing.

(f) *Prohibited controls.* You may not design engines with an emission-control system that emits any noxious or toxic substance that the engine would not emit during operation in the absence of such a system, except as specifically permitted by regulation.

(g) *Defeat devices.* You may not equip your engines with a defeat device. A defeat device is an auxiliary emission-control device or other control feature that reduces the effectiveness of emission controls under conditions you may reasonably expect the engine to encounter during normal operation and use. This does not apply to auxiliary

emission-control devices you identify in your certification application if any of the following is true:

(1) The conditions of concern were substantially included in your prescribed duty cycles.

(2) You show your design is necessary to prevent catastrophic engine (or equipment) damage or accidents.

(3) The reduced effectiveness applies only to starting the engine.

§ 1048.120 What warranty requirements apply to me?

(a) You must warrant to the ultimate buyer that the new engine meets two conditions:

(1) You have designed, built, and equipped it to meet the requirements of this part.

(2) It is free from defects in materials and workmanship that may keep it from meeting these requirements.

(b) Your emission-related warranty must be valid for at least 50 percent of the engine's useful life in hours of operation or at least three years, whichever comes first. In the case of a high-cost warranted part, the warranty must be valid for at least 70 percent of the engine's useful life in hours of operation or at least five years, whichever comes first. You may offer a warranty more generous than we require. This warranty may not be shorter than any published or negotiated warranty you offer for the engine or any of its components. If an engine has no tamper-proof hour meter, we base the warranty periods in this paragraph only on the engine's age (in years).

(c) The emission-related warranty must cover components whose failure would increase an engine's emissions, includeing electronic controls, fuel injection (for liquid or gaseous fuels), exhaust-gas recirculation, aftertreatment, or any other system you develop to control emissions. In general, we consider replacing or repairing other components to be the owner's responsibility.

(d) You may exclude from your warranty a component named in paragraph (c) of this section, if it meets both of the following conditions:

(1) It was in general use on similar engines before January 1, 2000.

(2) Its failure would clearly degrade the engine's performance enough that the operator would need to repair or replace it.

(e) You may limit your emission-related warranty's validity to properly maintained engines, as described in § 1068.115 of this chapter.

(f) If you make an aftermarket part, you may—but do not have to—certify that using the part will still allow engines to meet emission standards, as described in § 85.2114 of this chapter.

§ 1048.125 What maintenance instructions must I give to buyers?

Give the ultimate buyer of each new engine written instructions for properly maintaining and using the engine, including the emission-control system. The maintenance instructions also apply to service accumulation on your test engines, as described in 40 CFR part 1065, subpart E.

(a) *Critical emission-related maintenance.* You may schedule critical maintenance on particular devices if you meet the following conditions:

(1) You may ask us to approve maintenance on air-injection, fuel-system, or ignition components, aftertreatment devices, exhaust gas recirculation systems, crankcase ventilation valves, or oxygen sensors only if it meets two criteria:

(i) Operators are reasonably likely to do the maintenance you call for.

(ii) Engines need the maintenance to meet emission standards.

(2) We will accept scheduled maintenance as reasonably likely to occur in use if you satisfy any of four conditions:

(i) You present data showing that, if a lack of maintenance increases emissions, it also unacceptably degrades the engine's performance.

(ii) You present survey data showing that 80 percent of engines in the field get the maintenance you specify at the recommended intervals.

(iii) You provide the maintenance free of charge and clearly say so in maintenance instructions for the customer.

(iv) You otherwise show us that the maintenance is reasonably likely to be done at the recommended intervals.

(b) *Minimum maintenance intervals.* You may not schedule emission-related maintenance within the minimum useful life period for aftertreatment devices, fuel injectors, sensors, electronic control units, and turbochargers.

(c) *Noncritical emission-related maintenance.* For engine parts not listed in paragraph (a) or (b) of this section, you may recommend any additional amount of inspection or maintenance. But you must state clearly that these steps are not necessary to keep the emission-related warranty valid. Also, do not take these inspection or maintenance steps during service accumulation on your test engines.

(d) *Source of parts and repairs.* Print clearly on the first page of your written maintenance instructions that any repair shop or person may maintain, replace, or repair emission-control devices and systems. Make sure your instructions require no component or service identified by brand, trade, or corporate name. Also, do not directly or indirectly distinguish between service by companies with which you have a commercial relationship and service by independent repair shops or the owner. You may disregard the requirements in this paragraph (d) if you do one of two things:

(1) Provide a component or service without charge under the purchase agreement.

(2) Get us to waive this prohibition in the public's interest by convincing us the engine will work properly only with the identified component or service.

§ 1048.130 What installation instructions must I give to equipment manufacturers?

(a) If you sell an engine for someone else to install in a piece of nonroad equipment, give the buyer of the engine written instructions for installing it consistent with the requirements of this part. Make sure these instructions have the following information:

(1) Include the heading: ''Emission-related installation instructions.''

(2) State: ''Failing to follow these instructions when installing a certified engine in a piece of nonroad equipment violates federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.''.

(3) Describe any other instructions needed to install an exhaust aftertreatment device consistent with your application for certification.

(4) Describe the steps needed to control evaporative emissions, as described in § 1048.105.

(5) Describe any necessary steps for installing the diagnostic system described in § 1048.110.

(6) Describe any limits on the range of applications needed to ensure that the engine operates consistently with your application for certification. For example, if your engines are certified only for constant-speed operation, tell equipment manufacturers not to install the engines in variable-speed applications. Also, if you need to avoid sustained high-load operation to meet the field-testing emission standards we specify in § 1048.101(c), describe how the equipment manufacturer must properly size the engines for a given application.

(7) Describe any other instructions to make sure the installed engine will operate according to design specifications in your application for certification.

(8) State: ''If you obscure the engine's emission label, you must place a duplicate label on your equipment, as described in 40 CFR 1068.105.''.

(b) You do not need installation instructions for engines you install in your own equipment.

§ 1048.135 How must I label and identify the engines I produce?

(a) Assign each production engine a unique identification number and permanently and legibly affix or engrave it on the engine.

(b) At the time of manufacture, add a permanent label identifying each engine. To meet labeling requirements, do four things:

(1) Attach the label in one piece so it is not removable without being destroyed or defaced.

(2) Design and produce it to be durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.

(4) Write it in block letters in English.

(c) On your engine label, do 13 things:

(1) Include the heading ''EMISSION CONTROL INFORMATION.''

(2) Include your full corporate name and trademark.

(3) State: ''THIS ENGINE IS CERTIFIED TO OPERATE ON [specify operating fuel or fuels].''

(4) Identify the emission-control system; your identifiers must use names and abbreviations consistent with SAE J1930, which we incorporate by reference (see § 1048.710).

(5) List all requirements for fuel and lubricants.

(6) State the date of manufacture [DAY (optional), MONTH, and YEAR]; if you stamp this information on the engine and print it in the owner's manual, you may omit it from the label.

(7) State: ''THIS ENGINE MEETS U.S. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS FOR [MODEL YEAR] LARGE NONROAD SI ENGINES.''

(8) Include EPA's standardized designation for the engine family.

(9) State the engine's displacement (in liters) and rated power.

(10) State the engine's useful life (see § 1048.101(h)).

(11) List specifications and adjustments for engine tuneups; show the proper position for the transmission during tuneup and state which accessories should be operating.

(12) Describe other information on proper maintenance and use.

(13) Identify the emission standards to which you have certified the engine.

(d) Some of your engines may need more information on the label.

(1) If you have an engine family that has been certified only for constant-speed engines, add to the engine label ''CONSTANT-SPEED ONLY.''

(2) If you certify an engine to the voluntary standards in § 1048.140, add to the engine label ''BLUE SKY SERIES.''

(3) If you produce an engine we exempt from the requirements of this part, see 40 CFR part 1068, subparts C and D, for more label information.

(e) Some engines may not have enough space for a label with all the required information. In this case, you may omit the information required in paragraphs (c)(3), (c)(4), (c)(5), and (c)(12) of this section if you print it in the owner's manual instead.

(f) If you are unable to meet these labeling requirements, you may ask us to modify them consistent with the intent of this section.

(g) If you obscure the engine label while installing the engine in the vehicle, you must place a duplicate label on the vehicle. If someone else installs the engine in a vehicle, give them duplicate labels if they ask for them (see 40 CFR 1068.105).

§ 1048.140 How do I certify my engines to more stringent, voluntary standards?

This section defines voluntary standards that allow you to produce engines with a recognized level of superior emission control. We refer to these as ''Blue Sky Series'' engines. If you certify engines under this section, they must meet one of the following standards:

(a) For the 2003 model year, an engine family may qualify for designation as ''Blue Sky Series'' by meeting all the requirements in this part that apply to 2004 model year engines. This includes all testing and reporting requirements.

(b) For the 2003 through 2006 model years, an engine family may qualify for designation as ''Blue Sky Series'' by meeting all the requirements in this part that apply to 2007 model year engines. This includes all testing and reporting requirements.

(c) Any engine family may qualify for designation as ''Blue Sky Series'' by meeting all the requirements in this part, while certifying to the following voluntary emission standards:

(1) 1.3 g/kW-hr $HC+NO_X$ and 3.4 g/kW-hr CO using steady-state and transient test procedures, as described in subpart F of this part.

(2) 1.8 g/kW-hr $HC+NO_X$ and 4.7 g/kW-hr CO using field-testing procedures, as described in subpart F of this part.

§ 1048.145 What provisions apply only for a limited time?

The provisions in this section apply instead of other provisions in this part. This section describes when these interim provisions expire.

(a) *Family banking.* You may certify an engine family to comply with all the 2007 model year requirements before 2007. For each year of early compliance for an engine family, you may delay certification by one year for a different engine family with smaller projected power-weighted nationwide sales. For example, if you sell 1,000 engines with an average power rating of 50 kW certified a year early, you may delay certification for another engine family with an average power rating of 100 kW of up to 500 engines. You must notify us as soon as you are aware of such a discrepancy between projected and actual sales.

(b) *Hydrocarbon standards.* For 2004 through 2006 model years, manufacturers may use nonmethane hydrocarbon measurements to demonstrate compliance with applicable emission standards.

(c) *Transient emission testing.* Engines rated over 560 kW are exempt from the transient emission standards in § 1048.101(b).

(d) *In-use emission credits with steady-state testing.* You may generate credits for the in-use averaging program described in § 1048.415 using steady-state test procedures for 2004 through 2006 model years.

(e) *Optional early field testing.* For 2004 through 2006 model years, manufacturers may optionally use the field-testing procedures in subpart F of this part for any in-use testing required under subpart E of this part. In this case, the same emission standards apply to both steady-state testing and field testing.

(f) *Small-volume provisions.* Special provisions apply to you if you manufacture fewer than 300 engines per year that are subject to the standards of this part.

(1) For 2004 through 2006 model year engines, the lawn and garden exemption described in § 1048.615 applies to your engines with total displacement up to 2500 cc with rated power at or below 30 kW. To qualify for this exemption, you must meet a CO emission standard of 130 g/kW-hr using the procedures specified in 40 CFR part 90.

(2) For 2007 through 2009 model year engines, you may optionally comply with the emission standards and other requirements that would otherwise apply starting in 2004.

(3) If you qualify for the hardship provisions in § 1068.241 of this chapter,

we may approve extensions of up to three years total.

Subpart C—Certifying Engine Families

§ 1048.201 What are the general requirements for submitting a certification application?

(a) Send us an application for a certificate of conformity for each engine family. Each application is valid for only one model year.

(b) The application must not include false or incomplete statements or information (see § 1048.250). We may choose to ask you to send us less information than we specify in this subpart, but this would not change your recordkeeping requirements.

(c) Use good engineering judgment for all decisions related to your application (see § 1068.5 of this chapter).

(d) An authorized representative of your company must approve and sign the application.

§ 1048.205 How must I prepare my application?

In your application, you must do all the following things:

(a) Describe the engine family's specifications and other basic parameters of the engine's design. List the types of fuel you intend to use to certify the engine family (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).

(b) Explain how the emission-control system operates. Describe in detail all the system's components, auxiliary emission-control devices, and all fuel-system components you will install on any production or test engine. Explain why any auxiliary emission-control devices are not defeat devices (see § 1048.115(g)). Do not include detailed calibrations for components unless we ask for them.

(c) Explain how the engine diagnostic system works, describing especially the engine conditions (with the corresponding diagnostic trouble codes) that cause the malfunction-indicator light to go on. Propose what you consider to be extreme conditions under which the diagnostic system should disregard trouble codes, as described in § 1048.110.

(d) Describe the engines you selected for testing and the reasons for selecting them.

(e) Describe any special or alternate test procedures you used (see § 1048.501).

(f) Identify the duty cycle and the number of engine operating hours used to stabilize emission levels. Describe any scheduled maintenance you did.

(g) List the specifications of the test fuel to show that it falls within the required ranges we specify in 40 CFR part 1065, subpart C.

(h) Identify the engine family's useful life.

(i) Propose maintenance and use instructions for the ultimate buyer of each new engine (see § 1048.125).

(j) Propose emission-related installation instructions if you sell engines for someone else to install in a piece of nonroad equipment (see § 1048.130).

(k) Identify each high-cost warranted part and show us how you calculated its replacement cost, including the estimated retail cost of the part, labor rates, and labor hours to diagnose and replace defective parts.

(l) Propose an emission-control label.

(m) Present emission data for HC, NO_X, and CO on a test engine to show your engines meet the duty-cycle emission standards we specify in § 1048.101(a) and (b). Show these figures before and after applying deterioration factors for each engine. Include test data for each type of fuel on which you intend for engines in the engine family to operate (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).

(n) Report all test results, including those from invalid tests or from any nonstandard tests (such as measurements based on exhaust concentrations in parts per million).

(o) Identify the engine family's deterioration factors and describe how you developed them. Present any emission test data you used for this.

(p) Describe all adjustable operating parameters (see § 1048.115(d)), including the following:

(1) The nominal or recommended setting and the associated production tolerances.

(2) The intended physically adjustable range.

(3) The limits or stops used to establish adjustable ranges.

(4) Production tolerances of the limits or stops used to establish each physically adjustable range.

(5) Information showing that someone cannot readily modify the engines to operate outside the physically adjustable range.

(q) Describe everything we need to read and interpret all the information broadcast by an engine's onboard computers and electronic control modules and state that you will give us any hardware or tools we would need to do this. You may reference any appropriate publicly released standards that define conventions for these messages and parameters. Format your information consistent with publicly released standards.

(r) If your engine family includes a volatile liquid fuel, propose a set of design parameters and instructions for installing the engine to minimize evaporative emissions (see § 1048.115(g)).

(s) State whether your engine will operate in variable-speed applications, constant-speed applications, or both. If your certification covers only constant-speed applications, describe how you will prevent use of these engines in variable-speed applications.

(t) State that all the engines in the engine family comply with the field-testing emission standards we specify in § 1048.101(c) for all normal operation and use (see § 1048.515). Describe in detail any testing, engineering analysis, or other information on which you base this statement.

(u) State that you operated your test engines according to the specified procedures and test parameters using the fuels described in the application to show you meet the requirements of this part.

(v) State unconditionally that all the engines in the engine family comply with the requirements of this part, other referenced parts, and the Clean Air Act (42 U.S.C. 7401 et seq.).

(w) Include estimates of engine production.

(x) Add other information to help us evaluate your application if we ask for it.

§ 1048.210 May I get preliminary approval before I complete my application?

If you send us information before you finish the application, we will review it and make any appropriate determinations listed in § 1048.215(b) within 90 days of your request. If we need to ask you for further information, we will extend the 90-day period by the number of days we wait for your response.

§ 1048.215 What happens after I complete my application?

(a) If any of the information in your application changes after you submit it, amend it as described in § 1048.225.

(b) We may decide that we cannot approve your application unless you revise it.

(1) If you inappropriately use the provisions of § 1048.230(c) or (d) to define a broader or narrower engine family, we will require you to redefine your engine family.

(2) If we determine your selected useful life for the engine family is too short, we will require you to lengthen it (see § 1048.101(h)).

(3) If we determine your deterioration factors are not appropriate, we will

require you to revise them (see § 1048.240(c)).

(4) If your diagnostic system is inadequate for detecting significant malfunctions in emission-control systems, we will require you to make the system more effective (see § 1048.110(b)).

(5) If your diagnostic system inappropriately disregards trouble codes under certain conditions, we will require you to change the system to operate under broader conditions (see § 1048.110(g)).

(6) If your proposed label is inconsistent with § 1048.135, we will require you to change it (and tell you how, if possible).

(7) If you require or recommend maintenance and use instructions inconsistent with § 1048.125, we will require you to change them.

(8) If we find any other problem with your application, we will tell you how to correct it.

(c) If we determine your application is complete and shows you meet all the requirements, we will issue a certificate of conformity for your engine family for that model year. If we deny the application, we will explain why in writing. You may then ask us to hold a hearing to reconsider our decision (see § 1048.720).

§ 1048.220 How do I amend the maintenance instructions in my application?

Send the Designated Officer a request to amend your application for certification for an engine family if you want to change the maintenance instructions in a way that could affect emissions. In your request, describe the proposed changes to the maintenance instructions. Unless we disapprove it, you may distribute the new maintenance instructions to your customers 30 days after we receive your request. We may also approve a shorter time or waive this requirement.

§ 1048.225 How do I amend my application to include new or modified engines?

(a) You must amend your application for certification before you take either of the following actions:

(1) Add an engine to a certificate of conformity.

(2) Make a design change for a certified engine family that may affect emissions or an emission-related part over the engine's lifetime.

(b) Send the Designated Officer a request to amend the application for certification for an engine family. In your request, do all of the following:

(1) Describe the engine model or configuration you are adding or changing.

(2) Include engineering evaluations or reasons why the original test engine is or is not still appropriate.

(3) If the original test engine for the engine family is not appropriate to show compliance for the new or modified engine, include new test data showing that the new or modified engine meets the requirements of this part.

(c) You may start producing the new or modified engine anytime after you send us your request.

(d) You must give us test data within 30 days if we ask for more testing, or stop producing the engine if you cannot do this.

(e) If we determine that the certificate of conformity would not cover your new or modified engine, we will send you a written explanation of our decision. In this case, you may no longer produce these engines, though you may ask for a hearing for us to reconsider our decision (see § 1048.720).

§ 1048.230 How do I select engine families?

(a) Divide your product line into families of engines that you expect to have similar emission characteristics. Your engine family is limited to a single model year.

(b) Group engines in the same engine family if they are identical in all of the following aspects:

(1) The combustion cycle.

(2) The cooling system (water-cooled vs. air-cooled).

(3) The number and arrangement of cylinders.

(4) The number, location, volume, and composition of catalytic converters.

(5) Method of air aspiration.

(6) Bore and stroke.

(7) Configuration of the combustion chamber.

(8) Location of intake and exhaust valves or ports.

(c) In some cases you may subdivide a group of engines that is identical under paragraph (b) of this section into different engine families. To do so, you must show you expect emission characteristics to be different during the useful life or that any of the following engine characteristics are different:

(1) Method of actuating intake and exhaust timing (poppet valve, reed valve, rotary valve, etc.).

(2) Sizes of intake and exhaust valves or ports.

(3) Type of fuel.

(4) Configuration of the fuel system.

(5) Exhaust system.

(d) If your engines are not identical with respect to the things listed in paragraph (b) of this section, but you show that their emission characteristics during the useful life will be similar, we may approve grouping them in the same engine family.

(e) If you cannot define engine families by the method in this section, we will define them based on features related to emission characteristics.

§ 1048.235 How does testing fit with my application for a certificate of conformity?

This section describes how to test engines in your effort to apply for a certificate of conformity.

(a) Test your engines using the procedures and equipment specified in subpart F of this part.

(b) Select from each engine family a test engine for each fuel type with a configuration you believe is most likely to exceed the emission standards. Using good engineering judgment, consider the emission levels of all exhaust constituents over the full useful life of the engine when operated in a piece of equipment.

(c) You may submit emission data for equivalent engine families from previous years instead of doing new tests, but only if the data shows that the test engine would meet all the requirements for the latest engine models. We may require you to do new emission testing if we believe the latest engine models could be substantially different from the previously tested engine.

(d) We may choose to measure emissions from any of your test engines.

(1) If we do this, you must provide the test engine at the location we select. We may decide to do the testing at your plant or any other facility. If we choose to do the testing at your plant, you must schedule it as soon as possible and make available the instruments and equipment we need.

(2) If we measure emissions on one of your test engines, the results of that testing become the official data for the engine. Unless we later invalidate this data, we may decide not to consider your data in determining if your engine family meets the emission standards.

(3) Before we test one of your engines, we may set its adjustable parameters to any point within the physically adjustable ranges (see § 1048.115(d)).

(4) Calibrate the test engine within the production tolerances shown on the engine label for anything we do not consider an adjustable parameter (see § 1048.205(m)).

§ 1048.240 How do I determine if my engine family complies with emission standards?

(a) Your engine family complies with the numerical emission standards in § 1048.101 if all emission-data engines representing that family have test results

showing emission levels at or below the standards in § 1048.101(a) through (c).

(b) Your engine family does not comply if any emission-data engine representing that family has test results showing emission levels above the standards from § 1048.101(a) through (c) for any pollutant.

(c) To compare emission levels from the test engine with the emission standards, apply deterioration factors to the measured emission levels. The deterioration factor is a number that shows the relationship between exhaust emissions at the end of useful life and at the low-hour test point. Specify the deterioration factors based on emission measurements, using three decimal places. Deterioration factors must be consistent with emission increases observed from in-use testing with similar engines (see subpart E of this part). Small-volume manufacturers may use assigned deterioration factors established by EPA. Apply the deterioration factors as follows:

(1) For engines that use aftertreatment technology, such as catalytic converters, the deterioration factor is the ratio of exhaust emissions at the end of useful life to exhaust emissions at the low-hour test point. Adjust the official emission results for each tested engine at the selected test point by multiplying the measured emissions by the deterioration factor. If the factor is less than one, use one.

(2) For engines that do not use aftertreatment technology, the deterioration factor is the difference between exhaust emissions at the end of useful life and exhaust emissions at the low-hour test point. Adjust the official emission results for each tested engine at the selected test point by adding the factor to the measured emissions. If the factor is less than zero, use zero.

(d) After adjusting the emission levels for deterioration, round them to the same number of decimal places as the standard. Compare the rounded emission levels to the emission standard for each test engine.

§ 1048.245 What records must I keep and make available to EPA?

(a) Organize and maintain the following records to keep them readily available; we may review these records at any time:

(1) A copy of all applications and any summary information you sent us.

(2) Any of the information we specify in § 1048.205 that you did not include in your application.

(3) A detailed history of each emission-data engine. In each history, describe all of the following:

(i) The test engine's construction, including its origin and buildup, steps you took to ensure that it represents production engines, any components you built specially for it, and all emission-related components.

(ii) How you accumulated engine operating hours, including the dates and the number of hours accumulated.

(iii) All maintenance (including modifications, parts changes, and other service) and the dates and reasons for the maintenance.

(iv) All your emission tests, including documentation on routine and standard tests, as specified in part 1065 of this chapter, and the date and purpose of each test.

(v) All tests to diagnose engine or emission-control performance, giving the date and time of each and the reasons for the test.

(vi) Any other significant events.

(b) Keep data from routine emission tests (such as test cell temperatures and relative humidity readings) for one year after we issue the associated certificate of conformity. Keep all other information specified in paragraph (a) of this section for eight years after we issue your certificate.

(c) Store these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them.

(d) Send us copies of any engine maintenance instructions or explanations if we ask for them.

§ 1048.250 When may EPA deny, revoke, or void my certificate of conformity?

(a) We may deny your application for certification if your emission-data engines fail to comply with emission standards or other requirements. Our decision may be based on any information available to us. If we deny your application, we will explain why in writing.

(b) In addition, we may deny your application or revoke your certificate if you do any of the following:

(1) Refuse to comply with any testing or reporting requirements.

(2) Submit false or incomplete information (paragraph (d) of this section applies if this is fraudulent).

(3) Render inaccurate any test data.

(4) Deny us from completing authorized activities despite our presenting a warrant or court order (see § 1068.20 of this chapter).

(5) Produce engines for importation into the United States at a location where local law prohibits us from carrying out authorized activities.

(c) We may void your certificate if you do not keep the records we require or do not give us information when we ask for it.

(d) We may void your certificate if we find that you committed fraud to get it. This means intentionally submitting false or incomplete information.

(e) If we deny your application or revoke or void your certificate, you may ask for a hearing (see § 1048.720). Any such hearing will be limited to substantial and factual issues.

Subpart D—Testing Production-line Engines

§ 1048.301 When must I test my production-line engines?

(a) If you produce engines that are subject the requirements of this part, you must test them as described in this subpart.

(b) We may suspend or revoke your certificate of conformity for certain engine families if your production-line engines do not meet emission standards or you do not fulfill your obligations under this subpart (see §§ 1048.325 and 1048.340).

(c) The requirements of this part do not affect our ability to do selective enforcement audits, as described in part 1068 of this chapter.

(d) You may ask to use an alternate program for testing production-line engines. In your request, you must show us that the alternate program gives equal assurance that your production-line engines meet the requirements of this part. If we approve your alternate program, we may waive some or all of this part's requirements.

(e) If you certify an engine family with carryover emission data, as described in § 1048.235(c), and these equivalent engine families consistently meet the emission standards with production-line testing over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. The minimum testing rate is one engine per engine family. If we reduce your testing rate, we may limit our approval to a single model year.

(f) We may ask you to make a reasonable number of production-line engines available for a reasonable time so we can test or inspect them for compliance with the requirements of this part.

§ 1048.305 How must I prepare and test my production-line engines?

(a) *Test procedures.* Test your production-line engines using either the steady-state or transient testing procedures in subpart F of this part to show you meet the emission standards in § 1048.101 (a) or (b), respectively. We may require you to test engines using the transient testing procedures to show

you meet the emission standards in § 1048.101(b).

(b) *Modifying a test engine.* Once an engine is selected for testing (see § 1048.310), you may adjust, repair, prepare, or modify it or check its emissions only if one of the following is true:

(1) You document the need for doing so in your procedures for assembling and inspecting all your production engines and make the action routine for all the engines in the engine family.

(2) This subpart otherwise specifically allows your action.

(3) We approve your action in advance.

(c) *Engine malfunction.* If an engine malfunction prevents further emission testing, ask us to approve your decision to either repair the engine or delete it from the test sequence.

(d) *Setting adjustable parameters.* Before any test, we may adjust or require you to adjust any adjustable parameter to any setting within its physically adjustable range.

(1) We may adjust idle speed outside the physically adjustable range as needed until the engine has stabilized emission levels (see paragraph (e) of this section). We may ask you for information needed to establish an alternate minimum idle speed.

(2) We may make or specify adjustments within the physically adjustable range by considering their effect on emission levels, as well as how likely it is someone will make such an adjustment with in-use engines.

(e) *Stabilizing emission levels.* Before you test production-line engines, you may operate the engine to stabilize the emission levels. Using good engineering judgment, operate your engines in a way that represents the way production engines will be used. You may operate each engine for no more than the greater of two periods:

(1) 50 hours.

(2) The number of hours you operated your emission-data engine for certifying the engine family (see 40 CFR part 1065, subpart E).

(f) *Damage during shipment.* If shipping an engine to a remote facility for production-line testing makes necessary an adjustment or repair, you must wait until after the after the initial emission test to do this work. We may waive this requirement if the test would be impossible or unsafe, or if it would permanently damage the engine. Report to us, in your written report under § 1048.345, all adjustments or repairs you make on test engines before each test.

(g) *Retesting after invalid tests.* You may retest an engine if you determine an emission test is invalid. Explain in your written report reasons for invalidating any test and the emission results from all tests. If you retest an engine and, within ten days after testing, ask to substitute results of the new tests for the original ones, we will answer within ten days after we receive your information.

§ 1048.310 How must I select engines for production-line testing?

(a) Use test results from two engines for each engine family to calculate the required sample size for the model year. Update this calculation with each test.

(b) Early in each calendar quarter, randomly select and test two engines from the end of the assembly line for each engine family.

(c) Calculate the required sample size for each engine family. Separately calculate this figure for $HC+NO_X$ and for CO. The required sample size is the greater of these two calculated values. Use the following equation:

$$N = \left[\frac{(t_{95} \times \sigma)}{(x - STD)}\right]^2 + 1$$

Where:

N = Required sample size for the model year.

t_{95} = 95% confidence coefficient, which depends on the number of tests completed, n, as specified in the table in paragraph (c)(1) of this section. It defines 95% confidence intervals for a one-tail distribution.

x = Mean of emission test results of the sample.

STD = Emission standard.

σ = Test sample standard deviation (see paragraph (c)(2) of this section).

(1) Determine the 95% confidence coefficient, t_{95}, from the following table:

n	t_{95}	n	t_{95}	n	t_{95}
2	6.31	12	1.80	22	1.72
3	2.92	13	1.78	23	1.72
4	2.35	14	1.77	24	1.71
5	2.13	15	1.76	25	1.71
6	2.02	16	1.75	26	1.71
7	1.94	17	1.75	27	1.71
8	1.90	18	1.74	28	1.70
9	1.86	19	1.73	29	1.70
10	1.83	20	1.73	30+	1.70
11	1.81	21	1.72		

(2) Calculate the standard deviation, σ, for the test sample using the following formula:

$$\sigma = \sqrt{\frac{\sum (X_i - x)^2}{n - 1}}$$

Where:

X_i = Emission test result for an individual engine.

n = The number of tests completed in an engine family.

(d) Use final deteriorated test results to calculate the variables in the equations in paragraph (c) of this section (see § 1048.315(a)).

(e) After each new test, recalculate the required sample size using the updated mean values, standard deviations, and the appropriate 95% confidence coefficient.

(f) Distribute the remaining engine tests evenly throughout the rest of the year. You may need to adjust your schedule for selecting engines if the required sample size changes. Continue to randomly select engines from each engine family; this may involve testing engines that operate on different fuels.

(g) Continue testing any engine family for which the sample mean, x, is greater than the emission standard. This applies if the sample mean for either $HC+NO_X$ or for CO is greater than the emission standard. Continue testing until one of the following things happens:

(1) The sample size, n, for an engine family is greater than the required sample size, N, and the sample mean, x, is less than or equal to the emission standard.

(2) The engine family does not comply according to § 1048.325.

(3) You test 30 engines from the engine family.

(4) You test one percent of your projected annual U.S.-directed production volume for the engine family.

(5) You choose to declare that the engine family does not comply with emission standards.

(h) You may elect to test more randomly chosen engines than we require. Include these engines in the sample size calculations.

§ 1048.315 How do I know when my engine family does not comply?

(a) Calculate your test results. Round them to the number of decimal places in the emission standard expressed to one more decimal place.

(1) *Initial and final test results.* Calculate and round the test results for each engine. If you do several tests on an engine, calculate the initial test results, then add them together and divide by the number of tests and round for the final test results on that engine.

(2) *Final deteriorated test results.* Apply the deterioration factor for the engine family to the final test results (see § 1048.240(c)).

(b) Construct the following CumSum Equation for each engine family (for $HC+NO_X$ and for CO emissions):

$$C_i = C_{i-1} + X_i - (STD + F)$$

Where:

C_i = The current CumSum statistic.

C_{i-1} = The previous CumSum statistic. Prior to any testing, the CumSum statistic is 0 (i.e. $C_0 = 0$).

X_i = The current emission test result for an individual engine.

STD = Emission standard.

$F = 0.25 \times \sigma$

(c) Use final deteriorated test results to calculate the variables in the equation in paragraph (b) of this section (see § 1048.315(a)).

(d) After each new test, recalculate the CumSum statistic.

(e) If you test more than the required number of engines, include the results from these additional tests in the CumSum Equation.

(f) After each test, compare the current CumSum statistic, C_i, to the recalculated Action Limit, H, defined as $H = 5.0 \times \sigma$.

(g) If the CumSum statistic exceeds the Action Limit in two consecutive tests, the engine family does not comply with the requirements of this part. Tell us within ten working days if this happens.

(h) If you amend the application for certification for an engine family (see § 1048.225), do not change any previous calculations of sample size or CumSum statistics for the model year.

§ 1048.320 What happens if one of my production-line engines fails to meet emission standards?

(a) If you have a production-line engine with final deteriorated test results exceeding one or more emission standards (see § 1048.315(a)), the certificate of conformity is automatically suspended for that failing engine. You must take the following actions before your certificate of conformity can cover that engine:

(1) Correct the problem and retest the engine to show it complies with all emission standards.

(2) Include in your written report a description of the test results and the remedy for each engine (see § 1048.345).

(b) You may at any time ask for a hearing to determine whether the tests and sampling methods were proper (see § 1048.720).

§ 1048.325 What happens if an engine family does not comply?

(a) We may suspend your certificate of conformity for an engine family if it fails to comply under § 1048.315. The suspension may apply to all facilities producing engines from an engine family, even if you find noncompliant engines only at one facility.

(b) We will tell you in writing if we suspend your certificate in whole or in part. We will not suspend a certificate until at least 15 days after the engine family became noncompliant. The suspension is effective when you receive our notice.

(c) Up to 15 days after we suspend the certificate for an engine family, you may ask for a hearing to determine whether the tests and sampling methods were proper (see § 1048.720). If we agree before a hearing that we used erroneous information in deciding to suspend the certificate, we will reinstate the certificate.

§ 1048.330 May I sell engines from an engine family with a suspended certificate of conformity?

You may sell engines that you produce after we suspend the engine family's certificate of conformity under § 1048.315 only if one of the following occurs:

(a) You test each engine you produce and show it complies with emission standards that apply.

(b) We conditionally reinstate the certificate for the engine family. We may do so if you agree to recall all the affected engines and remedy any noncompliance at no expense to the owner if later testing shows that the engine family still does not comply.

§ 1048.335 How do I ask EPA to reinstate my suspended certificate?

(a) Send us a written report asking us to reinstate your suspended certificate. In your report, identify the reason for noncompliance, propose a remedy, and commit to a date for carrying it out. In your proposed remedy include any quality control measures you propose to keep the problem from happening again.

(b) Give us data from production-line testing that shows the remedied engine family complies with all the emission standards that apply.

§ 1048.340 When may EPA revoke my certificate under this subpart and how may I sell these engines again?

(a) We may revoke your certificate for an engine family in the following cases:

(1) You do not meet the reporting requirements.

(2) Your engine family fails to meet emission standards and your proposed remedy to address a suspended certificate under § 1048.325 is inadequate to solve the problem or requires you to change the engine's design or emission-control system.

(b) To sell engines from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the requirements of this part.

(1) If we determine your proposed design change may not control emissions for the engine's full useful life, we will tell you within five working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.

(2) Unless we require more testing, you may show compliance by testing production-line engines as described in this subpart.

(3) We will issue a new or updated certificate of conformity when you have met these requirements.

§ 1048.345 What production-line testing records must I send to EPA?

(a) Within 30 calendar days of the end of each calendar quarter, send us a report with the following information:

(1) Describe any facility used to test production-line engines and state its location.

(2) State the total U.S.-directed production volume and number of tests for each engine family.

(3) Describe how you randomly selected engines.

(4) Describe your test engines, including the engine family's identification and the engine's model year, build date, model number, identification number, and number of hours of operation before testing for each test engine.

(5) Identify where you accumulated hours of operation on the engines and describe the procedure and schedule you used.

(6) Provide the test number; the date, time and duration of testing; test procedure; initial test results before and after rounding; final test results; and final deteriorated test results for all tests. Provide the emission results for all measured pollutants. Include information for both valid and invalid tests and the reason for any invalidation.

(7) Describe completely and justify any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the test engine if you did not report it separately under this subpart. Include the results of any emission measurements, regardless of the procedure or type of equipment.

(8) Provide the CumSum analysis required in § 1048.315 for each engine family.

(9) Report on each failed engine as described in § 1048.320.

(10) State the date the calendar quarter ended for each engine family.

(b) We may ask you to add information to your written report, so we can determine whether your new engines conform with the requirements of this subpart.

(c) An authorized representative of your company must sign the following statement:

> We submit this report under Sections 208 and 213 of the Clean Air Act. Our production-line testing conformed completely with the requirements of 40 CFR part 1048. We have not changed production processes or quality-control procedures for the engine family in a way that might affect the emission control from production engines. All the information in this report is true and accurate, to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)

(d) Send electronic reports of production-line testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(e) We will send copies of your reports to anyone from the public who asks for them. We will not release information about your sales or production volumes, which we will consider confidential under 40 CFR part 2.

§ 1048.350 What records must I keep?

(a) Organize and maintain your records as described in this section. We may review your records at any time, so it is important to keep required information readily available.

(b) Keep paper records of your production-line testing for one full year after you complete all the testing required for an engine family in a model year. You may use any additional storage formats or media if you like.

(c) Keep a copy of the written reports described in § 1048.345.

(d) Keep the following additional records:

(1) A description of all test equipment for each test cell that you can use to test production-line engines.

(2) The names of supervisors involved in each test.

(3) The name of anyone who authorizes adjusting, repairing, preparing, or modifying a test engine and the names of all supervisors who oversee this work.

(4) If you shipped the engine for testing, the date you shipped it, the associated storage or port facility, and the date the engine arrived at the testing facility.

(5) Any records related to your production-line tests that are not in the written report.

(6) A brief description of any significant events during testing not otherwise described in the written report or in this section.

(e) If we ask, you must give us projected or actual production figures for an engine family. We may ask you to divide your production figures by power rating, displacement, fuel type, or assembly plant (if you produce engines at more than one plant).

(f) Keep a list of engine identification numbers for all the engines you produce under each certificate of conformity. Give us this list within 30 days if we ask for it.

(g) We may ask you to keep or send other information necessary to implement this subpart.

Subpart E—Testing In-Use Engines

§ 1048.401 What testing requirements apply to my engines that have gone into service?

(a) If you produce engines that are subject to the requirements of this part, you must test them as described in this subpart. This generally involves testing engines in the field or removing them for measurement in a laboratory.

(b) We may suspend or revoke your certificate of conformity for an engine family if in-use testing shows that the family fails to meet emission standards (see § 1048.420) or if you do not meet your obligations under this part. You may use averaging, banking, or trading of in-use emission credits to show that an engine family meets the standards (see § 1048.415).

(c) We may approve an alternate plan for showing that in-use engines comply with the requirements of this part if one of the following is true:

(1) You produce 200 or fewer engines per year in the selected engine family.

(2) Removing the engine from most of the applications for that engine family causes significant, irreparable damage to the equipment.

(3) You identify a unique aspect of your engine applications that keeps you from doing the required in-use testing.

(d) Independent of your responsibility to test in-use engines, we may choose at any time to do our own testing of your in-use engines.

§ 1048.405 How does this program work?

(a) You must test in-use engines from the families we select. We may select up to 25 percent of your engine families in any model year—or one engine family if you have three or fewer families. We will select engine families for testing before the end of the model year. When we select an engine family for testing, we may specify that you preferentially test engines based on fuel type or equipment type. In addition, we may identify specific modes of operation or sampling times.

(b) You may choose to test additional engine families that we do not select. You must explain to us your rationale and propose a testing plan if you want to generate in-use emission credits from this testing (see § 1048.415). You may begin testing these engines 30 days after you propose your testing plan or after we approve it, whichever comes first.

(c) Send us an in-use testing plan within 12 calendar months after we direct you to test a particular engine

family. Complete the testing within 24 calendar months after we approve your plan.

(d) You may need to test engines from more than one model year at a given time.

§ 1048.410 How must I select, prepare, and test my in-use engines?

(a) You may make arrangements to select representative test engines from your own fleet or from other independent sources.

(b) For the selected engine families, select engines that you or your customers have—

(1) Operated for at least 50 percent of the engine family's useful life (see § 1048.101(d));

(2) Not maintained or used in an abnormal way; and

(3) Documented in terms of total hours of operation, maintenance, operating conditions, and storage.

(c) Use the following methods to determine the number of engines you must test in each engine family:

(1) Test at least two engines if you produce 2,000 or fewer engines in the model year from all engine families, or if you produce 500 or fewer engines from the selected engine family. Otherwise, test at least four engines.

(2) If you successfully complete an in-use test program on an engine family and later certify an equivalent engine family with carryover emission data, as described in § 1048.235(c), then test at least one engine instead of the testing rates in paragraph (c)(1) of this section.

(3) If you test the minimum required number of engines and all comply fully with emission standards, you may stop testing.

(4) For each engine that fails any applicable standard, test two more. Regardless of measured emission levels, you do not have to test more than ten engines in an engine family. You may do more tests than we require.

(5) You may concede that the engine family does not comply before testing a total of ten engines.

(d) You may do minimal maintenance to set components of a test engine to specifications for anything we do not consider an adjustable parameter (see § 1048.205(m)). Limit maintenance to what is in the owner's instructions for engines with that amount of service and age. Document all maintenance and adjustments.

(e) Do at least one valid emission test for each test engine.

(f) For a test program on an engine family, choose one of the following methods to test your engines:

(1) Remove the selected engines for testing in a laboratory. Use the applicable steady-state and transient procedures in subpart F of this part to show compliance with the duty-cycle standards in § 1048.101(a) and (b). We may direct you to measure emissions on the dynamometer using the supplemental test procedures in § 1048.515 to show compliance with the field-testing standards in § 1048.101(c).

(2) Test the selected engines while they remain installed in the equipment. Use the field testing procedures in subpart F of this part. Measure emissions during normal operation of the equipment to show compliance with the field-testing standards in § 1048.101(c). We may direct you to include specific areas of normal operation.

(g) You may ask us to waive parts of the prescribed test procedures if they are not necessary to determine in-use compliance.

(h) Calculate the average emission levels for an engine family from the results for the set of tested engines. Round them to the number of decimal places in the emission standards expressed to one more decimal place.

§ 1048.415 How can I use in-use emission credits?

(a) You may include all engines subject to this part in the voluntary in-use credit program; however, you may generate or use emission credits under this program only if you measure emissions using the transient duty-cycle procedures in Subpart F of this part.

(b) If your average emission level for a family is lower than the emission standard, you may generate positive emission credits for any of three purposes:

(1) *Averaging.* Use these emission credits for averaging in the same model year. If you want to test other engine families to generate additional credits, file your request and plan with us for approval (See § 1048.405).

(2) *Banking.* Reserve a positive balance of unused credits at the end of the model year for banking and then ''withdraw'' them for a later model year.

(3) *Trading.* Sell your banked credits to another manufacturer or a broker for engines that are also subject to the requirements of this part. A manufacturer may use purchased credits for averaging, banking, or further trading.

(c) You may use emission credits for banking or trading beginning 30 days after you submit the last report required for a model year. We may correct any errors in calculating banked credits, but we may revoke some or all in-use emission credits if we discover problems or errors in calculating or reporting them.

(d) If your average emission level for a family is higher than the emission standard, you must calculate the negative or required credits for that engine family and use positive emission credits to offset them. You have until the date of the last report required for a model year to complete credit exchanges, so you can show a zero or positive credit balance.

(e) You may not generate positive emission credits for an engine family if it has an average emission level higher than the emission standard for any other pollutant.

(f) In-use emission credits expire after three model years. For example, emission credits you generate with 2007 model year engines are available for showing compliance with 2010 model year engines, but not with 2011 model year engines.

(g) For in-use emission credit trading that results in a negative credit balance, both the buyer and seller are liable, except in cases involving fraud. If a credit buyer is not responsible for causing the negative credit balance, the buyer is only liable to supply additional credits equivalent to any amount of invalid credits involved. If your engine families are involved in a negative trade, we order you to recall those engines.

(h) Calculate positive and negative emission credits according to the following equation and round the results to the nearest metric ton:

$$CREDITS = SALES \times (STD - CL) \times POWER \times AF \times LF \times UL \times 10^{-6}$$

Where:

CREDITS = Emission credits in metric tons.

SALES = The number of eligible sales, tracked to the point of first retail sale in the U.S., for the given engine family during the model year.

STD = The emission standard in g/kW-hr.

CL = Average emission level for an in-use testing family in g/kW-hr.

UL= Useful life in hours (see § 1048.101(d)).

POWER = The sales-weighted average rated power for an engine family in kW.

LF = Load factor or fraction of rated engine power utilized in use; use 0.50 for constant-speed engines and 0.32 for all other engines.

AF = Adjustment factor for the number of tests you do, as shown in the table in paragraph (i) of this section; this factor is 1.0 if the engine family has an average emission level higher than the emission standard for any pollutant.

(i) Use the following table for the adjustment factor in the equation in paragraph (h) of this section:

TABLE 1 OF § 1048.415.—ADJUSTMENT FACTORS FOR IN-USE CREDIT CALCULATION

Number of engines tested	Adjustment factor for positive credits
2	0.45
3	0.45
4	0.45
5	0.56
6	0.68
7	0.74
8	0.81
9	0.86
10+	0.90

§ 1048.420 What happens if my in-use engines do not meet requirements?

(a) Determine the reason each in-use engine exceeds the emission standards.

(b) If the average emission levels calculated in § 1048.410(h) exceed any of the emission standards that apply, the engine family is noncompliant. Section 1048.415 describes how you can use in-use averaging, banking, or trading to show that your engine families comply with the standards. Determine the reasons any engine family does not comply and notify us within fifteen days of completing testing on this family.

(c) If you voluntarily test more engine families and these engines do not comply with emission standards, you must treat the family as though it failed under the in-use testing program we direct.

(d) You may voluntarily recall an engine family for emission failures, as described in § 1068.535 of this chapter, unless we have ordered a recall for that family under § 1068.505 of this chapter.

(e) We will consider failure rates, average emission levels, and any defects—among other things—to decide on taking remedial action under this subpart. We may order a recall before or after you complete testing of an engine family if we determine a substantial number of engines do not conform to section 213 of the Act or to this part.

(f) You have the right to a hearing before we suspend or revoke your engine family's certificate of conformity (see § 1048.720).

§ 1048.425 What in-use testing information must I report to EPA?

(a) In a report to us within three months after you finish testing an engine family, do all the following:

(1) Identify the engine family, model, serial number, and date of manufacture.

(2) For each engine inspected or considered for testing, identify whether the diagnostic system was functioning.

(3) Describe the specific reasons for disqualifying any engines for not being properly maintained or used.

(4) For each engine selected for testing, include the following information:

(i) Estimate the hours each engine was used before testing.

(ii) Describe all maintenance, adjustments, modifications, and repairs to each test engine.

(5) State the date and time of each test attempt.

(6) Include the results of all emission testing, including incomplete or invalidated tests, if any.

(b) Notify us separately of any engine families that do not meet emission standards, as described in § 1048.420.

(c) If you participate in the in-use credit program, send us a report within 90 days after completing all in-use testing for the model year. If we do not receive this report on time, we will treat the results of your in-use testing without considering credits. Include required information in your report and show the calculated credits from all your in-use testing for the model year.

(d) If you or we determine a previous report had errors, you must recalculate your credits. We will void any erroneous positive credits and may adjust any erroneous negative credits. Do not recalculate your credits when you update your sales information for in-use testing, unless you made an error in estimating the number of engines you export.

(e) Send electronic reports of in-use testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(f) We will send copies of your reports to anyone from the public who asks for them. We will not release information about your sales or production volumes, which is all we will consider confidential.

(g) We may ask for more information.

§ 1048.430 What records must I keep?

(a) Organize and maintain your records as described in this section. We may review your records at any time, so it is important to keep required information readily available.

(b) Keep paper records of your in-use testing for one full year after you complete all the testing required for an engine family in a model year. You may use any additional storage formats or media if you like.

(c) Keep a copy of the written reports described in § 1048.425.

(d) Keep the following additional records:

(1) Documents used in the procurement process.

(2) Required records for the in-use credit program described in § 1048.415 if you participate in it.

Subpart F—Test Procedures

§ 1048.501 What procedures must I use to test my engines?

(a) Use the equipment and procedures for spark-ignition engines in part 1065 of this chapter to show your engines meet the duty-cycle emission standards in § 1048.101(a) and (b). Measure HC, NO_X, CO, and CO2 emissions using the dilute sampling procedures in part 1065 of this chapter. Use the applicable duty cycles in §§ 1048.505 and 1048.510.

(b) We describe in § 1048.515 the supplemental procedures for showing that your engines meet the field-testing emission standards in § 1048.101(c).

(c) Use the fuels specified in 40 CFR part 1065, subpart C, for all the testing and service accumulation we require in this part.

(d) You may use special or alternate procedures, as described in § 1065.10 of this chapter.

(e) We may reject data you generate using alternate procedures if later testing with the procedures in part 1065 of this chapter shows contradictory emission data.

§ 1048.505 What steady-state duty cycles apply for laboratory testing?

(a) Measure emissions by testing the engine on a dynamometer with one or both of the following sets of steady-state duty cycles:

(1) Use the 5-mode duty cycle described in the following table if you certify an engine family for operation only at a single, rated speed:

TABLE 1 OF § 1048.505.—5-MODE DUTY CYCLE FOR CONSTANT-SPEED ENGINES [1]

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
1	Maximum test	100	5.0	0.05
2	Maximum test	75	5.0	0.25
3	Maximum test	50	5.0	0.30
4	Maximum test	25	5.0	0.30
5	Maximum test	10	5.0	0.10

[1] This duty cycle is analogous to the D2 cycle specified in ISO 8178–4.

(2) Use the 7-mode duty cycle described in the following table for engines from an engine family that will be used only in variable-speed applications:

TABLE 2 OF § 1048.505.—7-MODE DUTY CYCLE [1]

Mode No.	Engine speed	Observed torque [2]	Minimum time in mode (minutes)	Weighting factors
1	Maximum test speed	25	5.0	0.06
2	Intermediate test speed	100	5.0	0.02
3	Intermediate test speed	75	5.0	0.05
4	Intermediate test speed	50	5.0	0.32
5	Intermediate test speed	25	5.0	0.30
6	Intermediate test speed	10	5.0	0.10
7	Idle	0	5.0	0.15

[1] This duty cycle is analogous to the C2 cycle specified in ISO 8178–4.
[2] The percent torque is relative to the maximum torque at the given engine speed.

(3) Use both of the duty cycles described in paragraphs (a)(1) and (a)(2) of this section if you will not restrict an engine family to constant-speed or variable-speed applications.

(b) If we test an engine to confirm that it meets the duty-cycle emission standards, we will use the duty cycles that apply for that engine family.

(c) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Keep the throttle fully closed.

(3) Keep engine torque under 5 percent of the peak torque value at maximum test speed.

(d) For the full-load operating mode, operate the engine at its maximum fueling rate.

(e) See part 1065 of this chapter for detailed specifications of tolerances and calculations.

§ 1048.510 What transient duty cycles apply for laboratory testing?

(a) Starting with the 2007 model year, measure emissions by testing the engine on a dynamometer with one of the following transient duty cycles:

(1) If you certify an engine family for constant-speed operation only, use the transient duty-cycle described in Appendix I of this part.

(2) For all other engines, use the transient duty-cycle described in Appendix II of this part.

(b) If we test an engine to confirm that it meets the duty-cycle emission standards, we will use the duty cycle that applies for that engine family.

(c) To warm up the engine, operate it for the first 180 seconds of the appropriate duty cycle, then allow it to idle without load for 30 seconds. At the end of the 30-second idling period, start measuring emissions as the engine operates over the prescribed duty cycle.

§ 1048.515 Field-testing procedures.

(a) This section describes the procedures to show that your engines meet the field-testing emission standards in § 1048.101(c). These procedures may include any normal engine operation and ambient conditions that the engines may experience in use. Paragraph (c) of this section defines the limits of what we will consider normal engine operation and ambient conditions. Measure emissions with one of the following procedures.

(1) Remove the selected engines for testing in a laboratory. This generally involves the same equipment and sampling methods we specify in § 1048.501(a). You can use the engine dynamometer to simulate normal operation, as described in this section.

(2) Test the selected engines while they remain installed in the equipment. Part 1065, subpart J, of this chapter describes the equipment and sampling methods for testing engines in the field. Use fuel meeting the specifications of § 1065.210 of this chapter or a fuel typical of what you would expect the engine to use in service.

(b) Use the test procedures we specify in § 1048.501, except for the provisions we specify in this section.

(c) To comply with the emission standards in § 1048.101(c), an engine's

emissions may not exceed the levels we specify in § 1048.101(c) for any continuous sampling period of at least 120 seconds under the following ranges of operation and operating conditions:

(1) Engine operation during the emission sampling period may include any normal operation, subject to the following restrictions:

(i) Average power must be over 5 percent of rated power.

(ii) Continuous time at idle must not be greater than 120 seconds.

(iii) The sampling period may not begin until the engine has reached stable operating temperatures. For example, this would exclude engine operation after starting until the thermostat starts modulating coolant temperature.

(iv) The sampling period may not include engine starting.

(v) For gasoline-fueled engines, operation at 90 percent or more of maximum power must be less than 10 percent of the total sampling time. You may request our approval for a different power threshold.

(2) Engine testing may occur under any normal conditions without correcting measured emission levels, subject to the following restrictions:

(i) Barometric pressure must be between 600 and 775 mm Hg.

(ii) Ambient air temperature must be between 13° and 35° C.

Subpart G—Compliance Provisions

§ 1048.601 What compliance provisions apply to these engines?

Engine and equipment manufacturers, as well as owners, operators, and rebuilders of these engines, and all other persons, must observe the requirements and prohibitions in part 1068 of this chapter. The compliance provisions in this subpart apply only to the engines we regulate in this part.

§ 1048.605 What are the provisions for exempting engines from the requirements of this part if they are already certified under the motor-vehicle program?

(a) This section applies to you if you are an engine manufacturer. See § 1048.610 if you are not an engine manufacturer.

(b) The only requirements or prohibitions from this part that apply to an engine that is exempt under this section are in this section.

(c) If you meet all the following criteria regarding your new engine, it is exempt under this section:

(1) You must produce it by modifying an engine covered by a valid certificate of conformity under 40 CFR part 86.

(2) You must not make any changes to the certified engine that we could reasonably expect to increase its exhaust or evaporative emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for this exemption:

(i) Change any fuel system or evaporative system parameters from the certified configuration (this does not apply to refueling emission controls).

(ii) Change any other emission-related components.

(iii) Modify or design the engine cooling system so that temperatures or heat rejection rates are outside the original engine manufacturer's specified ranges.

(3) You must make sure the engine still has the label we require under 40 CFR part 86.

(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in nonroad applications..

(d) If you produce both the engine and vehicle under this exemption, you must do all of the following to keep the exemption valid:

(1) Make sure the original engine label is intact.

(2) Add a permanent supplemental label to the engine in a position where it will remain clearly visible after installation in the equipment. In your engine label, do the following:

(i) Include the heading: ''Nonroad Engine Emission Control Information''.

(ii) Include your full corporate name and trademark.

(iii) State: ''THIS ENGINE WAS ADAPTED FOR NONROAD USE WITHOUT AFFECTING ITS EMISSION CONTROLS.''.

(iv) State the date you finished modifying the engine (month and year).

(3) Make sure the original and supplemental labels are readily visible after the engine is installed in the equipment or, if equipment obscures the engine's labels, make sure the equipment manufacturer attaches duplicate labels, as described in § 1068.105 of this chapter.

(4) Send the Designated Officer a signed letter by the end of each calendar year (or less often if we tell you) with all the following information:

(i) Identify your full corporate name, address, and telephone number.

(ii) List the engine models you expect to produce under this exemption in the coming year.

(iii) State: ''We produce each listed engine model for nonroad application without making any changes that could increase its certified emission levels, as described in 40 CFR 1048.605.''.

(e) If your engines do not meet the criteria listed in paragraph (c) of this section, they will be subject to the standards and prohibitions of this part. Producing these engines without a valid exemption or certificate of conformity would violate the prohibitions in § 1068.101 of this chapter.

(f) If you are the original manufacturer of both the highway and nonroad versions of an exempted engine, you must send us emission test data on the applicable nonroad duty cycle(s) (see §§ 1048.505 and 1048.510). You may include the data in your application for certification or in your letter requesting the exemption.

(g) If you are the original manufacturer of an exempted engine that is modified by another company under this exemption, we may require you to send us emission test data on the applicable nonroad duty cycle(s). If we ask for this data, we will allow a reasonable amount of time to collect it.

(h) Make sure the engine exempted under this section meets all applicable requirements from 40 CFR part 86. This applies to engine manufacturers, equipment manufacturers who use these engines, and all other persons as if these engines were used in a motor vehicle.

§ 1048.610 What are the provisions for producing nonroad equipment with engines already certified under the motor-vehicle program?

If you are not an engine manufacturer, you may produce nonroad equipment from complete or incomplete motor vehicles with the motor vehicle engine if you meet three criteria:

(a) The engine or vehicle is certified to 40 CFR part 86.

(b) The engine is not adjusted outside the manufacturer's specifications.

(c) The engine or vehicle is not modified in any way that may affect its emission control. This applies to exhaust and evaporative emission controls, but not refueling emission controls.

§ 1048.615 What are the provisions for exempting engines designed for lawn and garden applications?

This section is intended for engines designed for lawn and garden applications, but it applies to any engines meeting the size criteria in paragraph (a) of this section.

(a) If an engine meets all the following criteria, it is exempt from the requirements of this part:

(1) The engine must have a total displacement of 1,000 cc or less.

(2) The engine must have a rated power at or below 30 kW.

(3) The engine must be in an engine family that has a valid certificate of conformity showing that it meets emission standards for Class II engines under 40 CFR part 90.

(b) The only requirements or prohibitions from this part that apply to an engine that is exempt under this section are in this section.

(c) If your engines do not meet the criteria listed in paragraph (a) of this section, they will be subject to the provisions of this part. Producing these engines without a valid exemption or certificate of conformity would violate the prohibitions in § 1068.101 of this chapter.

(d) Engines exempted under this section are subject to all the requirements affecting engines under 40 CFR part 90. The requirements and restrictions of 40 CFR part 90 apply to anyone manufacturing these engines, anyone manufacturing equipment that uses these engines, and all other persons in the same manner as if these engines had a total rated power at or below 19 kW.

Subpart H—Definitions and Other Reference Information

§ 1048.701 What definitions apply to this part?

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them. The definitions follow:

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation.

Aftertreatment means relating to any system, component, or technology mounted downstream of the exhaust valve or exhaust port whose design function is to reduce exhaust emissions.

Aircraft means any vehicle capable of sustained air travel above treetop heights.

All-terrain vehicle means a nonroad vehicle with three or more wheels and a seat, designed for operation over rough terrain and intended primarily for transportation. This includes both land-based and amphibious vehicles.

Auxiliary emission-control device means any element of design that senses temperature, engine rpm, motive speed, transmission gear, atmospheric pressure, manifold pressure or vacuum, or any other parameter to activate, modulate, delay, or deactivate the operation of any part of the emission-control system. This also includes any other feature that causes in-use emissions to be higher than those measured under test conditions, except as we allow under this part.

Auxiliary marine engine means a marine engine not used for propulsion.

Blue Sky Series engine means an engine meeting the requirements of § 1048.140.

Broker means any entity that facilitates a trade of emission credits between a buyer and seller.

Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

Certification means obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

Constant-speed engine means an engine governed to operate at a single speed.

Crankcase emissions means airborne substances emitted to the atmosphere from any part of the engine crankcase's ventilation or lubrication systems. The crankcase is the housing for the crankshaft and other related internal parts.

Designated Officer means the Manager, Engine Programs Group (6403–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated emissions from an engine.

Emission-data engine means an engine that is tested for certification.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emissions deterioration.

Engine family means a group of engines with similar emission characteristics, as specified in § 1048.230.

Engine manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures an engine for sale in the United States or otherwise introduces a new engine into commerce in the United States. This includes importers.

Fuel system means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

Good engineering judgment has the meaning we give it in § 1068.5 of this chapter.

High-cost warranted part means a component covered by the emission-related warranty with a replacement cost (at the time of certification) exceeding $400 (in 1998 dollars). Adjust this value using the most recent annual average consumer price index information published by the U.S. Bureau of Labor Statistics. For this definition, replacement cost includes the retail cost of the part plus labor and standard diagnosis.

Hydrocarbon (HC) means the hydrocarbon group on which the emission standards are based for each fuel type. For gasoline- and LPG-fueled engines, HC means total hydrocarbon (THC). For natural gas-fueled engines, HC means nonmethane hydrocarbon (NMHC). For alcohol-fueled engines, HC means total hydrocarbon equivalent (THCE).

Identification number means a unique specification (for example, model number/serial number combination) that allows someone to distinguish a particular engine from other similar engines.

Intermediate test speed has the meaning we give in § 1065.515 of this chapter.

Marine engine means an engine that someone installs or intends to install on a marine vessel.

Marine vessel means a vehicle that is capable of operation in water but is not capable of operation out of water. Amphibious vehicles are not marine vessels.

Maximum test torque has the meaning we give in § 1065.1000 of this chapter.

Maximum test speed has the meaning we give in § 1065.515 of this chapter.

Model year means one of the following things:

(1) For freshly manufactured engines (see definition of ''new nonroad engine,'' paragraph (1)), model year means one of the following:

(i) Calendar year.

(ii) Your annual new model production period if it is different than the calendar year. This must include January 1 of the calendar year for which the model year is named. It may not begin before January 2 of the previous calendar year and it must end by December 31 of the named calendar year.

(2) For an engine that is converted to a nonroad engine after being placed into service in a motor vehicle, model year means the calendar year in which the engine was originally produced (see definition of ''new nonroad engine,'' paragraph (2)).

(3) For a nonroad engine excluded under § 1048.5 that is later converted to operate in an application that is not excluded, model year means the calendar year in which the engine was originally produced (see definition of ''new nonroad engine,'' paragraph (3)).

(4) For engines that are not freshly manufactured but are installed in new nonroad equipment, model year means the calendar year in which the engine is installed in the new nonroad equipment (see definition of ''new nonroad engine,'' paragraph (4)).

(5) For an engine modified by an importer (not the original engine manufacturer) who has a certificate of conformity for the imported engine (see definition of ''new nonroad engine,'' paragraph (5)), model year means one of the following:

(i) The calendar year in which the importer finishes modifying and labeling the engine.

(ii) Your annual production period for producing engines if it is different than the calendar year; follow the guidelines in paragraph (1)(ii) of this definition.

(6) For an engine you import that does not meet the criteria in paragraphs (1) through (5) of the definition of ''new nonroad engine,'' model year means the calendar year in which the manufacturer completed the original assembly of the engine. In general, this applies to used equipment that you import without conversion or major modification.

Motor vehicle has the meaning we give in § 85.1703(a) of this chapter. In general, *motor vehicle* means a self-propelled vehicle that can transport one or more people or any material, but doesn't include any of the following:

(1) Vehicles having a maximum ground speed over level, paved surfaces no higher than 40 km per hour (25 miles per hour).

(2) Vehicles that lack features usually needed for safe, practical use on streets or highways—for example, safety features required by law, a reverse gear (except for motorcycles), or a differential.

(3) Vehicles whose operation on streets or highways would be unsafe, impractical, or highly unlikely. Examples are vehicles with tracks instead of wheels, very large size, or features associated with military vehicles, such as armor or weaponry.

New nonroad engine means any of the following things:

(1) A freshly manufactured nonroad engine for which the ultimate buyer has never received the equitable or legal title. The engine is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.

(2) An engine originally manufactured as a motor vehicle engine that is later intended to be used in a piece of nonroad equipment. The engine is no longer new when it is placed into nonroad service.

(3) A nonroad engine that has been previously placed into service in an application we exclude under § 1048.5, where that engine is installed in a piece of equipment for which these exclusions do not apply. The engine is no longer new when it is placed into nonroad service.

(4) An engine not covered by paragraphs (1) through (3) of this definition that is intended to be installed in new nonroad equipment. The engine is no longer new when the ultimate buyer receives a title for the equipment or the product is placed into service, whichever comes first.

(5) An imported nonroad engine covered by a certificate of conformity issued under this part, where someone other than the original manufacturer modifies the engine after its initial assembly and holds the certificate. The engine is no longer new when it is placed into nonroad service.

(6) An imported nonroad engine that is not covered by a certificate of conformity issued under this part at the time of importation.

New nonroad equipment means either of the following things:

(1) A nonroad vehicle or other piece of equipment for which the ultimate buyer has never received the equitable or legal title. The product is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.

(2) An imported nonroad piece of equipment with an engine not covered by a certificate of conformity issued under this part at the time of importation and manufactured after the date for applying the requirements of this part.

Noncompliant engine means an engine that was originally covered by a certificate of conformity, but is not in the certified configuration or otherwise does not comply with the conditions of the certificate.

Nonconforming engine means an engine not covered by a certificate of conformity that would otherwise be subject to emission standards.

Nonmethane hydrocarbon means the difference between the emitted mass of total hydrocarbons and the emitted mass of methane.

Nonroad means relating to nonroad engines.

Nonroad engine has the meaning given in § 1068.25 of this chapter. In general this means all internal-combustion engines except motor vehicle engines, stationary engines, or engines used solely for competition. This part does not apply to all nonroad engines (see § 1048.5).

Off-highway motorcycle means a two-wheeled vehicle with a nonroad engine and a seat (excluding marine vessels and aircraft). Note: highway motorcycles are regulated under 40 CFR part 86.

Oxides of nitrogen means nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO_2 (assume a molecular weight for oxides of nitrogen equivalent to that of NO_2).

Placed into service means used for its intended purpose.

Propulsion marine engine means a marine engine that moves a vessel through the water or directs the vessel's movement.

Rated power means the maximum power an engine produces at maximum test speed.

Revoke means to discontinue the certificate for an engine family. If we revoke a certificate, you must apply for a new certificate before continuing to produce the affected vehicles or engines. This does not apply to vehicles or engines you no longer possess.

Round means to round numbers according to ASTM E29–93a, which is incorporated by reference (see § 1048.710), unless otherwise specified.

Scheduled maintenance means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems that is periodically needed to keep a part from failing or malfunctioning. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

Snowmobile means a vehicle designed to operate outdoors only over snow-covered ground, with a maximum width of 1.5 meters or less.

Spark-ignition means relating to a type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark-ignition engines usually use a throttle to regulate intake air flow to control power during normal operation.

Stationary engine means an internal combustion engine that is neither a nonroad engine, nor a motor-vehicle engine, nor an engine used solely for competition (see the definition of nonroad engine in § 1068.25 of this

chapter). In general this includes fixed engines and all portable or transportable engines that stay in a single site at a building, structure, facility, or installation for at least a full year; this does not include an engine installed in equipment that has the ability to propel itself. For year-round sources, a full year is 12 consecutive months. For seasonal sources, a full year is a full annual operating period of at least three months. A seasonal source is a site with engines operating only part of the year for at least two consecutive years. If you replace an engine with one that does the same or similar work in the same place, you may apply the previous engine's service to your calculation for residence time.

Stoichiometry means the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

Suspend means to temporarily discontinue the certificate for an engine family. If we suspend a certificate, you may not sell vehicles or engines from that engine family unless we reinstate the certificate or approve a new one.

Test engine means an engine in a test sample.

Test sample means the collection of engines selected from the population of an engine family for emission testing.

Total hydrocarbon means the combined mass organic compounds measured by our total hydrocarbon test procedure, expressed as a hydrocarbon with a hydrogen-to-carbon mass ratio of 1.85:1.

Total hydrocarbon equivalent means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as petroleum-fueled engine hydrocarbons. The hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

Ultimate buyer means ultimate purchaser.

Ultimate purchaser means, with respect to any new nonroad equipment or new nonroad engine, the first person who in good faith purchases such new nonroad equipment or new nonroad engine for purposes other than resale.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

U.S.-directed production volume means the number of engine units, subject to the requirements of this part, produced by a manufacturer for which the manufacturer has a reasonable assurance that sale was or will be made to ultimate buyers in the Unites States.

Useful life means the period during which the engine is designed to properly function in terms of reliability and fuel consumption, without being remanufactured, specified as a number of hours of operation or calendar years. It is the period during which a new engine is required to comply with all applicable emission standards.

Void means to invalidate a certificate or an exemption. If we void a certificate, all the vehicles produced under that engine family for that model year are considered noncompliant, and you are liable for each vehicle produced under the certificate and may face civil or criminal penalties or both. If we void an exemption, all the vehicles produced under that exemption are considered uncertified (or nonconforming), and you are liable for each vehicle produced under the exemption and may face civil or criminal penalties or both. You may not produce any additional vehicles using the voided exemption.

Volatile liquid fuel means any fuel other than diesel or biodiesel that is a liquid at atmospheric pressure.

§ 1048.705 What symbols, acronyms, and abbreviations does this part use?

The following symbols, acronyms, and abbreviations apply to this part:

°C degrees Celsius.
ASTM American Society for Testing and Materials.
cc cubic centimeters.
CO carbon monoxide.
CO2 carbon dioxide.
EPA Environmental Protection Agency.
g/kW-hr grams per kilowatt-hour.
LPG liquefied petroleum gas.
m meters.
mm Hg millimeters of mercury.
NMHC nonmethane hydrocarbons.
NO_X oxides of nitrogen (NO and NO2).
rpm revolutions per minute.
SAE Society of Automotive Engineers.
SI spark-ignition.
THC total hydrocarbon.
THCE total hydrocarbon equivalent.
U.S.C. United States Code.

§ 1048.710 What materials does this part reference?

We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at U.S. EPA, OAR, Air and Radiation Docket and Information Center, 401 M Street, SW, Washington, DC 20460 or Office of the Federal Register, 800 N. Capitol St., NW, 7th Floor, Suite 700, Washington, DC.

(a) *ASTM material.* Table 1 of § 1048.710 lists material from the American Society for Testing and Materials that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the sections of this part where we reference it. The second column is for information only and may not include all locations. Anyone may receive copies of these materials from American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103. Table 1 follows:

TABLE 1 OF § 1048.710.—ASTM MATERIALS

Document No. and name	Part reference
ASTM E29–93a, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.	1048.240, 1048.315, 1048.345, 1048.410, 1048.415

(b) *ISO material.* Table 2 of § 1048.710 lists material from the International Organization for Standardization that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the section of this part where we reference it. The second column is for information only and may not be all-inclusive. Anyone may receive copies of these materials from International Organization for Standardization, Case Postale 56, CH–1211 Geneva 20, Switzerland. Table 2 follows:

TABLE 2 OF § 1048.710.—ISO MATERIALS

Document No. and name	Part 1048 reference
ISO 9141–2 February 1994, Road vehicles—Diagnostic systems Part 2.	1048.110
ISO 14230–4 June 2000, Road vehicles—Diagnostic systems—KWP 2000 requirements for emission-related systems.	1048.110

§ 1048.715 How should I request EPA to keep my information confidential?

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other

method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in § 2.204 of this chapter.

§ 1048.720 How do I request a public hearing?

(a) File a request for a hearing with the Designated Officer within 15 days of a decision to deny, suspend, revoke, or void your certificate. If you ask later, we may give you a hearing for good cause, but we do not have to.

(b) Include the following in your request for a public hearing:

(1) State which engine family is involved.

(2) State the issues you intend to raise. We may limit these issues, as described elsewhere in this part.

(3) Summarize the evidence supporting your position and state why you believe this evidence justifies granting or reinstating the certificate.

(c) We will hold the hearing as described in 40 CFR part 1068, subpart F.

Appendix I to Part 1048—Transient Duty Cycle for Constant-Speed Engines

The following table shows the transient duty-cycle for constant-speed engines, as described in § 1048.510:

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
1	58	5
2	58	5
3	58	5
4	58	5
5	58	5
6	58	5
7	58	5
8	58	5
9	58	5
10	58	5
11	58	5
12	65	8
13	72	9
14	79	12
15	86	14
16	93	16
17	93	16
18	93	16
19	93	16
20	93	16
21	93	16
22	93	16
23	93	16
24	93	31
25	93	30
26	93	27
27	93	23
28	93	24
29	93	21
30	93	20
31	93	18
32	93	16
33	93	18
34	93	16
35	93	17
36	93	20
37	93	20
38	93	22
39	93	20
40	93	17
41	93	17
42	93	17
43	93	16
44	93	18
45	93	18
46	93	21
47	93	21
48	93	18
49	94	24
50	93	28
51	93	23
52	93	19
53	93	20
54	93	20
55	93	29
56	93	23
57	93	25
58	93	23
59	93	23
60	93	23
61	93	22
62	93	21
63	93	22
64	93	30
65	93	33
66	93	25
67	93	29
68	93	27
69	93	23
70	93	21
71	93	21
72	93	19
73	93	20
74	93	24
75	93	23
76	93	21
77	93	44
78	93	34
79	93	28
80	93	37
81	93	29
82	93	27
83	93	33
84	93	28
85	93	22
86	96	30
87	95	25
88	95	17
89	95	13
90	95	10
91	95	9
92	95	8
93	95	7
94	95	7
95	95	6
96	95	6
97	93	37
98	93	35
99	93	29
100	93	23
101	93	23
102	93	21
103	93	20
104	93	29
105	93	27
106	93	26
107	93	35
108	93	43
109	95	35
110	95	24
111	95	17
112	95	13
113	95	10
114	95	9
115	95	8
116	95	7
117	95	7
118	95	6
119	93	36
120	93	30
121	93	25
122	93	21
123	93	22
124	93	19
125	93	34
126	93	36
127	93	31
128	93	26
129	93	27
130	93	22
131	93	22
132	93	18
133	93	18
134	93	19
135	93	19
136	93	23
137	93	22
138	93	20
139	93	23
140	93	20
141	93	18
142	93	18
143	93	16
144	93	19
145	94	25
146	93	30
147	93	29
148	93	23
149	93	24
150	93	22
151	94	20
152	93	17
153	93	16
154	93	16
155	93	15
156	93	17
157	93	18
158	93	20
159	93	21
160	93	18
161	93	17
162	92	54
163	93	38
164	93	29
165	93	24
166	93	24
167	93	24
168	93	23

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
169	93	20
170	93	20
171	93	18
172	93	19
173	93	19
174	93	16
175	93	16
176	93	16
177	93	18
178	93	21
179	93	20
180	93	20
181	93	17
182	93	19
183	93	17
184	93	18
185	93	16
186	93	16
187	93	16
188	93	17
189	93	16
190	93	17
191	93	18
192	93	17
193	93	16
194	93	17
195	93	17
196	93	22
197	93	19
198	93	19
199	95	21
200	95	16
201	95	12
202	95	10
203	96	8
204	96	7
205	95	7
206	96	7
207	95	6
208	96	6
209	96	6
210	88	6
211	89	48
212	93	34
213	93	27
214	93	26
215	93	25
216	93	22
217	93	23
218	93	21
219	93	21
220	93	23
221	93	23
222	93	23
223	93	23
224	93	23
225	93	22
226	93	22
227	93	24
228	93	23
229	93	23
230	93	21
231	93	20
232	93	20
233	93	20
234	93	22
235	93	26
236	93	22
237	93	20
238	93	18
239	93	22
240	93	20
241	94	27
242	93	22
243	93	23
244	93	21
245	93	22
246	95	22
247	95	16
248	95	12
249	95	10
250	95	9
251	95	8
252	96	7
253	95	7
254	95	6
255	92	42
256	93	36
257	93	33
258	92	60
259	93	48
260	93	36
261	93	30
262	93	28
263	93	24
264	93	24
265	93	23
266	93	23
267	93	25
268	93	27
269	93	29
270	93	26
271	93	26
272	93	21
273	93	23
274	93	23
275	94	23
276	93	40
277	94	67
278	93	46
279	93	38
280	93	29
281	93	28
282	93	27
283	93	29
284	93	28
285	94	34
286	93	31
287	93	30
288	94	42
289	93	31
290	93	29
291	93	27
292	93	23
293	93	23
294	93	20
295	93	20
296	93	23
297	93	23
298	93	24
299	93	25
300	93	20
301	93	25
302	93	23
303	93	23
304	93	24
305	93	28
306	93	23
307	93	24
308	93	34
309	93	31
310	93	35
311	93	31
312	93	32
313	93	31
314	93	30
315	93	23
316	93	23
317	93	36
318	93	32
319	93	25
320	93	31
321	93	33
322	93	31
323	93	27
324	93	24
325	93	19
326	96	21
327	96	16
328	95	12
329	95	10
330	95	8
331	95	8
332	95	7
333	95	7
334	95	6
335	95	6
336	95	6
337	87	6
338	57	6
339	58	6
340	58	6
341	58	6
342	58	6
343	58	6
344	58	6
345	58	6
346	58	6
347	58	6
348	58	6
349	58	6
350	58	6
351	58	6
352	95	73
353	93	65
354	93	52
355	93	38
356	93	30
357	93	31
358	93	26
359	93	21
360	93	22
361	93	26
362	93	23
363	93	19
364	93	27
365	93	42
366	93	29
367	94	25
368	94	26
369	94	29
370	93	28
371	93	23
372	93	21
373	93	26
374	93	23
375	93	20
376	94	23
377	93	18
378	93	19
379	93	23
380	93	19
381	93	16
382	93	25
383	93	22
384	93	20

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
385	93	25
386	94	28
387	93	23
388	93	23
389	93	25
390	93	23
391	93	20
392	93	19
393	93	24
394	93	20
395	93	18
396	93	21
397	95	22
398	96	16
399	96	12
400	95	10
401	96	9
402	95	8
403	96	7
404	96	7
405	96	6
406	96	6
407	95	6
408	91	6
409	58	6
410	58	6
411	58	6
412	58	6
413	58	6
414	58	6
415	58	6
416	58	6
417	58	6
418	58	6
419	58	6
420	58	6
421	58	6
422	58	6
423	58	6
424	58	6
425	58	6
426	58	6
427	58	6
428	58	6
429	58	6
430	58	6
431	58	6
432	58	6
433	58	6
434	58	6
435	58	6
436	58	6
437	58	6
438	58	6
439	58	6
440	58	6
441	58	6
442	58	6
443	93	66
444	93	48
445	93	40
446	93	34
447	93	28
448	93	23
449	93	28
450	93	27
451	93	23
452	93	19
453	93	25
454	93	24
455	93	22
456	93	31
457	93	36
458	93	28
459	93	25
460	93	35
461	93	34
462	93	29
463	93	37
464	93	36
465	93	38
466	93	31
467	93	29
468	93	34
469	93	36
470	93	34
471	93	31
472	93	26
473	93	21
474	94	16
475	96	19
476	96	15
477	95	11
478	96	10
479	95	8
480	95	7
481	95	7
482	96	7
483	96	6
484	96	6
485	95	6
486	85	6
487	56	74
488	93	52
489	93	42
490	93	36
491	93	35
492	93	33
493	93	38
494	93	40
495	93	29
496	93	23
497	93	23
498	93	24
499	93	24
500	93	20
501	93	19
502	93	16
503	93	21
504	93	23
505	93	24
506	93	22
507	93	18
508	93	21
509	95	18
510	95	20
511	95	15
512	96	11
513	95	10
514	96	8
515	95	7
516	95	7
517	95	7
518	95	6
519	96	6
520	96	6
521	83	6
522	56	6
523	58	6
524	72	54
525	94	51
526	93	42
527	93	42
528	93	31
529	93	25
530	93	21
531	93	17
532	93	15
533	93	15
534	93	16
535	93	15
536	93	14
537	93	15
538	93	16
539	94	15
540	93	45
541	93	45
542	93	41
543	93	33
544	93	26
545	93	21
546	93	20
547	93	17
548	93	16
549	93	17
550	93	16
551	93	14
552	93	16
553	93	15
554	93	14
555	93	16
556	93	15
557	93	14
558	93	13
559	93	14
560	93	14
561	93	15
562	93	17
563	93	17
564	93	22
565	93	22
566	93	19
567	93	19
568	93	20
569	93	18
570	93	20
571	93	20
572	93	42
573	93	32
574	93	25
575	93	26
576	93	23
577	93	21
578	93	23
579	93	19
580	93	21
581	93	20
582	93	20
583	93	20
584	93	18
585	93	18
586	93	21
587	93	19
588	93	21
589	93	19
590	93	19
591	93	18
592	93	18
593	93	17
594	93	16
595	93	16
596	93	15
597	93	16
598	93	19
599	93	52
600	93	45

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
601	95	39
602	95	39
603	95	39
604	95	39
605	94	30
606	95	30
607	95	29
608	95	24
609	94	30
610	95	28
611	94	25
612	94	29
613	95	32
614	95	33
615	95	44
616	99	37
617	98	27
618	98	19
619	98	13
620	98	11
621	98	9
622	98	7
623	98	7
624	98	6
625	98	6
626	98	6
627	98	5
628	69	6
629	49	5
630	51	5
631	51	5
632	51	5
633	51	6
634	51	6
635	51	6
636	51	6
637	51	5
638	51	5
639	51	5
640	51	5
641	51	6
642	51	6
643	51	6
644	51	6
645	51	5
646	51	6
647	51	5
648	51	6
649	51	5
650	96	35
651	95	29
652	95	26
653	95	31
654	95	34
655	95	29
656	95	29
657	95	30
658	95	24
659	95	19
660	95	23
661	95	21
662	95	22
663	95	19
664	95	18
665	95	20
666	94	60
667	95	48
668	95	39
669	95	36
670	95	27
671	95	22
672	95	19
673	95	22
674	95	19
675	94	17
676	95	27
677	95	24
678	98	19
679	98	19
680	98	14
681	98	11
682	98	9
683	98	8
684	98	7
685	98	6
686	98	6
687	98	6
688	98	6
689	98	5
690	81	5
691	49	5
692	78	48
693	95	37
694	95	31
695	94	32
696	94	34
697	95	29
698	95	25
699	94	26
700	95	28
701	95	27
702	94	28
703	95	30
704	95	27
705	95	26
706	95	27
707	95	25
708	95	26
709	95	25
710	95	23
711	95	20
712	95	23
713	95	20
714	95	18
715	94	22
716	95	19
717	95	23
718	95	27
719	95	26
720	95	23
721	95	20
722	99	23
723	98	20
724	98	14
725	98	11
726	98	9
727	98	8
728	98	7
729	98	6
730	98	6
731	98	6
732	98	5
733	98	5
734	73	6
735	49	5
736	50	77
737	95	39
738	95	30
739	95	28
740	94	31
741	95	36
742	95	36
743	95	30
744	95	26
745	95	27
746	95	22
747	95	18
748	95	19
749	95	25
750	94	25
751	95	21
752	95	22
753	95	27
754	95	27
755	95	27
756	95	24
757	94	20
758	94	23
759	94	26
760	95	25
761	95	25
762	95	21
763	95	28
764	94	39
765	95	32
766	95	24
767	95	19
768	98	20
769	98	17
770	98	12
771	98	10
772	98	8
773	98	7
774	98	6
775	98	6
776	95	61
777	94	51
778	95	40
779	94	35
780	94	36
781	94	32
782	95	24
783	94	19
784	94	19
785	95	19
786	95	19
787	94	18
788	94	20
789	94	23
790	94	22
791	95	23
792	94	20
793	94	18
794	95	16
795	95	17
796	94	16
797	94	16
798	94	17
799	94	18
800	94	21
801	95	21
802	94	19
803	95	18
804	94	19
805	95	22
806	95	21
807	95	19
808	94	20
809	94	22
810	94	22
811	94	22
812	95	23
813	94	22
814	95	22
815	95	19
816	95	16

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
817	95	14
818	95	18
819	95	18
820	94	20
821	94	22
822	94	19
823	95	18
824	95	17
825	95	19
826	95	19
827	95	19
828	94	19
829	94	21
830	94	19
831	94	17
832	94	18
833	94	21
834	94	19
835	95	18
836	95	19
837	95	17
838	94	15
839	94	17
840	95	19
841	94	22
842	94	21
843	94	18
844	94	16
845	95	14
846	95	14
847	94	19
848	95	20
849	95	23
850	98	23
851	98	22
852	98	16
853	98	12
854	98	9
855	98	8
856	98	7
857	98	6
858	98	6
859	98	6
860	98	5
861	98	5
862	80	5
863	49	5
864	51	5
865	51	5
866	51	6
867	51	6
868	51	6
869	51	6
870	51	5
871	51	6
872	51	7
873	96	45
874	94	44
875	94	34
876	94	41
877	95	44
878	94	32
879	95	26
880	94	20
881	95	29
882	95	27
883	95	21
884	95	34
885	95	31
886	94	26
887	95	22
888	95	23
889	95	19
890	94	18
891	94	20
892	94	26
893	95	29
894	94	32
895	95	26
896	95	34
897	95	30
898	95	24
899	95	19
900	94	17
901	94	16
902	98	19
903	98	17
904	98	12
905	98	10
906	98	8
907	98	7
908	98	6
909	98	6
910	98	6
911	98	5
912	98	5
913	98	5
914	69	5
915	49	5
916	51	5
917	51	6
918	51	6
919	69	75
920	95	70
921	95	57
922	94	49
923	94	38
924	95	43
925	94	51
926	94	41
927	98	42
928	95	89
929	95	66
930	94	52
931	95	41
932	95	34
933	95	34
934	94	30
935	94	30
936	95	29
937	94	28
938	95	24
939	94	34
940	95	26
941	94	36
942	95	27
943	95	25
944	95	26
945	94	21
946	94	19
947	98	21
948	93	53
949	94	45
950	94	35
951	95	28
952	95	23
953	95	20
954	95	17
955	94	19
956	94	18
957	94	18
958	94	18
959	94	19
960	97	17
961	98	19
962	98	14
963	98	11
964	98	9
965	98	7
966	98	7
967	98	6
968	98	6
969	98	6
970	98	5
971	98	5
972	82	5
973	49	5
974	51	6
975	51	6
976	51	6
977	51	5
978	51	6
979	72	58
980	94	36
981	95	28
982	95	24
983	95	25
984	95	26
985	94	30
986	94	26
987	95	34
988	95	57
989	95	45
990	94	37
991	95	34
992	95	27
993	95	27
994	95	29
995	98	22
996	94	84
997	94	74
998	95	62
999	94	51
1000	95	50
1001	95	81
1002	94	65
1003	95	49
1004	94	56
1005	95	65
1006	94	59
1007	99	58
1008	98	41
1009	98	27
1010	98	19
1011	98	13
1012	98	11
1013	98	9
1014	98	8
1015	98	7
1016	98	6
1017	98	6
1018	98	6
1019	71	6
1020	49	5
1021	51	6
1022	51	6
1023	51	6
1024	51	6
1025	51	6
1026	51	6
1027	51	6
1028	51	6
1029	51	6
1030	51	6
1031	51	5
1032	51	6

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
1033	51	5
1034	51	6
1035	51	6
1036	51	6
1037	51	5
1038	51	5
1039	51	6
1040	51	6
1041	69	59
1042	94	48
1043	95	34
1044	95	29
1045	95	26
1046	94	27
1047	95	31
1048	95	26
1049	95	34
1050	95	29
1051	95	31
1052	95	29
1053	95	35
1054	95	38
1055	94	41
1056	95	28
1057	95	36
1058	94	30
1059	94	26
1060	94	33
1061	95	34
1062	95	27
1063	98	26
1064	98	19
1065	98	13
1066	98	11
1067	98	9
1068	98	7
1069	98	7
1070	98	6
1071	98	6
1072	98	6
1073	98	5
1074	89	6
1075	49	5
1076	51	6
1077	51	6
1078	51	6
1079	51	6
1080	51	6
1081	51	6
1082	51	6
1083	50	6
1084	51	6
1085	51	6
1086	51	6
1087	51	6
1088	51	6
1089	51	6
1090	51	6
1091	56	74
1092	95	56
1093	94	49
1094	95	47
1095	94	43
1096	94	33
1097	95	50
1098	94	40
1099	95	33
1100	95	24
1101	94	22
1102	94	22
1103	94	25
1104	95	27
1105	95	32
1106	94	29
1107	94	26
1108	94	26
1109	94	24
1110	98	52
1111	94	41
1112	99	35
1113	95	58
1114	95	58
1115	98	57
1116	98	38
1117	98	26
1118	93	63
1119	94	59
1120	98	100
1121	94	73
1122	98	53
1123	94	76
1124	95	61
1125	94	49
1126	94	37
1127	97	50
1128	98	36
1129	98	25
1130	98	18
1131	98	12
1132	98	10
1133	98	8
1134	98	7
1135	98	7
1136	98	6
1137	98	6
1138	98	6
1139	80	6
1140	49	6
1141	78	61
1142	95	50
1143	94	43
1144	94	42
1145	94	31
1146	95	30
1147	95	34
1148	95	28
1149	95	27
1150	94	27
1151	95	31
1152	95	42
1153	94	41
1154	95	37
1155	95	43
1156	95	34
1157	95	31
1158	95	27
1159	95	23
1160	95	27
1161	96	38
1162	95	40
1163	95	39
1164	95	26
1165	95	33
1166	94	28
1167	94	34
1168	98	73
1169	95	49
1170	95	51
1171	94	55
1172	95	48
1173	95	35
1174	95	39
1175	95	39
1176	94	41
1177	95	30
1178	95	23
1179	94	19
1180	95	25
1181	94	29
1182	98	27
1183	95	89
1184	95	74
1185	94	60
1186	94	48
1187	94	41
1188	94	29
1189	94	24
1190	95	19
1191	94	21
1192	95	29
1193	95	28
1194	95	27
1195	94	23
1196	95	25
1197	95	26
1198	94	22
1199	95	19
1200	94	17

Appendix II to Part 1048—Transient Duty Cycle for Engines That Are Not Constant-Speed Engines

The following table shows the transient duty-cycle for engines that are not constant-speed engines, as described in § 1048.510:

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	1	8
10	6	54
11	8	61
12	34	59
13	22	46
14	5	51
15	18	51
16	31	50
17	30	56
18	31	49
19	25	66
20	58	55
21	43	31
22	16	45
23	24	38
24	24	27
25	30	33
26	45	65
27	50	49
28	23	42
29	13	42
30	9	45
31	23	30
32	37	45
33	44	50

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
34	49	52
35	55	49
36	61	46
37	66	38
38	42	33
39	17	41
40	17	37
41	7	50
42	20	32
43	5	55
44	30	42
45	44	53
46	45	56
47	41	52
48	24	41
49	15	40
50	11	44
51	32	31
52	38	54
53	38	47
54	9	55
55	10	50
56	33	55
57	48	56
58	49	47
59	33	44
60	52	43
61	55	43
62	59	38
63	44	28
64	24	37
65	12	44
66	9	47
67	12	52
68	34	21
69	29	44
70	44	54
71	54	62
72	62	57
73	72	56
74	88	71
75	100	69
76	100	34
77	100	42
78	100	54
79	100	58
80	100	38
81	83	17
82	61	15
83	43	22
84	24	35
85	16	39
86	15	45
87	32	34
88	14	42
89	8	48
90	5	51
91	10	41
92	12	37
93	4	47
94	3	49
95	3	50
96	4	49
97	4	48
98	8	43
99	2	51
100	5	46
101	8	41
102	4	47
103	3	49
104	6	45
105	3	48
106	10	42
107	18	27
108	3	50
109	11	41
110	34	29
111	51	57
112	67	63
113	61	32
114	44	31
115	48	54
116	69	65
117	85	65
118	81	29
119	74	21
120	62	23
121	76	58
122	96	75
123	100	77
124	100	27
125	100	79
126	100	79
127	100	81
128	100	57
129	99	52
130	81	35
131	69	29
132	47	22
133	34	28
134	27	37
135	83	60
136	100	74
137	100	7
138	100	2
139	70	18
140	23	39
141	5	54
142	11	40
143	11	34
144	11	41
145	19	25
146	16	32
147	20	31
148	21	38
149	21	42
150	9	51
151	4	49
152	2	51
153	1	58
154	21	57
155	29	47
156	33	45
157	16	49
158	38	45
159	37	43
160	35	42
161	39	43
162	51	49
163	59	55
164	65	54
165	76	62
166	84	59
167	83	29
168	67	35
169	84	54
170	90	58
171	93	43
172	90	29
173	66	19
174	52	16
175	49	17
176	56	38
177	73	71
178	86	80
179	96	75
180	89	27
181	66	17
182	50	18
183	36	25
184	36	24
185	38	40
186	40	50
187	27	48
188	19	48
189	23	50
190	19	45
191	6	51
192	24	48
193	49	67
194	47	49
195	22	44
196	25	40
197	38	54
198	43	55
199	40	52
200	14	49
201	11	45
202	7	48
203	26	41
204	41	59
205	53	60
206	44	54
207	22	40
208	24	41
209	32	53
210	44	74
211	57	25
212	22	49
213	29	45
214	19	37
215	14	43
216	36	40
217	43	63
218	42	49
219	15	50
220	19	44
221	47	59
222	67	80
223	76	74
224	87	66
225	98	61
226	100	38
227	97	27
228	100	53
229	100	72
230	100	49
231	100	4
232	100	13
233	87	15
234	53	26
235	33	27
236	39	19
237	51	33
238	67	54
239	83	60
240	95	52
241	100	50
242	100	36
243	100	25
244	85	16
245	62	16
246	40	26
247	56	39
248	81	75
249	98	86

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
250	100	76
251	100	51
252	100	78
253	100	83
254	100	100
255	100	66
256	100	85
257	100	72
258	100	45
259	98	58
260	60	30
261	43	32
262	71	36
263	44	32
264	24	38
265	42	17
266	22	51
267	13	53
268	23	45
269	29	50
270	28	42
271	21	55
272	34	57
273	44	47
274	19	46
275	13	44
276	25	36
277	43	51
278	55	73
279	68	72
280	76	63
281	80	45
282	83	40
283	78	26
284	60	20
285	47	19
286	52	25
287	36	30
288	40	26
289	45	34
290	47	35
291	42	28
292	46	38
293	48	44
294	68	61
295	70	47
296	48	28
297	42	22
298	31	29
299	22	35
300	28	28
301	46	46
302	62	69
303	76	81
304	88	85
305	98	81
306	100	74
307	100	13
308	100	11
309	100	17
310	99	3
311	80	7
312	62	11
313	63	11
314	64	16
315	69	43
316	81	67
317	93	74
318	100	72
319	94	27
320	73	15
321	40	33
322	40	52
323	50	50
324	11	53
325	12	45
326	5	50
327	1	55
328	7	55
329	62	60
330	80	28
331	23	37
332	39	58
333	47	24
334	59	51
335	58	68
336	36	52
337	18	42
338	36	52
339	59	73
340	72	85
341	85	92
342	99	90
343	100	72
344	100	18
345	100	76
346	100	64
347	100	87
348	100	97
349	100	84
350	100	100
351	100	91
352	100	83
353	100	93
354	100	100
355	94	43
356	72	10
357	77	3
358	48	2
359	29	5
360	59	19
361	63	5
362	35	2
363	24	3
364	28	2
365	36	16
366	54	23
367	60	10
368	33	1
369	23	0
370	16	0
371	11	0
372	20	0
373	25	2
374	40	3
375	33	4
376	34	5
377	46	7
378	57	10
379	66	11
380	75	14
381	79	11
382	80	16
383	92	21
384	99	16
385	83	2
386	71	2
387	69	4
388	67	4
389	74	16
390	86	25
391	97	28
392	100	15
393	83	2
394	62	4
395	40	6
396	49	10
397	36	5
398	27	4
399	29	3
400	22	2
401	13	3
402	37	36
403	90	26
404	41	2
405	25	2
406	29	2
407	38	7
408	50	13
409	55	10
410	29	3
411	24	7
412	51	16
413	62	15
414	72	35
415	91	74
416	100	73
417	100	8
418	98	11
419	100	59
420	100	98
421	100	99
422	100	75
423	100	95
424	100	100
425	100	97
426	100	90
427	100	86
428	100	82
429	97	43
430	70	16
431	50	20
432	42	33
433	89	64
434	89	77
435	99	95
436	100	41
437	77	12
438	29	37
439	16	41
440	16	38
441	15	36
442	18	44
443	4	55
444	24	26
445	26	35
446	15	45
447	21	39
448	29	52
449	26	46
450	27	50
451	13	43
452	25	36
453	37	57
454	29	46
455	17	39
456	13	41
457	19	38
458	28	35
459	8	51
460	14	36
461	17	47
462	34	39
463	34	57
464	11	70
465	13	51

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
466	13	68
467	38	44
468	53	67
469	29	69
470	19	65
471	52	45
472	61	79
473	29	70
474	15	53
475	15	60
476	52	40
477	50	61
478	13	74
479	46	51
480	60	73
481	33	84
482	31	63
483	41	42
484	26	69
485	23	65
486	48	49
487	28	57
488	16	67
489	39	48
490	47	73
491	35	87
492	26	73
493	30	61
494	34	49
495	35	66
496	56	47
497	49	64
498	59	64
499	42	69
500	6	77
501	5	59
502	17	59
503	45	53
504	21	62
505	31	60
506	53	68
507	48	79
508	45	61
509	51	47
510	41	48
511	26	58
512	21	62
513	50	52
514	39	65
515	23	65
516	42	62
517	57	80
518	66	81
519	64	62
520	45	42
521	33	42
522	27	57
523	31	59
524	41	53
525	45	72
526	48	73
527	46	90
528	56	76
529	64	76
530	69	64
531	72	59
532	73	58
533	71	56
534	66	48
535	61	50
536	55	56
537	52	52
538	54	49
539	61	50
540	64	54
541	67	54
542	68	52
543	60	53
544	52	50
545	45	49
546	38	45
547	32	45
548	26	53
549	23	56
550	30	49
551	33	55
552	35	59
553	33	65
554	30	67
555	28	59
556	25	58
557	23	56
558	22	57
559	19	63
560	14	63
561	31	61
562	35	62
563	21	80
564	28	65
565	7	74
566	23	54
567	38	54
568	14	78
569	38	58
570	52	75
571	59	81
572	66	69
573	54	44
574	48	34
575	44	33
576	40	40
577	28	58
578	27	63
579	35	45
580	20	66
581	15	60
582	10	52
583	22	56
584	30	62
585	21	67
586	29	53
587	41	56
588	15	67
589	24	56
590	42	69
591	39	83
592	40	73
593	35	67
594	32	61
595	30	65
596	30	72
597	48	51
598	66	58
599	62	71
600	36	63
601	17	59
602	16	50
603	16	62
604	34	48
605	51	66
606	35	74
607	15	56
608	19	54
609	43	65
610	52	80
611	52	83
612	49	57
613	48	46
614	37	36
615	25	44
616	14	53
617	13	64
618	23	56
619	21	63
620	18	67
621	20	54
622	16	67
623	26	56
624	41	65
625	28	62
626	19	60
627	33	56
628	37	70
629	24	79
630	28	57
631	40	57
632	40	58
633	28	44
634	25	41
635	29	53
636	31	55
637	26	64
638	20	50
639	16	53
640	11	54
641	13	53
642	23	50
643	32	59
644	36	63
645	33	59
646	24	52
647	20	52
648	22	55
649	30	53
650	37	59
651	41	58
652	36	54
653	29	49
654	24	53
655	14	57
656	10	54
657	9	55
658	10	57
659	13	55
660	15	64
661	31	57
662	19	69
663	14	59
664	33	57
665	41	65
666	39	64
667	39	59
668	39	51
669	28	41
670	19	49
671	27	54
672	37	63
673	32	74
674	16	70
675	12	67
676	13	60
677	17	56
678	15	62
679	25	47
680	27	64
681	14	71

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
682	5	65
683	6	57
684	6	57
685	15	52
686	22	61
687	14	77
688	12	67
689	12	62
690	14	59
691	15	58
692	18	55
693	22	53
694	19	69
695	14	67
696	9	63
697	8	56
698	17	49
699	25	55
700	14	70
701	12	60
702	22	57
703	27	67
704	29	68
705	34	62
706	35	61
707	28	78
708	11	71
709	4	58
710	5	58
711	10	56
712	20	63
713	13	76
714	11	65
715	9	60
716	7	55
717	8	53
718	10	60
719	28	53
720	12	73
721	4	64
722	4	61
723	4	61
724	10	56
725	8	61
726	20	56
727	32	62
728	33	66
729	34	73
730	31	61
731	33	55
732	33	60
733	31	59
734	29	58
735	31	53
736	33	51
737	33	48
738	27	44
739	21	52
740	13	57
741	12	56
742	10	64
743	22	47
744	15	74
745	8	66
746	34	47
747	18	71
748	9	57
749	11	55
750	12	57
751	10	61
752	16	53
753	12	75
754	6	70
755	12	55
756	24	50
757	28	60
758	28	64
759	23	60
760	20	56
761	26	50
762	28	55
763	18	56
764	15	52
765	11	59
766	16	59
767	34	54
768	16	82
769	15	64
770	36	53
771	45	64
772	41	59
773	34	50
774	27	45
775	22	52
776	18	55
777	26	54
778	39	62
779	37	71
780	32	58
781	24	48
782	14	59
783	7	59
784	7	55
785	18	49
786	40	62
787	44	73
788	41	68
789	35	48
790	29	54
791	22	69
792	46	53
793	59	71
794	69	68
795	75	47
796	62	32
797	48	35
798	27	59
799	13	58
800	14	54
801	21	53
802	23	56
803	23	57
804	23	65
805	13	65
806	9	64
807	27	56
808	26	78
809	40	61
810	35	76
811	28	66
812	23	57
813	16	50
814	11	53
815	9	57
816	9	62
817	27	57
818	42	69
819	47	75
820	53	67
821	61	62
822	63	53
823	60	54
824	56	44
825	49	39
826	39	35
827	30	34
828	33	46
829	44	56
830	50	56
831	44	52
832	38	46
833	33	44
834	29	45
835	24	46
836	18	52
837	9	55
838	10	54
839	20	53
840	27	58
841	29	59
842	30	62
843	30	65
844	27	66
845	32	58
846	40	56
847	41	57
848	18	73
849	15	55
850	18	50
851	17	52
852	20	49
853	16	62
854	4	67
855	2	64
856	7	54
857	10	50
858	9	57
859	5	62
860	12	51
861	14	65
862	9	64
863	31	50
864	30	78
865	21	65
866	14	51
867	10	55
868	6	59
869	7	59
870	19	54
871	23	61
872	24	62
873	34	61
874	51	67
875	60	66
876	58	55
877	60	52
878	64	55
879	68	51
880	63	54
881	64	50
882	68	58
883	73	47
884	63	40
885	50	38
886	29	61
887	14	61
888	14	53
889	42	6
890	58	6
891	58	6
892	77	39
893	93	56
894	93	44
895	93	37
896	93	31
897	93	25

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
898	93	26
899	93	27
900	93	25
901	93	21
902	93	22
903	93	24
904	93	23
905	93	27
906	93	34
907	93	32
908	93	26
909	93	31
910	93	34
911	93	31
912	93	33
913	93	36
914	93	37
915	93	34
916	93	30
917	93	32
918	93	35
919	93	35
920	93	32
921	93	28
922	93	23
923	94	18
924	95	18
925	96	17
926	95	13
927	96	10
928	95	9
929	95	7
930	95	7
931	96	7
932	96	6
933	96	6
934	95	6
935	90	6
936	69	43
937	76	62
938	93	47
939	93	39
940	93	35
941	93	34
942	93	36
943	93	39
944	93	34
945	93	26
946	93	23
947	93	24
948	93	24
949	93	22
950	93	19
951	93	17
952	93	19
953	93	22
954	93	24
955	93	23
956	93	20
957	93	20
958	94	19
959	95	19
960	95	17
961	96	13
962	95	10
963	96	9
964	95	7
965	95	7
966	95	7
967	95	6
968	96	6
969	96	6
970	89	6
971	68	6
972	57	6
973	66	32
974	84	52
975	93	46
976	93	42
977	93	36
978	93	28
979	93	23
980	93	19
981	93	16
982	93	15
983	93	16
984	93	15
985	93	14
986	93	15
987	93	16
988	94	15
989	93	32
990	93	45
991	93	43
992	93	37
993	93	29
994	93	23
995	93	20
996	93	18
997	93	16
998	93	17
999	93	16
1000	93	15
1001	93	15
1002	93	15
1003	93	14
1004	93	15
1005	93	15
1006	93	14
1007	93	13
1008	93	14
1009	93	14
1010	93	15
1011	93	16
1012	93	17
1013	93	20
1014	93	22
1015	93	20
1016	93	19
1017	93	20
1018	93	19
1019	93	19
1020	93	20
1021	93	32
1022	93	37
1023	93	28
1024	93	26
1025	93	24
1026	93	22
1027	93	22
1028	93	21
1029	93	20
1030	93	20
1031	93	20
1032	93	20
1033	93	19
1034	93	18
1035	93	20
1036	93	20
1037	93	20
1038	93	20
1039	93	19
1040	93	18
1041	93	18
1042	93	17
1043	93	16
1044	93	16
1045	93	15
1046	93	16
1047	93	18
1048	93	37
1049	93	48
1050	93	38
1051	93	31
1052	93	26
1053	93	21
1054	93	18
1055	93	16
1056	93	17
1057	93	18
1058	93	19
1059	93	21
1060	93	20
1061	93	18
1062	93	17
1063	93	17
1064	93	18
1065	93	18
1066	93	18
1067	93	19
1068	93	18
1069	93	18
1070	93	20
1071	93	23
1072	93	25
1073	93	25
1074	93	24
1075	93	24
1076	93	22
1077	93	22
1078	93	22
1079	93	19
1080	93	16
1081	95	17
1082	95	37
1083	93	43
1084	93	32
1085	93	27
1086	93	26
1087	93	24
1088	93	22
1089	93	22
1090	93	22
1091	93	23
1092	93	22
1093	93	22
1094	93	23
1095	93	23
1096	93	23
1097	93	22
1098	93	23
1099	93	23
1100	93	23
1101	93	25
1102	93	27
1103	93	26
1104	93	25
1105	93	27
1106	93	27
1107	93	27
1108	93	24
1109	93	20
1110	93	18
1111	93	17
1112	93	17
1113	93	18

Time(s)	Normalized speed (in percent)	Normalized torque (in percent)
1114	93	18
1115	93	18
1116	93	19
1117	93	22
1118	93	22
1119	93	19
1120	93	17
1121	93	17
1122	93	18
1123	93	18
1124	93	19
1125	93	19
1126	93	20
1127	93	19
1128	93	20
1129	93	25
1130	93	30
1131	93	31
1132	93	26
1133	93	21
1134	93	18
1135	93	20
1136	93	25
1137	93	24
1138	93	21
1139	93	21
1140	93	22
1141	93	22
1142	93	28
1143	93	29
1144	93	23
1145	93	21
1146	93	18
1147	93	16
1148	93	16
1149	93	16
1150	93	17
1151	93	17
1152	93	17
1153	93	17
1154	93	23
1155	93	26
1156	93	22
1157	93	18
1158	93	16
1159	93	16
1160	93	17
1161	93	19
1162	93	18
1163	93	16
1164	93	19
1165	93	22
1166	93	25
1167	93	29
1168	93	27
1169	93	22
1170	93	18
1171	93	16
1172	93	19
1173	93	19
1174	93	17
1175	93	17
1176	93	17
1177	93	16
1178	93	16
1179	93	15
1180	93	16
1181	93	15
1182	93	17
1183	93	21
1184	93	30
1185	93	53
1186	93	54
1187	93	38
1188	93	30
1189	93	24
1190	93	20
1191	95	20
1192	96	18
1193	96	15
1194	96	11
1195	95	9
1196	95	8
1197	96	7
1198	94	33
1199	93	46
1200	93	37
1201	16	8
1202	0	0
1203	0	0
1204	0	0
1205	0	0
1206	0	0
1207	0	0
1208	0	0
1209	0	0

PART 1051—CONTROL OF EMISSIONS FROM RECREATIONAL ENGINES AND VEHICLES

Subpart A—Determining How To Follow This Part

Sec.

Subpart B—Emission Standards and Related Requirements

Subpart C—Certifying Engine Families

Subpart D—Testing Production-line Engines

Subpart E—Testing In-use Engines

Subpart F—Test Procedures

Subpart G—Compliance Provisions

Authority: 42 U.S.C. 7401–7671(q).

Subpart A—Determining How To Follow This Part

§ 1051.1 Does this part apply to me?

(a) This part applies to you if you manufacture or import any of the following recreational vehicles or engines used in them, unless we exclude them under § 1051.5 or exempt them under § 1051.620:

(1) Snowmobiles.

(2) Off-highway motorcycles.

(3) All-terrain vehicles (ATVs).

(b) Note in subpart G of this part that 40 CFR part 1068 applies to everyone, including anyone who manufactures, installs, owns, operates, or rebuilds any of the vehicles or engines this part covers.

(c) You need not follow this part for vehicles you produce before the 2006 model year, unless you certify voluntarily. See § 1051.101, § 1051.145, and the definition of model year in § 1051.801 for more information about the timing of new requirements.

(d) See §§ 1051.801 and 1051.805 for definitions and acronyms that apply to this part.

§ 1051.5 May I exclude any vehicles from this part's requirements?

(a) You may exclude vehicles with compression-ignition engines. See 40 CFR part 89 for regulations that cover these engines.

(b) See subpart G of this part and 40 CFR part 1068, subpart C, for exemptions of specific engines.

(c) We may require you to label an engine or vehicle (or both) if this section excludes it and other requirements in this chapter do not apply.

(d) Send the Designated Officer a written request with supporting documentation if you want us to determine whether this part covers or excludes certain vehicles. Excluding engines from this part's requirements does not affect other requirements that may apply to them.

§ 1051.10 What main steps must I take to comply with this part?

(a) You must get a certificate of conformity from us for each engine family before do any of the following things with a new vehicle or new engine covered by this part: sell, offer for sale, introduce into commerce, distribute or deliver for introduction into commerce, or import it into the United States. ''New'' vehicles or engines may include some already placed in service (see the definition of ''new'' in § 1051.801). You must get a new certificate of conformity for each new model year.

(b) To get a certificate of conformity and comply with its terms, you must do four things:

(1) Meet the emission standards and other requirements in subpart B of this part.

(2) Apply for certification (see subpart C of this part).

(3) Do routine emission testing on production vehicles or engines (see subpart D of this part).

(4) Follow our instructions throughout this part.

(c) Subpart F of this part and 40 CFR parts 86 and 1065 describe how you must test your vehicles or engines. Subpart F of this part describes when you may test the engine alone instead of the entire vehicle.

(d) Subpart G of this part and 40 CFR part 1068 describe requirements and prohibitions that apply to manufacturers, owners, operators, rebuilders, and all others. They also describe exemptions available for special circumstances.

§ 1051.15 Do any other regulation parts affect me?

(a) Parts 86 and 1065 of this chapter describe procedures and equipment specifications for testing vehicles and engines. Subpart F of this part describes how to apply part 86 or 1065 of this chapter to show you meet the emission standards in this part.

(b) Part 1068 of this chapter describes general provisions, including these seven areas:

(1) Prohibited acts and penalties for manufacturers and others.

(2) Rebuilding and other aftermarket changes.

(3) Exemptions for certain vehicles and engines.

(4) Importing vehicles and engines.

(5) Selective enforcement audits of your production.

(6) Defect reporting and recall.

(7) Procedures for public hearings.

(c) Other parts of this chapter affect you if referenced in this part.

§ 1051.20 May I certify a recreational engine instead of the vehicle?

(a) You may certify engines sold separately from vehicles in either of two cases:

(1) If you manufacture recreational engines but not recreational vehicles, you may ask to certify the engine alone. In your request, explain why you cannot certify the entire vehicle.

(2) If you manufacture complete recreational vehicles containing engines you also sell separately, you may ask to certify all these engines in a single engine family or in separate engine families.

(b) If you certify an engine under this section, you must use the test procedures in subpart F of this part. If the test procedures require chassis testing, use good engineering judgment to install the engine in an appropriate vehicle for measuring emissions.

(c) If we allow you to certify recreational engines, we may tell you how to ensure the engine will comply with emission standards after it is in a vehicle. If we do not tell you what to do, use good engineering judgment to ensure that the engine will meet standards after installation. You must comply with § 1051.130.

(d) Do not use the provisions of this section to circumvent or reduce the stringency of this part's standards or other requirements.

Subpart B—Emission Standards and Related Requirements

§ 1051.100 What exhaust emission standards must my vehicles meet?

Your vehicles must meet the following exhaust emission standards:

(a) For snowmobiles, see § 1051.101.

(b) For off-highway motorcycles, see § 1051.102.

(c) For all-terrain vehicles, see § 1051.103.

(d) Apply this subpart to all testing, including production-line and in-use testing, as described in subparts D and E of this part.

§ 1051.101 What are the exhaust emission standards for snowmobiles?

(a) Apply the exhaust emission standards in this section by model year while measuring emissions with snowmobile test procedures in subpart F of this part.

(b) Follow Table 1 of this section for exhaust emission standards. You may use the averaging, banking, and trading provisions of subpart H of this part to show compliance with these standards. Table 1 also shows the maximum value you may specify for a Family Emission Limit, as follows:

TABLE 1 OF § 1051.101.—EXHAUST EMISSION STANDARDS FOR SNOWMOBILES (g/kW-hr)

Phase—Model year	Emission standards		Maximum allowable family emission limits	
	HC	CO	HC	CO
Phase 1—2007–2009	100	275	150	400
Phase 2—2010 and later	75	200	150	400

(c) You may also follow the voluntary standards in Table 2 of this section while measuring emissions with the test procedures in subpart F of this part. If you certify snowmobiles under this paragraph (c), you must meet the emission standards and all testing and reporting requirements. Table 2 follows:

TABLE 2 OF § 1051.101.—VOLUNTARY EXHAUST EMISSION STANDARDS FOR SNOWMOBILES (g/kW-hr)

Model year	Emission standards	
	HC	CO
2002–2009	75	200
2002 and later	45	120

(d) Apply the exhaust emission standards in this section for snowmobiles using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for snowmobiles powered by the following fuels:

(1) Gasoline- and LPG-fueled snowmobiles: THC emissions.

(2) Natural gas-fueled snowmobiles: NMHC emissions.

(3) Alcohol-fueled snowmobiles: THCE emissions.

(e) You must show in your certification application that your snowmobiles meet emission standards over their full useful life. The minimum useful life is 300 hours of operation or five years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your snowmobile to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(f) Refer to § 1051.240 to apply deterioration factors.

§ 1051.102 What are the exhaust emission standards for off-highway motorcycles?

(a) Apply the exhaust emission standards in this section by model year while measuring emissions with off-highway motorcycle test procedures in subpart F of this part.

(b) Follow Table 1 of this section for exhaust emission standards. You may use the averaging, banking, and trading provisions of subpart H of this part to show compliance with these $HC+NO_X$ standards. The phase-in percentages in the following table specify the percentage of your production that must comply with the emission standards for those model years:

TABLE 1 OF § 1051.102.—EXHAUST EMISSION STANDARDS FOR OFF-HIGHWAY MOTORCYCLES (g/km)

Model year—phase-in	Emission standards		Maximum allowable family emission limits
	$HC+NO_X$	CO	$HC+NO_X$
2006—50%	2.0	25.0	20.0
2007 and later—100%	2.0	25.0	20.0

(c) You may also follow the voluntary standards in Table 2 of this section while measuring emissions with the test procedures in subpart F of this part. If you certify off-highway motorcycles under this paragraph (c), you must meet the emission standards and all testing and reporting requirements. Table 2 follows:

TABLE 2 OF § 1051.102.—VOLUNTARY EXHAUST EMISSION STANDARDS FOR OFF-HIGHWAY MOTORCYCLES (g/km)

Model year	Emission standards	
	$HC+NO_X$	CO
2002 and later	0.8	15

(d) Apply the exhaust emission standards in this section for snowmobiles using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for snowmobiles powered by the following fuels:

(1) Gasoline- and LPG-fueled snowmobiles: THC emissions.

(2) Natural gas-fueled snowmobiles: NMHC emissions.

(3) Alcohol-fueled snowmobiles: THCE emissions.

(e) You must show in your certification application that your snowmobiles meet emission standards over their full useful life. The minimum useful life is 300 hours of operation or five years, whichever comes first.

Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your snowmobile to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(f) Refer to § 1051.240 to apply deterioration factors.

§ 1051.102 What are the exhaust emission standards for allterrain vehicles (ATVs)?

(a) Apply the exhaust emission standards in this section by model year while measuring emissions with ATV test procedures in subpart F of this part.

(b) Follow Table 1 of this section for exhaust emission standards. You may use the averaging, banking, and trading provisions of subpart H of this part to show compliance with these $HC+NO_X$ standards. Table 1 also shows the maximum value you may specify for a Family Emission Limit.

(1) The phase-in percentages in the table specify the percentage of your production that must comply with the emission standards for those model years.

(2) In the 2009 model year, you must produce the specified minimum percentage of Phase 2 vehicles, while certifying any remaining vehilces to Phase 1 standards.

(3) Table 1 follows:

TABLE 1 OF § 1051.103.—EXHAUST EMISSION STANDARDS FOR ATVS (g/km)

Phase	Model year	Phase-in (percent)	Emission standards		Maximum allowable family emission limits
			$HC+NO_X$	CO	$HC+NO_X$
Phase 1	2006	50	2.0	25.0	20.0
	2007 and 2008	100	2.0	25.0	20.0
	2009	50	2.0	25.0	20.0
Phase 2	2009	50	1.0	25.0	2.0
	2010 and later	100	1.0	25.0	2.0

(c) You may also follow the voluntary standards in Table 2 of this section while measuring emissions with the test procedures in subpart F of this part. If you certify ATVs under this paragraph (c), you must meet the emission standards and all testing and reporting requirements. Table 2 follows:

TABLE 2 OF § 1051.103.—VOLUNTARY EXHAUST EMISSION STANDARDS FOR ATVS (g/km)

Model year	Emission standards	
	$HC+NO_X$	CO
2002 and later ..	0.8	12

(d) Apply the exhaust emission standards in this section for ATVs using all fuels. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for ATVs powered by the following fuels:

(1) Gasoline- and LPG-fueled ATVs: THC emissions.

(2) Natural gas-fueled ATVs: NMHC emissions.

(3) Alcohol-fueled ATVs: THCE emissions.

(e) You must show in your certification application that your ATVs meet emission standards over their full useful life. The minimum useful life is 30,000 km or five years, whichever comes first. Specify a longer useful life under either of two conditions:

(1) If you design, advertise, or market your ATV to operate longer than the minimum useful life (your recommended time until rebuild may indicate a longer design life).

(2) If your basic mechanical warranty is longer than the minimum useful life.

(f) Refer to § 1051.240 to apply deterioration factors.

§ 1051.115 What other requirements must my vehicles meet?

Your vehicles must meet the following requirements:

(a) *Closed crankcase.* Design and produce your vehicles so they release no crankcase emissions into the atmosphere.

(b) *Emission sampling capability.* Produce all your vehicles to allow sampling of exhaust emissions in the field. This sampling requires either exhaust ports downstream of any aftertreatment devices or the ability to extend the exhaust pipe by 20 cm. This is necessary to minimize any diluting effect from ambient air at the end of the exhaust pipe.

(c) *Adjustable parameters.* If your vehicles have adjustable parameters, make sure they meet all the requirements of this part for any adjustment in the physically available range.

(1) We do not consider an operating parameter adjustable if you permanently seal it or if ordinary tools cannot readily access it.

(2) We may require you to adjust the engine to any specification within the adjustable range during certification testing, production-line testing, selective enforcement auditing, or in-use testing.

(d) *Other adjustments.* This provision applies if an experienced mechanic can change your engine's air-fuel ratio in less than one hour with a few parts whose total cost is under $50 (in 2001 dollars). An example is carburetor jets. In this case, your vehicle must meet all the requirements of this part for any air/fuel ratio within the adjustable range described in paragraph (d)(1) of this section.

(1) In your application for certification, specify the adjustable range of air/fuel ratios you expect to occur in use. You may specify it in terms of engine parts (such as the carburetor jet's size). This adjustable range must include all air/fuel ratios between the lean limit and the rich limit, unless you can show that some air/fuel ratios will not occur in use.

(i) The lean limit is the air/fuel ratio that produces the highest engine power output (averaged over the test cycle).

(ii) The rich limit is the richest of the following air/fuel ratios:

(A) The air/fuel ratio when you produce it.

(B) The air/fuel ratio when you do durability testing.

(C) The richest air-fuel ratio that you recommend to your customers.

(2) We may require you to adjust the engine to any specification within the adjustable range during certification testing, production-line testing, selective enforcement auditing, or in-use testing.

(e) *Prohibited controls.* You may not design engines with an emission-control system that emits any noxious or toxic substance that the engine would not emit during operation in the absence of such a system, except as specifically permitted by regulation.

(f) *Defeat devices.* You may not equip your vehicles with a defeat device. A defeat device is an auxiliary emission-control device or other control feature that reduces the effectiveness of emission controls under conditions you may reasonably expect the vehicle to encounter during normal operation and use. This does not apply to auxiliary emission-control devices you identify in your certification application if any of the following is true:

(1) The conditions of concern were substantially included in your prescribed duty cycles.

(2) You show your design is necessary to prevent catastrophic vehicle damage or accidents.

(3) The reduced effectiveness applies only to starting the engine.

(g) *Noise standards.* See 40 CFR chapter I, subchapter G, to determine if your vehicle must meet noise emission standards.

§ 1051.120 What warranty requirements apply to me?

(a) You must warrant to the ultimate buyer that the new vehicle meets two conditions:

(1) You have designed, built, and equipped it to meet the requirements of this part.

(2) It is free from defects in materials and workmanship that may keep it from meeting these requirements.

(b) Your emission-related warranty must be valid for at least 50 percent of the vehicle's useful life in kilometers (or hours) of operation or at least three years, whichever comes first. You may offer a warranty more generous than we require. This warranty may not be shorter than any published or negotiated warranty you offer for the vehicle or any of its components. If a vehicle has no tamper-proof odometer (or hour meter), we base warranty periods in this paragraph (b) only on the vehicle's age (in years).

(c) Your emission-related warranty must cover components whose failure would increase a vehicle's emissions, including electronic controls, fuel injection, exhaust-gas recirculation, aftertreatment, or any other system you develop to control emissions. In general, we consider replacing or repairing other components to be the owner's responsibility.

(d) You may exclude from your warranty a component named in paragraph (c) of this section, if it meets two conditions:

(1) It was in general use on similar vehicles before January 1, 2000.

(2) Its failure would clearly degrade the vehicle's performance enough that the operator would need to repair or replace it.

(e) You may limit your emission-related warranty's validity to properly maintained vehicles, as described in § 1068.115 of this chapter.

(f) If you make an aftermarket part, you may—but do not have to—certify that using the part will still allow vehicles to meet emission standards, as described in § 85.2114 of this chapter.

§ 1051.125 What maintenance instructions must I give to buyers?

Give the ultimate buyer of each new vehicle written instructions for properly maintaining and using the vehicle, including the emission-control system. The maintenance instructions also apply to service accumulation on your test vehicles or engines, as described in 40 CFR part 1065, subpart E.

(a) *Critical emission-related maintenance.* You may schedule critical maintenance on particular devices if you meet the following conditions:

(1) You may ask us to approve maintenance on air-injection, fuel-system, or ignition components, aftertreatment devices, exhaust gas recirculation systems, crankcase ventilation valves, or oxygen sensors only if it meets two criteria:

(i) Operators are reasonably likely to do the maintenance you call for.

(ii) Vehicles need the maintenance to meet emission standards.

(2) We will accept scheduled maintenance as reasonably likely to occur in use if you satisfy any of four conditions:

(i) You present data showing that, if a lack of maintenance increases emissions, it also unacceptably degrades the vehicle's performance.

(ii) You present survey data showing that 80 percent of vehicles in the field get the maintenance you specify at the recommended intervals.

(iii) You provide the maintenance free of charge and clearly say so in maintenance instructions for the customer.

(iv) You otherwise show us that the maintenance is reasonably likely to be done at the recommended intervals.

(b) *Minimum maintenance intervals.* You may not schedule emission-related maintenance within the minimum useful life period for aftertreatment devices, fuel injectors, sensors, electronic control units, and turbochargers.

(c) *Noncritical emission-related maintenance.* For engine parts not listed in paragraph (a) or (b) of this section, you may recommend any additional amount of inspection or maintenance. But you must state clearly that these steps are not necessary to keep the emission-related warranty valid. Also, do not take these inspection or maintenance steps during service accumulation on your test vehicles or engines.

(d) *Source of parts and repairs.* Print clearly on the first page of your written maintenance instructions that any repair shop or person may maintain, replace, or repair emission-control devices and systems. Make sure your instructions require no component or service identified by brand, trade, or corporate name. Also, do not directly or indirectly distinguish between service by companies with which you have a commercial relationship and service by independent repair shops or the owner. You may disregard the requirements in this paragraph (d) if you do one of two things:

(1) Provide a component or service without charge under the purchase agreement.

(2) Get us to waive this prohibition in the public's interest by convincing us the vehicle will work properly only with the identified component or service.

§ 1051.130 What installation instructions must I give to vehicle manufacturers?

(a) If you sell an engine for someone else to install in a recreational vehicle, give the buyer of the vehicle written instructions for installing it consistent with the requirements of this part. Make sure these instructions have the following information:

(1) Include the heading: ''Emission-related installation instructions.''

(2) State: ''Failing to follow these instructions when installing a certified engine in a recreational vehicle violates federal law (40 CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.''.

(3) Describe any other instructions needed to install an exhaust

aftertreatment device consistent with your application for certification.

(4) Describe any limits on the range of applications needed to ensure that the engine operates consistently with your application for certification. For example, if your engines are certified only to the snowmobile standards, tell vehicle manufacturers not to install the engines in other vehicles.

(5) Describe any other instructions to make sure the installed engine will operate according to any design specifications you describe in your application for certification.

(6) State: ''If you obscure the engine's emission label, you must attach a duplicate label to your vehicle, as described in 40 CFR 1068.105.''.

(b) You do not need installation instructions for engines you install in your own vehicle.

§ 1051.135 How must I label and identify the vehicles and engines I produce?

(a) Assign each production engine a unique identification number and permanently and legibly affix or engrave it on the engine.

(b) At the time of manufacture, add a permanent label identifying each engine. To meet labeling requirements, do four things:

(1) Attach the label in one piece so it is not removable without being destroyed or defaced.

(2) Design and produce it to be durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.

(4) Write it in block letters in English.

(c) On your engine label, do 13 things:

(1) Include the heading ''EMISSION CONTROL INFORMATION.''

(2) Include your full corporate name and trademark.

(3) State: ''THIS VEHICLE IS CERTIFIED TO OPERATE ON [specify operating fuel or fuels].''.

(4) Identify the emission-control system; your identifiers must use names and abbreviations consistent with SAE J1930, which we incorporate by reference (see § 1051.810).

(5) List all requirements for fuel and lubricants.

(6) State the date of manufacture [DAY (optional), MONTH, and YEAR]; if you stamp it on the engine and print it in the owner's manual, you may omit this information from the label.

(7) State: ''THIS VEHICLE MEETS U.S. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS FOR [MODEL YEAR] [SNOWMOBILES or OFF-ROAD MOTORCYCLES or ATVS].''.

(8) Include EPA's standardized designation for the engine family.

(9) State the engine's displacement (in liters) and rated power.

(10) State the engine's useful life (see § 1051.100(h).

(11) List specifications and adjustments for engine tuneups; show the proper position for the transmission during tuneup and state which accessories should be operating.

(12) Describe other information on proper maintenance and use.

(13) Identify the emission standards or Family Emission Limits to which you have certified the engine.

(d) Some of your engines may need more information on the label. If you produce an engine or vehicle that we exempt from the requirements of this part, see 40 CFR part 1068, subparts C and D, for more label information.

(e) Some engines may not have enough space for a label with all the required information. In this case, you may omit the information required in paragraphs (c)(3), (c)(4), (c)(5), and (c)(12) of this section if you print it in the owner's manual instead.

(f) If you are unable to meet these labeling requirements, you may ask us to modify them consistent with the intent of this section.

(g) If you obscure the engine label while installing the engine in the vehicle, you must place a duplicate label on the vehicle. If someone else installs the engine in a vehicle, give them duplicate labels if they ask for them (see 40 CFR 1068.105).

§ 1051.145 What provisions apply only for a limited time?

Apply the following provisions instead of others in this part for the periods and circumstances specified in this section.

(a) *Provisions for small-volume manufacturers.* Special provisions apply to you if you are a small-volume manufacturer subject to the requirements of this part.

(1) You may delay complying with otherwise applicable emission standards (and other requirements) for two model years.

(2) If you are a small-volume manufacturer of snowmobiles, at least 50 percent of the models you produce must meet emission standards in the first two years they apply, as described in paragraph (a)(1) of this section.

(3) Your vehicles for model years before 2011 may be exempt from the requirements and prohibitions of this part if you meet four criteria:

(i) Produce your vehicles by installing engines covered by a valid certificate of conformity under 40 CFR part 90 that shows the engines meet standards for Class II engines for each engine's model year.

(ii) Do not change the engine in a way that we could reasonably expect to increase its exhaust emissions.

(iii) Make sure the engine meets all applicable requirements from 40 CFR part 90. This applies to engine manufacturers, vehicle manufacturers who use these engines, and all other persons as if these engines were not used in recreational vehicles.

(iv) Make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in recreational vehicles regulated under this part.

(b) *Optional emission standards for Phase 1 ATVs.* To meet Phase 1 ATV standards, you may apply the exhaust emission standards by model year in paragraph (b)(1) of this section while measuring emissions using the engine-based test procedures in 40 CFR part 1065 instead of the chassis-based test procedures in 40 CFR part 86.

(1) Follow Table 1 of this section for exhaust emission standards, while meeting all the other requirements of § 1051.103. You may use emission credits to show compliance with these standards (see subpart H of this part). You may not exchange emission credits with engine families meeting the standards in § 1051.103. You may also not exchange credits between engine families certified above 225 cc and engine families certified below 225 cc.

(i) The phase-in percentages in the table specify the percentage of your production that must comply with the emission standards for those model years.

(ii) In the 2009 model year, you may produce fewer vehicles meeting Phase 1 standards if they are instead certified to Phase 2 standards.

(iii) Table 1 follows:

TABLE 1 OF § 1051.145.—OPTIONAL EXHAUST EMISSION STANDARDS FOR PHASE 1 ATVS (g/kW-hr)

Engine displacement	Model year	Phase-in (percent)	Emission standards		Maximum allowable family emission limits
			$HC+NO_X$	CO	$HC+NO_X$
<225 cc	2006	50	16.1	400	32.2
	2007 and 2008	100	16.1	400	32.2
	2009	50	16.1	400	32.2
≥225 cc	2006	50	13.4	400	26.8
	2007 and 2008	100	13.4	400	26.8
	2009	50	13.4	400	26.8

(2) Measure emissions by testing the engine on a dynamometer with the steady-state duty cycle described in Table 2 of this section.

(i) During idle mode, hold the speed within your specifications, keep the throttle fully closed, and keep engine torque under 5 percent of the peak torque value at maximum test speed.

(ii) For the full-load operating mode, operate the engine at its maximum fueling rate.

(iii) See part 1065 of this chapter for detailed specifications of tolerances and calculations.

(iv) Table 2 follows:

TABLE 2 OF § 1051.145.—6-MODE DUTY CYCLE FOR RECREATIONAL ENGINES

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
1	85	100	5.0	0.09
2	85	75	5.0	0.20
3	85	50	5.0	0.29
4	85	25	5.0	0.30
5	85	10	5.0	0.07
6	Idle	0	5.0	0.05

(c) For model years before 2011, if you are a small-volume manufacturer, your vehicles may be exempt from the requirements and prohibitions of this part if you meet all the following criteria:

(1) You must produce them by installing engines covered by a valid certificate of conformity under 40 CFR part 90 showing that the engines meet the standards for Class II engines for each engine's model year.

(2) You must not make any changes to the engine that we could reasonably expect to increase its exhaust emissions.

(3) You must make sure the engine meets all the requirements from 40 CFR part 90 that apply. The requirements and restrictions of 40 CFR part 90 apply to anyone manufacturing these engines, anyone manufacturing vehicles that use these engines, and all other persons in the same manner as if these engines were not used in recreational vehicles.

(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in recreational vehicles.

Subpart C—Certifying Engine Families

§ 1051.201 What are the general requirements for submitting a certification application?

(a) Send us an application for a certificate of conformity for each engine family. Each application is valid for only one model year.

(b) The application must not include false or incomplete statements or information (see § 1051.250).

(c) We may choose to ask you to send us less information than we specify in this subpart, but this would not change your recordkeeping requirements.

(d) Use good engineering judgment for all decisions related to your application (see § 1068.5 of this chapter).

(e) An authorized representative of your company must approve and sign the application.

§ 1051.205 How must I prepare my application?

In your application, you must do all the following things:

(a) Describe the engine family's specifications and other basic parameters of the vehicle design. List the types of fuel you intend to use to certify the engine family (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).

(b) Explain how the emission-control system operates. Describe in detail all the system's components, auxiliary emission-control devices, and all fuel-system components you will install on

any production or test vehicle or engine. Explain why any auxiliary emission-control devices are not defeat devices (see § 1051.115(f)). Do not include detailed calibrations for components unless we ask for them.

(c) Describe the vehicles or engines you selected for testing and the reasons for selecting them.

(d) Describe any special or alternate test procedures you used (see § 1051.501).

(e) Identify the duty cycle and the number of engine operating hours used to stabilize emission levels. Describe any scheduled maintenance you did.

(f) List the specifications of the test fuel to show that it falls within the required ranges we specify in 40 CFR part 1065, subpart C.

(g) Identify the engine family's useful life.

(h) Propose maintenance and use instructions for the ultimate buyer of each new vehicle (see § 1051.125).

(i) Propose emission-related installation instructions if you sell engines for someone else to install in a vehicle (see § 1051.130).

(j) Propose an emission-control label.

(k) Present emission data for HC, NO_X (where applicable), and CO on a test vehicle or engine to show your vehicles meet the emission standards we specify in subpart B of this part. Show these figures before and after applying deterioration factors for each vehicle or engine. Include test data for each type of fuel on which you intend for vehicles in the engine family to operate (for example, gasoline, liquefied petroleum gas, methanol, or natural gas).

(l) Report all test results, including those from invalid tests or from any nonstandard tests (such as measurements based on exhaust concentrations in parts per million).

(m) Identify the engine family's deterioration factors and describe how you developed them. Present any emission test data you used for this.

(n) Describe all adjustable operating parameters and other adjustments (see § 1051.115(c) and (d)), including the following:

(1) The nominal or recommended setting and the associated production tolerances.

(2) The intended physically adjustable range.

(3) The limits or stops used to establish adjustable ranges.

(4) Production tolerances of the limits or stops used to establish each physically adjustable range.

(5) Where applicable, information showing that someone cannot readily modify the engines to operate outside the physically adjustable range.

(6) The air/fuel ratios specified in § 1051.115(d).

(o) State that you operated your test vehicles or engines according to the specified procedures and test parameters using the fuels described in the application to show you meet the requirements of this part.

(p) State unconditionally that all the vehicles (and/or engines) in the engine family comply with the requirements of this part, other referenced parts, and the Clean Air Act (42 U.S.C. 7401 *et seq.*)

(q) Include estimates of vehicle production.

(r) Add other information to help us evaluate your application if we ask for it.

§ 1051.210 May I get preliminary approval before I complete my application?

If you send us information before you finish the application, we will review it and make any appropriate determinations listed in § 1051.215(b) within 90 days of your request. If we need to ask you for further information, we will extend the 90-day period by the number of days we wait for your response.

§ 1051.215 What happens after I complete my application?

(a) If any of the information in your application changes after you submit it, amend it as described in § 1051.225.

(b) We may decide that we cannot approve your application unless you revise it.

(1) If you inappropriately use the provisions of § 1051.230(c) or (d) to define a broader or narrower engine family, we will require you to redefine your engine family.

(2) If we determine your selected useful life for the engine family is too short, we will require you to lengthen it (see § 1051.101(e), § 1051.102(e), or § 1051.103(e)).

(3) If we determine your deterioration factors are not appropriate, we will require you to revise them (see § 1051.240(c)).

(4) If your proposed label is inconsistent with § 1051.135, we will require you to change it (and tell you how, if possible).

(5) If you require or recommend maintenance and use instructions inconsistent with § 1051.125, we will require you to change them.

(6) If we find any other problem with your application, we will tell you how to correct it.

(c) If we determine your application is complete and shows you meet all the requirements, we will issue a certificate of conformity for your engine family for that model year. If we deny the application, we will explain why in writing. You may then ask us to hold a hearing to reconsider our decision (see § 1051.820).

§ 1051.220 How do I amend the maintenance instructions in my application?

Send the Designated Officer a request to amend your application for certification for an engine family if you want to change the maintenance instructions in a way that could affect emissions. In your request, describe the proposed changes to the maintenance instructions. Unless we disapprove it, you may distribute the new maintenance instructions to your customers 30 days after we receive your request. We may also approve a shorter time or waive this requirement.

§ 1051.225 How do I amend my application to include new or modified vehicles?

(a) You must amend your application for certification before you take either of the following actions:

(1) Add a vehicle to a certificate of conformity.

(2) Make a design change for a certified engine family that may affect emissions or an emission-related part over the vehicle's lifetime.

(b) Send the Designated Officer a request to amend the application for certification for an engine family. In your request, do all of the following:

(1) Describe the vehicle model or configuration you are adding or changing.

(2) Include engineering evaluations or reasons why the original test vehicle or engine is or is not still appropriate.

(3) If the original test vehicle or engine for the engine family is not appropriate to show compliance for the new or modified vehicle, include new test data showing that the new or modified vehicle meets the requirements of this part.

(c) You may start producing the new or modified vehicle anytime after you send us your request.

(d) You must give us test data within 30 days if we ask for more testing, or stop producing the vehicle if you are not able do this.

(e) If we determine that the certificate of conformity would not cover your new or modified vehicle, we will send you a written explanation of our decision. In this case, you may no longer produce these vehicles, though you may ask for a hearing for us to reconsider our decision (see § 1051.820).

§ 1051.230 How do I select engine families?

(a) Divide your product line into families of vehicles that you expect to

have similar emission characteristics. Your engine family is limited to a single model year.

(b) Group vehicles in the same engine family if they are identical in all of the following aspects:

(1) The combustion cycle.

(2) The cooling system (water-cooled vs. air-cooled).

(3) The number and arrangement of cylinders.

(4) The number, location, volume, and composition of catalytic converters.

(5) Method of air aspiration.

(6) Bore and stroke.

(7) Configuration of the combustion chamber.

(8) Location of intake and exhaust valves or ports.

(c) In some cases you may subdivide a group of vehicles that is identical under paragraph (b) of this section into different engine families. To do so, you must show you expect emission characteristics to be different during the useful life or that any of the following engine characteristics are different:

(1) Method of actuating intake and exhaust timing (poppet valve, reed valve, rotary valve, etc.).

(2) Sizes of intake and exhaust valves or ports.

(3) Type of fuel.

(4) Configuration of the fuel system.

(5) Exhaust system.

(d) In some cases, you may include different engines in the same engine family, even though they are not identical with respect to the things listed in paragraph (b) of this section.

(1) If you show that different engines have similar emission characteristics during the useful life, we may approve grouping them in the same engine family.

(2) If you are a small-volume manufacturer, you may group engines from any vehicles subject to the same emission standards into a single engine family. This does not change any of the requirements of this part for showing that an engine family meets emission standards.

(e) If you cannot define engine families by the method in this section, we will define them based on features related to emission characteristics.

§ 1051.235 How does testing fit with my application for a certificate of conformity?

This section describes how to test vehicles or engines in your effort to apply for a certificate of conformity.

(a) Test your vehicles or engines using the procedures and equipment specified in subpart F of this part.

(b) Select from each engine family a test vehicle or engine for each fuel type with a configuration you believe is most likely to exceed the emission standards. Using good engineering judgment, consider the emission levels of all exhaust constituents over the full useful life of the vehicle.

(c) You may submit emission data for equivalent engine families from previous years instead of doing new tests, but only if the data shows that the test vehicle or engine would meet all the requirements for the latest vehicle or engine models. We may require you to do new emission testing if we believe the latest vehicle or engine models could be substantially different from the previously tested vehicle or engine.

(d) We may choose to measure emissions from any of your test vehicles or engines.

(1) If we do this, you must provide the test vehicle or engine at the location we select. We may decide to do the testing at your plant or any other facility. If we choose to do the testing at your plant, you must schedule it as soon as possible and make available the instruments and equipment we need.

(2) If we measure emissions on one of your test vehicles or engines, the results of that testing become the official data for the vehicle or engine. Unless we later invalidate this data, we may decide not to consider your data in determining if your engine family meets the emission standards.

(3) Before we test one of your vehicles or engines, we may set its adjustable parameters to any point within the physically adjustable ranges (see § 1051.115(c)) we may also adjust the air/fuel ratio within the adjustable range specified in § 1051.115(d).

(4) Calibrate the test vehicle or engine within the production tolerances shown on the engine label for anything we do not consider an adjustable parameter (see § 1051.205(m)).

(e) If you are a small-volume manufacturer, you may certify by design on the basis of existing emission data from comparable vehicles, in accordance with good engineering judgment. In those cases, you are not required to test your vehicles.

§ 1051.240 How do I determine if my engine family complies with emission standards?

(a) Your engine family complies with the numerical emission standards in subpart B of this part if all emission-data vehicles representing that family have test results showing emission levels at or below the standards.

(b) Your engine family does not comply if any emission-data vehicle representing that family has test results showing emission levels above the standards for any pollutant.

(c) To compare emission levels from the emission-data vehicle with the emission standards, apply deterioration factors (to three decimal places) to the measured emission levels. The deterioration factor is a number that shows the relationship between exhaust emissions at the end of useful life and at the low-hour test point. Section 1051.520 specifies how to test your vehicle to develop deterioration factors that estimate the change in emissions over your vehicle's full useful life. Small-volume manufacturers may use assigned deterioration factors established by EPA. Apply the deterioration factors as follows:

(1) For vehicles that use aftertreatment technology, such as catalytic converters, the deterioration factor is the ratio of exhaust emissions at the end of useful life to exhaust emissions at the low-hour test point. Adjust the official emission results for each tested vehicle at the selected test point by multiplying the measured emissions by the deterioration factor. If the factor is less than one, use one.

(2) For vehicles that do not use aftertreatment technology, the deterioration factor is the difference between exhaust emissions at the end of useful life and exhaust emissions at the low-hour test point. Adjust the official emission results for each tested vehicle at the selected test point by adding the factor to the measured emissions. If the factor is less than zero, use zero.

(d) After adjusting the emission levels for deterioration, round them to the same number of decimal places as the standard. Compare the rounded emission levels to the emission standard for each test vehicle.

§ 1051.245 What records must I keep and make available to EPA?

(a) Organize and maintain the following records to keep them readily available; we may review these records at any time:

(1) A copy of all applications and any summary information you sent us.

(2) Any of the information we specify in § 1051.205 that you did not include in your application.

(3) A detailed history of each emission-data vehicle. In each history, describe all of the following:

(i) The emission-data vehicle's construction, including its origin and buildup, steps you took to ensure that it represents production vehicles, any components you built specially for it, and all emission-related components.

(ii) How you accumulated vehicle or engine operating hours, including the dates and the number of hours accumulated.

(iii) All maintenance (including modifications, parts changes, and other service) and the dates and reasons for the maintenance.

(iv) All your emission tests, including documentation on routine and standard tests, as specified in part 1065 of this chapter, and the date and purpose of each test.

(v) All tests to diagnose engine or emission-control performance, giving the date and time of each and the reasons for the test.

(vi) Any other significant events.

(b) Keep data from routine emission tests (such as test cell temperatures and relative humidity readings) for one year after we issue the associated certificate of conformity. Keep all other information specified in paragraph (a) of this section for eight years after we issue your certificate.

(c) Store these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them.

(d) Send us copies of any maintenance instructions or explanations if we ask for them.

§ 1051.250 When may EPA deny, revoke, or void my certificate of conformity?

(a) We may deny your application for certification if your emission-data vehicles fail to comply with emission standards or other requirements. Our decision may be based on any information available to us. If we deny your application, we will explain why in writing.

(b) In addition, we may deny your application or revoke your certificate if you do any of the following:

(1) Refuse to comply with any testing or reporting requirements.

(2) Submit false or incomplete information (paragraph (d) of this section applies if this is fraudulent).

(3) Render inaccurate any test data.

(4) Deny us from completing authorized activities despite our presenting a warrant or court order (see § 1068.20 of this chapter).

(5) Produce vehicle or engines for importation into the United States at a location where local law prohibits us from carrying out authorized activities.

(c) We may void your certificate if you do not keep the records we require or do not give us information when we ask for it.

(d) We may void your certificate if we find that you committed fraud to get it. This means intentionally submitting false or incomplete information.

(e) If we deny your application or revoke or void your certificate, you may ask for a hearing (see § 1051.820). Any such hearing will be limited to substantial and factual issues.

Subpart D—Testing Production-Line Engines

§ 1051.301 When must I test my production-line vehicles or engines?

(a) If you certify vehicles to the standards of this part, you must test them as described in this subpart. If your vehicle is certified to g/kW-hr standards, then test the engine; otherwise, test the vehicle. The provisions of this subpart do not apply to small-volume manufacturers.

(b) We may suspend or revoke your certificate of conformity for certain engine families if your production-line vehicles or engines do not meet emission standards or you do not fulfill your obligations under this subpart (see §§ 1051.325 and 1051.340).

(c) The requirements of this part do not affect our ability to do selective enforcement audits, as described in part 1068 of this chapter.

(d) You may ask to use an alternate program for testing production-line vehicles or engines. In your request, you must show us that the alternate program gives equal assurance that your products meet the requirements of this part. If we approve your alternate program, we may waive some or all of this part's requirements.

(e) If you certify an engine family with carryover emission data, as described in § 1051.235(c), and these equivalent engine families consistently meet the emission standards with production-line testing over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. The minimum testing rate is one vehicle or engine per engine family. If we reduce your testing rate, we may limit our approval to a single model year.

(f) We may ask you to make a reasonable number of production-line vehicles or engines available for a reasonable time so we can test or inspect them for compliance with the requirements of this part.

§ 1051.305 How must I prepare and test my production-line vehicles or engines?

(a) *Test procedures.* Test your production-line vehicles or engines using the applicable testing procedures in subpart F of this part to show you meet the emission standards in subpart B of this part.

(b) *Modifying a test vehicle or engine.* Once a vehicle or engine is selected for testing (see § 1051.310), you may adjust, repair, prepare, or modify it or check its emissions only if one of the following is true:

(1) You document the need for doing so in your procedures for assembling and inspecting all your production vehicles or engines and make the action routine for all the vehicles or engines in the engine family.

(2) This subpart otherwise specifically allows your action.

(3) We approve your action in advance.

(c) *Malfunction.* If a vehicle or engine malfunction prevents further emission testing, ask us to approve your decision to either repair it or delete it from the test sequence.

(d) *Setting adjustable parameters.* Before any test, we may adjust or require you to adjust any adjustable parameter to any setting within its physically adjustable range.

(1) We may adjust idle speed outside the physically adjustable range as needed until the vehicle or engine has stabilized emission levels (see paragraph (e) of this section). We may ask you for information needed to establish an alternate minimum idle speed.

(2) We may make or specify adjustments within the physically adjustable range by considering their effect on emission levels, as well as how likely it is someone will make such an adjustment with in-use vehicles.

(e) *Stabilizing emission levels.* Before you test production-line vehicles or engines, you may operate the vehicle or engine to stabilize the emission levels. Using good engineering judgment, operate your vehicles or engines in a way that represents the way they will be used. You may operate each vehicle or engine for no more than the greater of two periods:

(1) 50 hours.

(2) The number of hours you operated your emission-data vehicle for certifying the engine family (see 40 CFR part 1065, subpart E).

(f) *Damage during shipment.* If shipping a vehicle or engine to a remote facility for production-line testing makes necessary an adjustment or repair, you must wait until after the after the initial emission test to do this work. We may waive this requirement if the test would be impossible or unsafe, or if it would permanently damage the vehicle or engine. Report to us, in your written report under § 1051.345, all adjustments or repairs you make on test vehicles or engines before each test.

(g) *Retesting after invalid tests.* You may retest a vehicle or engine if you determine an emission test is invalid. Explain in your written report reasons for invalidating any test and the emission results from all tests. If you retest a vehicle or engine and, within ten days after testing, ask to substitute results of the new tests for the original

ones, we will answer within ten days after we receive your information.

§ 1051.310 How must I select vehicles or engines for production-line testing?

(a) Use test results from two vehicles or engines for each engine family to calculate the required sample size for the model year. Update this calculation with each test.

(1) For engine families with projected annual sales of at least 1600, the test periods are consecutive quarters (3 months).

(2) For engine families with projected annual sales below 1600, the test period is the whole model year.

(b) Early in each test period, randomly select and test an engine from the end of the assembly line for each engine family.

(1) In the first test period for newly certified engines, randomly select and test one more engine. Then, calculate the required sample size for the test period as described in paragraph (c) of this section.

(2) In later test periods or for engine families relying on previously submitted test data, combine the new test result with the last test result from the previous test period. Then, calculate the required sample size for the new test period as described in paragraph (c) of this section.

(c) Calculate the required sample size for each engine family. Separately calculate this figure for HC, NO_X (or HC+NO_X), and CO. The required sample size is the greater of these calculated values. Use the following equation:

$$N = \left[\frac{(t_{95} \times \sigma)}{(x - STD)}\right]^2 + 1$$

Where:

N = Required sample size for the model year.

t_{95} = 95% confidence coefficient, which depends on the number of tests completed, n, as specified in the table in paragraph (c)(1) of this section. It defines 95% confidence intervals for a one-tail distribution.

x = Mean of emission test results of the sample.

STD = Emission standard.

σ = Test sample standard deviation (see paragraph (c)(2) of this section).

(1) Determine the 95% confidence coefficient, t_{95}, from the following table:

n	t_{95}	n	t_{95}	n	t_{95}
2	6.31	12	1.80	22	1.72
3	2.92	13	1.78	23	1.72
4	2.35	14	1.77	24	1.71
5	2.13	15	1.76	25	1.71
6	2.02	16	1.75	26	1.71
7	1.94	17	1.75	27	1.71
8	1.90	18	1.74	28	1.70
9	1.86	19	1.73	29	1.70
10	1.83	20	1.73	30+	1.70
11	1.81	21	1.72		

(2) Calculate the standard deviation, σ, for the test sample using the following formula:

$$\sigma = \sqrt{\frac{\sum (X_i - x)^2}{n - 1}}$$

Where:

X_i = Emission test result for an individual vehicle or engine.

n = The number of tests completed in an engine family.

(d) Use final deteriorated test results to calculate the variables in the equations in paragraph (c) of this section (see § 1051.315(a)).

(e) After each new test, recalculate the required sample size using the updated mean values, standard deviations, and the appropriate 95% confidence coefficient.

(f) Distribute the remaining vehicle or engine tests evenly throughout the rest of the test period. You may need to adjust your schedule for selecting vehicles or engines if the required sample size changes. Continue to randomly select vehicles or engines from each engine family; this may involve testing vehicles or engines that operate on different fuels.

(g) Continue testing any engine family for which the sample mean, x, is greater than the emission standard. This applies if the sample mean for either HC, NO_X (or HC+NO_X) or for CO is greater than the emission standard. Continue testing until one of the following things happens:

(1) The sample size, n, for an engine family is greater than the required sample size, N, and the sample mean, x, is less than or equal to the emission standard.

(2) The engine family does not comply according to § 1051.325.

(3) You test 30 vehicles or engines from the engine family.

(4) You test one percent of your projected annual U.S.-directed production volume for the engine family.

(h) You may elect to test more randomly chosen vehicles or engines than we require. Include these vehicles or engines in the sample size calculations.

§ 1051.315 How do I know when my engine family does not comply?

(a) Calculate your test results. Round them to the number of decimal places in the emission standard expressed to one more decimal place.

(1) *Initial and final test results.* Calculate and round the test results for each vehicle or engine. If you do several tests on a vehicle or engine, calculate the initial test results, then add them together and divide by the number of tests and round for the final test results on that vehicle or engine.

(2) *Final deteriorated test results.* Apply the deterioration factor for the engine family to the final test results (see § 1051.240(c)).

(b) Construct the following CumSum Equation for each engine family (for HC, NO_X (or $HC+NO_X$), and CO emissions):

$C_i = C_{i-1} + X_i - (STD + F)$

Where:

C_i = The current CumSum statistic.

C_{i-1} = The previous CumSum statistic. Prior to any testing, the CumSum statistic is 0 (i.e. $C_0 = 0$).

X_i = The current emission test result for an individual vehicle or engine.

STD = Emission standard.

$F = 0.25 \times \sigma$.

(c) Use final deteriorated test results to calculate the variables in the equation in paragraph (b) of this section (see § 1051.315(a)).

(d) After each new test, recalculate the CumSum statistic.

(e) If you test more than the required number of vehicles or engines, include the results from these additional tests in the CumSum Equation.

(f) After each test, compare the current CumSum statistic, C_i, to the recalculated Action Limit, H, defined as $H = 5.0 \times \sigma$.

(g) If the CumSum statistic exceeds the Action Limit in two consecutive tests, the engine family does not comply with the requirements of this part. Tell us within ten working days if this happens.

(h) If you amend the application for certification for an engine family (see § 1051.225), do not change any previous calculations of sample size or CumSum statistics for the model year.

§ 1051.320 What happens if one of my production-line vehicles or engines fails to meet emission standards?

(a) If you have a production-line vehicle or engine with final deteriorated test results exceeding one or more emission standards (see § 1051.315(a)), the certificate of conformity is automatically suspended for that failing vehicle or engine. You must take the following actions before your certificate of conformity can cover that vehicle or engine:

(1) Correct the problem and retest the vehicle or engine to show it complies with all emission standards.

(2) Include in your written report a description of the test results and the remedy for each vehicle or engine (see § 1051.345).

(b) You may at any time ask for a hearing to determine whether the tests and sampling methods were proper (see § 1051.820).

§ 1051.325 What happens if an engine family does not comply?

(a) We may suspend your certificate of conformity for an engine family if it fails to comply under § 1051.315. The suspension may apply to all facilities producing vehicles or engines from an engine family, even if you find noncompliant vehicles or engines only at one facility.

(b) We will tell you in writing if we suspend your certificate in whole or in part. We will not suspend a certificate until at least 15 days after the engine family became noncompliant. The suspension is effective when you receive our notice.

(c) Up to 15 days after we suspend the certificate for an engine family, you may ask for a hearing to determine whether the tests and sampling methods were proper (see § 1051.820). If we agree before a hearing that we used erroneous information in deciding to suspend the certificate, we will reinstate the certificate.

§ 1051.330 May I sell vehicles from an engine family with a suspended certificate of conformity?

You may sell vehicles that you produce after we suspend the engine family's certificate of conformity under § 1048.315 only if one of the following occurs:

(a) You test each vehicle or engine you produce and show it complies with emission standards that apply.

(b) We conditionally reinstate the certificate for the engine family. We may do so if you agree to recall all the affected vehicles and remedy any noncompliance at no expense to the owner if later testing shows that the engine family still does not comply.

§ 1051.335 How do I ask EPA to reinstate my suspended certificate?

(a) Send us a written report asking us to reinstate your suspended certificate. In your report, identify the reason for noncompliance, propose a remedy, and commit to a date for carrying it out. In your proposed remedy include any quality control measures you propose to keep the problem from happening again.

(b) Give us data from production-line testing that shows the remedied engine family complies with all the emission standards that apply.

§ 1051.340 When may EPA revoke my certificate under this subpart and how may I sell these vehicles again?

(a) We may revoke your certificate for an engine family in the following cases:

(1) You do not meet the reporting requirements.

(2) Your engine family fails to meet emission standards and your proposed remedy to address a suspended certificate under § 1051.325 is inadequate to solve the problem or requires you to change the vehicle's design or emission-control system.

(b) To sell vehicles from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the requirements of this part.

(1) If we determine your proposed design change may not control emissions for the vehicle's full useful life, we will tell you within five working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.

(2) Unless we require more testing, you may show compliance by testing production-line vehicles or engines as described in this subpart.

(3) We will issue a new or updated certificate of conformity when you have met these requirements.

§ 1051.345 What production-line testing records must I send to EPA?

(a) Within 30 calendar days of the end of each calendar quarter, send us a report with the following information:

(1) Describe any facility used to test production-line vehicles or engines and state its location.

(2) State the total U.S.-directed production volume and number of tests for each engine family.

(3) Describe how you randomly selected vehicles or engines.

(4) Describe your test vehicles or engines, including the engine family's identification and the vehicle's model year, build date, model number, identification number, and number of hours of operation before testing for each test vehicle or engine.

(5) Identify where you accumulated hours of operation on the vehicles or engines and describe the procedure and schedule you used.

(6) Provide the test number; the date, time and duration of testing; test procedure; initial test results before and after rounding; final test results; and final deteriorated test results for all tests. Provide the emission results for all measured pollutants. Include information for both valid and invalid tests and the reason for any invalidation.

(7) Describe completely and justify any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the test vehicle or engine if you did not report it separately under this subpart. Include the results of any emission measurements, regardless of the procedure or type of vehicle.

(8) Provide the CumSum analysis required in § 1051.315 for each engine family.

(9) Report on each failed vehicle or engine as described in § 1051.320.

(10) State the date the calendar quarter ended for each engine family.

(b) We may ask you to add information to your written report, so we can determine whether your new vehicles conform with the requirements of this subpart.

(c) An authorized representative of your company must sign the following statement:

We submit this report under Sections 208 and 213 of the Clean Air Act. Our production-line testing conformed completely with the requirements of 40 CFR part 1051. We have not changed production processes or quality-control procedures for the engine family in a way that might affect the emission control from production vehicles (or engines). All the information in this report is true and accurate, to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)

(d) Send electronic reports of production-line testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(e) We will send copies of your reports to anyone from the public who asks for them. We will not release information about your sales or production volumes, which we will consider confidential under 40 CFR part 2.

§ 1051.350 What records must I keep?

(a) Organize and maintain your records as described in this section. We may review your records at any time, so it is important to keep required information readily available.

(b) Keep paper records of your production-line testing for one full year after you complete all the testing required for an engine family in a model year. You may use any additional storage formats or media if you like.

(c) Keep a copy of the written reports described in § 1051.345.

(d) Keep the following additional records:

(1) A description of all test equipment for each test cell that you can use to test production-line vehicles or engines.

(2) The names of supervisors involved in each test.

(3) The name of anyone who authorizes adjusting, repairing, preparing, or modifying a test vehicle or engine and the names of all supervisors who oversee this work.

(4) If you shipped the vehicle or engine for testing, the date you shipped it, the associated storage or port facility, and the date the vehicle or engine arrived at the testing facility.

(5) Any records related to your production-line tests that are not in the written report.

(6) A brief description of any significant events during testing not otherwise described in the written report or in this section.

(e) If we ask, you must give us projected or actual production figures for an engine family. We may ask you to divide your production figures by power rating, displacement, fuel type, or assembly plant (if you produce vehicles or engines at more than one plant).

(f) Keep a list of vehicle or engine identification numbers for all the vehicles or engines you produce under each certificate of conformity. Give us this list within 30 days if we ask for it.

(g) We may ask you to keep or send other information necessary to implement this subpart.

Subpart E—Testing In-Use Engines

§ 1051.401 What provisions apply for in-use testing of my vehicles or engines?

We may conduct in-use testing of any vehicle or engine subject to the standards of this part. If we determine that a substantial number of vehicles or engines do not comply with the regulations of this part throughout their full useful life, we may order the manufacturer to conduct a recall as specified in 40 CFR part 1068.

Subpart F—Test Procedures

§ 1051.501 What procedures must I use to test my vehicles or engines?

(a) For snowmobiles, use the equipment and procedures for spark-ignition engines in part 1065 of this chapter to show your snowmobiles meet the duty-cycle emission standards in § 1051.101. Measure HC, NO_X, CO, and CO_2 emissions using the dilute sampling procedures in part 1065 of this chapter. Use the duty cycle in § 1051.505.

(b) For motorcycles and ATVs, use the equipment, procedures, and duty cycle in 40 CFR part 86, subpart F, to show your vehicles meet the exhaust emission standards in § 1051.102 or § 1051.103. Measure HC, NO_X, CO, and CO_2. If you certify ATVs using the interim testing provisions of § 1051.145, use the equipment, procedures, and duty cycle described or referenced in that section. Motorcycles and ATVs with engine displacement at or below 169 cc must use the driving schedule in paragraph (c) of Appendix I to part 86. All others must use the driving schedule in paragraph (b) of Appendix I to part 86.

(c) Use the fuels and lubricants specified in 40 CFR part 1065, subpart C, for all the testing and service accumulation we require in this part.

(d) You may use special or alternate procedures, as described in § 1065.10 of this chapter.

(e) We may reject data you generate using alternate procedures if later testing with the procedures in part 1065 of this chapter shows contradictory emission data.

§ 1051.505 What special provisions apply for testing snowmobiles?

Use the following special provisions for testing snowmobiles:

(a) Measure emissions by testing the engine on a dynamometer with the steady-state duty cycle described in Table 1 of this section.

(b) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Keep the throttle fully closed.

(3) Keep engine torque under 5 percent of the peak torque value at maximum test speed.

(c) For the full-load operating mode, operate the engine at its maximum fueling rate.

(d) Keep the test engine's intake air between -15° C and -5° C (5° F and 23° F). Ambient temperatures during testing must be between -15° C and 30° C (5° F and 86° F).

(e) See part 1065 of this chapter for detailed specifications of tolerances and calculations.

(f) Table 1 follows:

TABLE 1 OF § 1051.501.—5-MODE DUTY CYCLE FOR SNOWMOBILES

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
1	100	100	5.0	0.12

TABLE 1 OF § 1051.501.—5-MODE DUTY CYCLE FOR SNOWMOBILES—Continued

Mode No.	Engine speed	Torque	Minimum time in mode (minutes)	Weighting factors
2	85	51	5.0	0.27
3	75	33	5.0	0.25
4	65	19	5.0	0.31
5	Idle	0	5.0	0.05

§ 1051.520 How do I perform durability testing?

This section applies for durability testing to determine deterioration factors. A small-volume manufacturer may omit durability testing if it uses our assigned deterioration factors that we establish based on our projection of the likely deterioration in the performance of specific emission controls.

(a) Calculate your deterioration factor by testing a vehicles or engine that is representative of your engine family at a low-hour test point and the end of its useful life. You may also test at intermediate points.

(b) Operate the vehicle or engine over a representative duty cycle for a period at least as long as the useful life (in hours or kilometers). You may operate the vehicle or engine continuously.

(c) You may only perform the scheduled emission-related maintenance specified in § 1051.125. You may not perform any unscheduled maintenance during durability testing unless we approve it in advance.

(d) Use a linear least-squares fit of your test data for each pollutant to calculate your deterioration factor.

Subpart G—Compliance Provisions

§ 1051.601 What compliance provisions apply to these vehicles?

Engine and vehicle manufacturers, as well as owners, operators, and rebuilders of these vehicles, and all other persons, must observe the requirements and prohibitions in part 1068 of this chapter. The compliance provisions in this subpart apply only to the vehicles we regulate in this part.

§ 1051.605 What are the provisions for exempting vehicles from the requirements of this part if they use engines you have certified under the motor-vehicle program or the Large Spark-ignition (SI) program?

(a) This section applies to you if you are the manufacturer of the engine. See § 1051.610 if you are not the engine manufacturer.

(b) The only requirements or prohibitions from this part that apply to a vehicle that is exempt under this section are in this section and § 1051.610.

(c) If you meet all the following criteria regarding your new vehicle, you are exempt under this section:

(1) You must produce it using an engine covered by a valid certificate of conformity under 40 CFR part 86 or part 1048.

(2) You must not make any changes to the certified engine that we could reasonably expect to increase its exhaust or evaporative emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for this exemption:

(i) Change any fuel system or evaporative system parameters from the certified configuration (this does not apply to refueling emission controls).

(ii) Change any other emission-related components.

(iii) Modify or design the engine cooling system so that temperatures or heat rejection rates are outside the original engine's specified ranges.

(3) You must make sure the engine still has the label we require under 40 CFR part 86 or part 1048.

(4) You must make sure that fewer than 50 percent of the engine model's total sales, from all companies, are used in recreational vehicles.

(d) If you produce both the engine and vehicle under this exemption, you must do all of the following to keep the exemption valid:

(1) Make sure the original emission label is intact.

(2) Add a permanent supplemental label to the engine in a position where it will remain clearly visible after installation in the vehicle. In your engine label, do the following:

(i) Include the heading: ''Recreational Vehicle Emission Control Information''.

(ii) Include your full corporate name and trademark.

(iii) State: ''THIS ENGINE WAS ADAPTED FOR RECREATIONAL USE WITHOUT AFFECTING ITS EMISSION CONTROLS.''.

(iv) State the date you finished installing (month and year).

(3) Make the original and supplemental labels readily visible after the engine is installed in the vehicle or, if vehicle obscures the engine's labels, make sure the vehicle manufacturer attaches duplicate labels, as described in § 1068.105 of this chapter.

(4) Send the Designated Officer a signed letter by the end of each calendar year (or less often if we tell you) with all the following information:

(i) Identify your full corporate name, address, and telephone number.

(ii) List the models you expect to produce under this exemption in the coming year.

(iii) State: ''We produce each listed model for recreational application without making any changes that could increase its certified emission levels, as described in 40 CFR 1051.605.''.

(e) If your vehicles do not meet the criteria listed in paragraph (c) of this section, they will be subject to the standards and prohibitions of this part. Producing these vehicles without a valid exemption or certificate of conformity would violate the prohibitions in § 1068.100 of this chapter.

(f) If we request it, you must send us emission test data on the applicable recreational duty cycle(s) (see §§ 1051.505 and 1051.510). You may include the data in your application for certification or in your letter requesting the exemption.

(g) Vehicles exempted under this section are subject to all the requirements affecting engines and vehicles under 40 CFR part 86 or part 1048, as applicable. The requirements and restrictions of 40 CFR part 86 or 1048 apply to anyone manufacturing these engines, anyone manufacturing vehicles that use these engines, and all other persons in the same manner as if these engines were used in a motor vehicle or other nonrecreational application.

§ 1051.610 What are the provisions for producing recreational vehicles with engines already certified under the motor-vehicle program or the Large SI program?

(a) You may produce a recreational vehicle using a motor vehicle engine, or a Large SI engine if you meet three criteria:

(1) The engine or vehicle is certified to 40 CFR part 86 or part 1048.

(2) The engine is not adjusted outside the manufacturer's specifications.

(3) The engine or vehicle is not modified in any way that may affect its emission control. This applies to exhaust and evaporative emission controls, but not refueling emission controls.

(b) This section does not apply if you manufacture the engine yourself; see § 1051.605.

§ 1051.615 What are the special provisions for certifying small recreational engines?

(a) If an off-highway motorcycle or ATV has an engine with total displacement of 70 cc or less, you may choose for these engines to meet the Phase 1 emission standards from 40 CFR part 90 that apply to Class I nonhandheld engines instead of the requirements of this part. In this case, all the requirements and prohibitions of 40 CFR part 90 relevant to Class I engines meeting Phase 1 standards apply to these engines and vehicles, with the following additional provisions:

(1) If you qualify as a small-volume manufacturer under this part, emission standards apply beginning with the 2008 model year. Otherwise, emission standards apply beginning with the 2006 model year.

(2) If you qualify as a small-volume manufacturer under this part, the provisions of § 1068.241 of this chapter apply to these engines.

(3) The provisions of § 1068.240 of this chapter apply to these engines.

(b) If you do not certify the engines under 40 CFR part 90, then all the requirements and prohibitions of this part apply to these engines and vehicles.

(c) Once emission standards apply, producing these engines or vehicles without a valid exemption or certificate of conformity under this part or part 90 of this chapter would violate the prohibitions in § 1068.101 of this chapter.

§ 1051.620 When may a manufacturer introduce into commerce an uncertified recreational vehicle to be used for competition?

(a) You may introduce into commerce a new recreational vehicle that is to be used for competition if we grant you an exemption under this section.

(b) We will exempt vehicles that we determine will be used solely for competition. The basis of our determinations are described in paragraphs (b)(1) and (b)(2) and (c) of this section.

(1) *Off-highway motorcycles.* Motorcycles that are marketed and labeled as only for competitive use and which meet at least four of the criteria listed in paragraphs (b)(1)(i) through (v) of this section are considered to be used solely for competition, except in cases where other information is available that indicates that they are not used solely for competition. The following features are indicative of motorcycles used solely for competition:

(i) The absence of a headlight or other lights.

(ii) The absence of a spark arrestor.

(iii) The absence of manufacturer warranty.

(iv) Suspension travel greater than 10 inches.

(v) Engine displacement greater than 50 cc.

(2) *Snowmobiles and ATVs.* Snowmobiles and ATVs meeting all of the following criteria are considered to be used solely for competition, except in cases where other information is available that indicates that they are not used solely for competition:

(i) The vehicle or vehicle may not be sold in any public dealership.

(ii) Sale of the vehicle must be limited to professional racers or other qualified racers.

(iii) The vehicle must have performance characteristics that are substantially superior to noncompetitive models.

(c) Vehicles not meeting the applicable criteria listed in paragraph (b) of this section will be exempted only in cases where the manufacturer has clear and convincing evidence that the vehicles for which the exemption is being sought will be used solely for competition.

(d) You must permanently label vehicles exempted under this section to clearly indicate that they are to be used only for competition. Failure to properly label a vehicle will void the exemption for that vehicle.

(e) If we request it, you must provide us any information we need to determine whether the vehicles are used solely for competition.

§ 1051.625 What special provisions apply to unique snowmobile designs?

(a) We may permit you to produce up to 300 snowmobiles per year that are certified to less stringent emission standards than those in § 1051.101, as long as you meet all the conditions and requirements in this section.

(b) To be eligible for these alternate standards, you must be a small-volume manufacturer.

(c) To apply for alternate standards under this section, send the Designated Officer a written request. In your request, do two things:

(1) Show that the snowmobile has unique design, calibration, or operating characteristics that make it atypical and infeasible or highly impractical to meet the emission standards in § 1051.101, considering technology, cost, and other factors.

(2) Identify the level of compliance you can achieve, including a description of available emission-control technologies and any constraints that may prevent more effective use of these technologies.

(d) You must give us other relevant information if we ask for it.

(e) An authorized representative of your company must sign the request and include the statement: ''All the information in this request is true and accurate, to the best of my knowledge.''

(f) Send your request for this extension at least nine months before the relevant deadline. If different deadlines apply to companies that are not small-volume manufacturers, do not send your request before the regulations in question apply to the other manufacturers.

(g) If we approve your request, we will set alternate standards for your qualifying snowmobiles. These standards will not be above 400 g/kW-hr for CO or 150 g/kW-hr for HC.

(h) You may produce these snowmobiles to meet the alternate standards we establish under this section as long as you continue to produce them at the same or lower emission levels.

(i) Do not include snowmobiles you produce under this section in any averaging, banking, or trading calculations under Subpart H of this part.

(j) You must meet all the requirements of this part, except as noted in this section.

Subpart H—Averaging, Banking, and Trading for Certification

§ 1051.701 General provisions.

(a) You may average, bank, and trade emission credits for certification as described in this subpart to meet the average standards of this part. To do this you must show that your average emission levels are below the applicable standards in subpart B of this part, or that you have sufficient credits to offset a credit deficit for the model year (as calculated in § 1051.720).

(b) There are separate averaging, banking, and trading programs for snowmobiles, ATVs, and off-highway motorcycles. You may not exchange credits from engine families of one type of these vehicles with those from engine families of another type. You may also not exchange credits with other families of the same type if you use different measurement procedures for the different engine families (for example, ATVs certified to chassis-based vs. engine-based standards).

(c) The definitions of Subpart I of this part apply to this subpart. The following definitions also apply:

(1) *Average standard* means the standard that applies on average to all your vehicle under this part.

(2) *Broker* means any entity that facilitates a trade between a buyer and seller.

(3) *Buyer* means the entity that receives credits as a result of trade or transfer.

(4) *Reserved credits* means credits generated but not yet verified by EPA in the end of year report review.

(5) *Seller* means the entity that provides credits during a trade or transfer.

(d) Do not include any exported vehicles in the certification averaging, banking, and trading program. Include only vehicles certified under this part.

§ 1051.705 How do I average emission levels?

(a) As specified in subpart B of this part, certify each vehicle to a family emission limit (FEL).

(b) Calculate a preliminary average emission level according to § 1051.720 using projected production volumes for your application for certification.

(c) After the end of your model year, calculate a final average emission level according to § 1051.720 for each type of recreational vehicle or engine you manufacture or import. Use actual production volumes.

(d) If your preliminary average emission level is below the allowable average standard, see § 1051.710 for information about generating and banking emission credits. These credits will be considered reserved until verified by EPA during the end of year report review.

§ 1051.710 How do I generate and bank emission credits?

(a) If your average emission level is below the average standard, you may calculate credits according to § 1051.720.

(b) You may generate credits if you are a certifying manufacturer.

(c) You may bank unused emission credits, but only after the end of the calendar year and after we have reviewed your end-of-year reports. Credits you generate do not expire.

(d) During the calendar year and before you send in your end-of-year report, you may consider reserved any credits you originally designate for banking during certification. You may redesignate these credits for trading or transfer in your end-of-year report, but they are not valid to demonstrate compliance until verified.

(e) You may use for averaging or trading any credits you declared for banking from the previous calendar year that we have not reviewed. But, we may revoke these credits later—following our review of your end-of-year report or audit actions. For example, this could occur if we find that credits are based on erroneous calculations; or that emission levels are misrepresented, unsubstantiated, or derived incorrectly in the certification process.

§ 1051.715 How do I trade emission credits?

(a) You may trade only banked emission credits, not reserved credits.

(b) You may trade banked credits to any certifying manufacturer.

(c) If a negative credit balance results from a credit trade, both buyers and sellers are liable, except in cases involving fraud. We may void the certificates of all emission families participating in a negative trade.

(1) If you buy credits but have not caused the negative credit balance, you must only supply more credits equivalent to the amount of invalid credits you used.

(2) If you caused the credit shortfall, you may be subject to the requirements of § 1051.730(b)(6).

§ 1051.720 How do I calculate my average emission level or emission credits?

(a) Calculate your average emission level for each type of recreational vehicle or engine for each model year according to the following equation and round it to the nearest tenth of a g/km or g/kW-hr. Use consistent units throughout the calculation.

(1) Calculate the average emission level as:

$$\text{Emission level} = \left[\sum_i (\text{FEL})_i \times (\text{UL})_i \times (\text{Production})_i\right] \Big/ \left[\sum_i (\text{Production})_i \times (\text{UL})_i\right]$$

Where:

FEL_i = The FEL to which the engine family is certified.

UL_i = The useful life of the engine family.

$Production_i$ = The number of vehicles in the engine family.

(2) Use production projections for initial certification, and actual production volumes to determine compliance at the end of the model year.

(b) If your average emission level is below the average standard, calculate credits available for banking according to the following equation and round them to the nearest tenth of a gram:

$$\text{Credit} = \left[(\text{Average standard} - \text{Emission level})\right] \times \left[\sum_i (\text{Production})_i \times (\text{UL})_i\right]$$

(c) If your average emission level is above the average standard, calculate your preliminary credit deficit according to the following equation, rounding to the nearest tenth of a gram:

$$\text{Deficit} = \left[(\text{Emission level} - \text{Average standard})\right] \times \left[\sum_i (\text{Production})_i \times (\text{UL})_i\right]$$

§ 1051.725 What information must I retain?

(a) Maintain and keep five types of properly organized and indexed records for each group and for each emission family:

(1) Model year and EPA emission family.

(2) FEL.

(3) Useful life.

(4) Projected production volume for the model year.

(5) Actual production volume for the model year.

(b) Keep paper records of this information for three years from the due date for the end-of-year report. You may use any additional storage formats or media if you like.

(c) Follow § 1051.730 to send us the information you must keep.

(d) We may ask you to keep or send other information necessary to implement this subpart.

§ 1051.730 What information must I report?

(a) Include the following information in your applications for certification:

(1) A statement that, to the best of your belief, you will not have a negative credit balance for any type of recreational vehicle or engine when all credits are calculated. This means that if you believe that your average emission level will be above the standard (i.e., that you will have a deficit for the model year), you must have banked credits (or project to have traded credits) to offset the deficit.

(2) Detailed calculations of projected emission credits (zero, positive, or negative) based on production projections.

(i) If you project a credit deficit, state the source of credits needed to offset the credit deficit.

(ii) If you project credits, state whether you will reserve them for banking or transfer them.

(b) At the end of each model year, send an end-of-year report.

(1) Make sure your report includes three things:

(i) Calculate in detail your average emission level and any emission credits (zero, positive, or negative) based on actual production volumes.

(ii) If your average emission level is above the allowable average standard, state the source of credits needed to offset the credit deficit.

(iii) If your average emission level is below the allowable average standard, state whether you will reserve the credits for banking or transfer them.

(2) Base your production volumes on the point of first retail sale. This point is called the final product-purchase location.

(3) Send end-of-year reports to the Designated Officer within 120 days of the end of the model year. If you send reports later, you are violating the Clean Air Act.

(4) If you generate credits for banking and you do not send your end-of-year reports within 120 days after the end of the model year, you may not use or trade the credits until we receive and review your reports. You may not use projected credits pending our review.

(5) You may correct errors discovered in your end-of-year report, including errors in calculating credits according to the following table:

If . . .	And if . . .	Then we . . .
(i) Our review discovers an error in your end-of-year report that increases your credit balance.	the discovery occurs within 180 days of receipt.	restore the credits for your use.
(ii) You discover an error in your report that increases your credit balance.	the discovery occurs within 180 days of receipt.	restore the credits for your use.
(iii) We or you discover an error in your report that increases your credit balance.	the discovery occurs more than 180 days after receipt.	do not restore the credits for your use.
(iv) We discover an error in your report that reduces your credit balance.	at any time after your receipt	reduce your credit balance.

(6) If our review of a your end-of year-report shows a negative balance, you may buy credits to bring your credit balance to zero. But you must buy 1.1 credits for each 1.0 credit needed. If enough credits are not available to bring your credit balance to zero, we may void the certificates for all families certified to standards above the allowable average.

(c) Within 90 days of any credit trade or transfer, you must send the Designated Officer a report of the trade or transfer that includes three types of information:

(1) The corporate names of the buyer, seller, and any brokers.

(2) Information about the credits that depends on whether you trade or transfer them.

(i) For trades, describe the banked credits being traded.

(ii) For transfers, calculate the credits in detail and identify the source or use of the credits.

(3) Copies of contracts related to credit trading or transfer from the buyer, seller, and broker, as applicable.

(d) Include in each report a statement certifying the accuracy and authenticity of its contents.

(e) We may void a certificate of conformity for any emission family if you do not keep the records this section requires or give us the information when we ask for it.

Subpart I—Definitions and Other Reference Information

§ 1051.801 What definitions apply to this part?

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them. The definitions follow:

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 *et seq.*

Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation.

Aftertreatment means relating to any system, component, or technology mounted downstream of the exhaust valve or exhaust port whose design function is to reduce exhaust emissions.

All-terrain vehicle means a nonroad vehicle with three or more wheels and a seat, designed for operation over rough terrain and intended primarily for

transportation. This includes both land-based and amphibious vehicles.

Auxiliary emission-control device means any element of design that senses temperature, engine rpm, motive speed, transmission gear, atmospheric pressure, manifold pressure or vacuum, or any other parameter to activate, modulate, delay, or deactivate the operation of any part of the emission-control system. This also includes any other feature that causes in-use emissions to be higher than those measured under test conditions, except as we allow under this part.

Broker means any entity that facilitates a trade of emission credits between a buyer and seller.

Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

Certification means obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

Crankcase emissions means airborne substances emitted to the atmosphere from any part of the engine crankcase's ventilation or lubrication systems. The crankcase is the housing for the crankshaft and other related internal parts.

Designated Officer means the Manager, Engine Compliance Programs Group (6403–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated emissions from a vehicle.

Emission-data vehicle means a vehicle or engine that is tested for certification.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emissions deterioration.

Engine family means a group of vehicles with similar emission characteristics, as specified in § 1051.230.

Fuel system means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

Good engineering judgment has the meaning we give it in § 1068.5 of this chapter.

Hydrocarbon (HC) means the hydrocarbon group on which the emission standards are based for each fuel type. For gasoline- and LPG-fueled engines, HC means total hydrocarbon (THC). For natural gas-fueled engines, HC means nonmethane hydrocarbon (NMHC). For alcohol-fueled engines, HC means total hydrocarbon equivalent (THCE).

Identification number means a unique specification (for example, model number/serial number combination) that allows someone to distinguish a particular vehicle or engine from other similar vehicle or engines.

Manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures a vehicle or engine for sale in the United States or otherwise introduces a new vehicle or engine into commerce in the United States. This includes importers.

Maximum test torque means the torque output observed with the maximum fueling rate possible at a given speed.

Model year means one of the following things:

(1) For freshly manufactured vehicles or engines (see definition of ''new'' paragraph (1)), model year means one of the following:

(i) Calendar year.

(ii) Your annual new model production period if it is different than the calendar year. This must include January 1 of the calendar year for which the model year is named. It may not begin before January 2 of the previous calendar year and it must end by December 31 of the named calendar year.

(2) For a vehicle or engine that is converted to a nonroad vehicle or engine after being placed into service in a motor vehicle, model year means the calendar year in which the vehicle or engine was originally produced (see definition of ''new'' paragraph (2)).

(3) For a nonroad vehicle excluded under § 1051.5 that is later converted to operate in an application that is not excluded, model year means the calendar year in which the vehicle was originally produced (see definition of ''new'' paragraph (3)).

(4) For engines that are not freshly manufactured but are installed in new nonroad vehicle, model year means the calendar year in which the engine is installed in the new nonroad vehicle (see definition of ''new'' paragraph (4)).

(5) For a vehicle or engine modified by an importer (not the original manufacturer) who has a certificate of conformity for the imported vehicle or engine (see definition of ''new'' paragraph (5)), model year means one of the following:

(i) The calendar year in which the importer finishes modifying and labeling the vehicle or engine.

(ii) Your annual production period for producing vehicles or engines if it is different than the calendar year; follow the guidelines in paragraph (1)(ii) of this definition.

(6) For a vehicle or engine you import that does not meet the criteria in paragraphs (1) through (5) of the definition of ''new'' model year means the calendar year in which the manufacturer completed the original assembly of the vehicle or engine. In general, this applies to used equipment that you import without conversion or major modification.

Motor vehicle has the meaning we give in § 85.1703(a) of this chapter. In general, *motor vehicle* means a self-propelled vehicle that can transport one or more people or any material, but does not include any of the following:

(1) Vehicles having a maximum ground speed over level, paved surfaces no higher than 40 km per hour (25 miles per hour).

(2) Vehicles that lack features usually needed for safe, practical use on streets or highways—for example, safety features required by law, a reverse gear (except for motorcycles), or a differential.

(3) Vehicles whose operation on streets or highways would be unsafe, impractical, or highly unlikely. Examples are vehicles with tracks instead of wheels, very large size, or features associated with military vehicles, such as armor or weaponry.

New means relating to any of the following vehicles or engines:

(1) A freshly manufactured engine or vehicle for which the ultimate buyer has never received the equitable or legal title. The vehicle or engine is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.

(2) An engine originally manufactured as a motor vehicle engine that is later intended to be used in a piece of nonroad equipment. The engine is no longer new when it is placed into nonroad service.

(3) A nonroad engine that has been previously placed into service in an application we exclude under § 1051.5, where that engine is installed in a piece of equipment for which these exclusions do not apply. The engine is no longer new when it is placed into nonroad service.

(4) An engine not covered by paragraphs (1) through (3) of this definition that is intended to be installed in new nonroad equipment. The engine is no longer new when the ultimate buyer receives a title for the equipment or the product is placed into service, whichever comes first.

(5) An imported nonroad vehicle or engine covered by a certificate of conformity issued under this part, where someone other than the original manufacturer modifies the vehicle or engine after its initial assembly and holds the certificate. The vehicle or engine is no longer new when it is placed into nonroad service.

(6) An imported nonroad vehicle or engine that is not covered by a certificate of conformity issued under this part at the time of importation.

New nonroad equipment means either of the following things:

(1) A nonroad vehicle or other piece of equipment for which the ultimate buyer has never received the equitable or legal title. The product is no longer new when the ultimate buyer receives this title or the product is placed into service, whichever comes first.

(2) An imported nonroad piece of equipment with a vehicle or engine not covered by a certificate of conformity issued under this part at the time of importation and manufactured after the date for applying the requirements of this part.

Noncompliant vehicle or engine means a vehicle or engine that was originally covered by a certificate of conformity, but is not in the certified configuration or otherwise does not comply with the conditions of the certificate.

Nonconforming vehicle or engine means a vehicle or engine not covered by a certificate of conformity that would otherwise be subject to emission standards.

Nonmethane hydrocarbon means the difference between the emitted mass of total hydrocarbons and the emitted mass of methane.

Nonroad means relating to nonroad vehicle or engines.

Nonroad engine has the meaning given in § 1068.25 of this chapter. In general this means all internal-combustion engines except motor vehicle engines, stationary engines, or engines used solely for competition. This part only applies to nonroad engines that are used in snowmobiles, off-highway motorcycles, and ATVs (see § 1051.5).

Off-highway motorcycle means a two-wheeled vehicle with a nonroad engine and a seat (excluding marine vessels and aircraft). Note: highway motorcycles are regulated under 40 CFR part 86.

Oxides of nitrogen means nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO_2 (assume a molecular weight for oxides of nitrogen equivalent to that of NO_2).

Phase 1 means relating to Phase 1 standards of § 1051.101 or § 1051.103.

Phase 2 means relating to Phase 2 standards of § 1051.101 or § 1051.103.

Physically adjustable range means the entire range over which an engine parameter can be adjusted, except as modified by § 1051.115(c).

Placed into service means used for its intended purpose.

Recreational means, for purposes of this part, relating to snowmobiles, all-terrain vehicles, and off-highway motorcycles we regulate under this part. Note that 40 CFR part 90 applies to other recreational vehicles.

Revoke means to discontinue the certificate for an engine family. If we revoke a certificate, you must apply for a new certificate before continuing to produce the affected vehicles or engines. This does not apply to vehicles or engines you no longer possess.

Round means to round numbers according to ASTM E29–93a, which is incorporated by reference (see § 1051.810), unless otherwise specified.

Scheduled maintenance means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems that is periodically needed to keep a part from failing or malfunctioning. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

Small-volume manufacturer means:

(1) For motorcycles and ATVs, a manufacturer with U.S.-directed production of fewer than 5,000 off-road motorcycles and ATVs (combined number) in 2001. For manufacturers owned by a parent company, the limit applies to the production of the parent company and all of its subsidiaries.

(2) For snowmobiles, a manufacturer with annual U.S. directed production of fewer than 300 snowmobiles in 2001. For manufacturers owned by a parent company, the limit applies to the production of the parent company and all of its subsidiaries.

Snowmobile means a vehicle designed to operate outdoors only over snow-covered ground, with a maximum width of 1.5 meters or less.

Spark-ignition means relating to a type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark-ignition engines usually use a throttle to regulate intake air flow to control power during normal operation.

Stoichiometry means the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

Suspend means to temporarily discontinue the certificate for an engine family. If we suspend a certificate, you may not sell vehicles or engines from that engine family unless we reinstate the certificate or approve a new one.

Test sample means the collection of vehicles or engines selected from the population of an engine family for emission testing.

Test vehicle or engine means a vehicle or engine in a test sample.

Total hydrocarbon means the combined mass organic compounds measured by our total hydrocarbon test procedure, expressed as a hydrocarbon with a hydrogen-to-carbon mass ratio of 1.85:1.

Total hydrocarbon equivalent means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as petroleum-fueled engine hydrocarbons. The hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

Ultimate buyer means ultimate purchaser.

Ultimate purchaser means, with respect to any new vehicle or engine, the first person who in good faith purchases such vehicle or engine for purposes other than resale.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

U.S.-directed production means the number of vehicle units, subject to the requirements of this part, produced by a manufacturer (and/or imported) for which the manufacturer has a reasonable assurance that sale was or will be made to ultimate buyers in the Unites States.

Useful life means the period during which the vehicle is designed to properly function in terms of reliability and fuel consumption, without being remanufactured, specified as a number of hours of operation or calendar years.

It is the period during which a new vehicle is required to comply with all applicable emission standards.

Void means to invalidate a certificate or an exemption. If we void a certificate, all the vehicles produced under that engine family for that model year are considered noncompliant, and you are liable for each vehicle produced under the certificate and may face civil or criminal penalties or both. If we void an exemption, all the vehicles produced under that exemption are considered uncertified (or nonconforming), and you are liable for each vehicle produced under the exemption and may face civil or criminal penalties or both. You may not produce any additional vehicles using the voided exemption.

§ 1051.805 What symbols, acronyms, and abbreviations does this part use?

The following symbols, acronyms, and abbreviations apply to this part:

°C degrees Celsius.
ASTM American Society for Testing and Materials.
ATV all-terrain vehicle.
cc cubic centimeters.
CO carbon monoxide.
CO_2 carbon dioxide.
EPA Environmental Protection Agency.
g/kW-hr grams per kilowatt-hour.
LPG liquefied petroleum gas.
m meters.
mm Hg millimeters of mercury.
NMHC nonmethane hydrocarbons.
NO_X oxides of nitrogen (NO and NO_2).
rpm revolutions per minute.
SAE Society of Automotive Engineers.
SI spark-ignition.
THC total hydrocarbon.
THCE total hydrocarbon equivalent.
U.S.C. United States Code.

§ 1051.810 What materials does this part reference?

We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at U.S. EPA, OAR, Air and Radiation Docket and Information Center, 401 M Street, SW., Washington, DC 20460 or Office of the Federal Register, 800 N. Capitol St., NW., 7th Floor, Suite 700, Washington, DC.

(a) *ASTM material.* Table 1 of § 1051.810 lists material from the American Society for Testing and Materials that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the sections of this part where we reference it. The second column is for information only and may not include all locations. Anyone may receive copies of these materials from American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103. Table 1 follows:

TABLE 1 OF § 1051.810.—ASTM MATERIALS

Document No. and name	Part 1051 reference
ASTM E29–93a, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.	1051.240, 1051.315, 1051.345, 1051.410, 1051.415.

(b) *ISO material.* [Reserved]

§ 1051.815 How should I request EPA to keep my information confidential?

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in § 2.204 of this chapter.

§ 1051.820 How do I request a public hearing?

(a) File a request for a hearing with the Designated Officer within 15 days of a decision to deny, suspend, revoke, or void your certificate. If you ask later, we may give you a hearing for good cause, but we do not have to.

(b) Include the following in your request for a public hearing:

(1) State which engine family is involved.

(2) State the issues you intend to raise. We may limit these issues, as described elsewhere in this part.

(3) Summarize the evidence supporting your position and state why you believe this evidence justifies granting or reinstating the certificate.

(c) We will hold the hearing as described in 40 CFR part 1068, subpart F.

PART 1065—TEST PROCEDURES AND EQUIPMENT

Subpart A—Applicability and General Provisions

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Subpart G—Data Analysis and Calculations

1065.601 Overview.
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Subpart H—Particulate Measurements [Reserved]

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Subpart J—Field Testing

1065.901 Applicability.
1065.905 General provisions.
1065.910 Measurement accuracy and precision.
1065.915 Equipment specifications for SI engines.

Authority: 42 U.S.C. 7401–7671(q).

Subpart A—Applicability and General Provisions

§ 1065.1 Applicability.

(a) This part describes the procedures that apply to testing that we require for the following engines or for equipment using the following engines:

(1) Large nonroad spark-ignition engines we regulate under 40 CFR part 1048.

(2) Snowmobiles, all-terrain vehicles, and off-highway motorcycles we regulate under 40 CFR part 1051.

(b) This part does not apply to any of the following engine or vehicle categories:

(1) Light-duty highway vehicles (see 40 CFR part 86).

(2) Heavy-duty highway Otto-cycle engines (see 40 CFR part 86).

(3) Heavy-duty highway diesel engines (see 40 CFR part 86).

(4) Aircraft engines (see 40 CFR part 87).

(5) Locomotive engines (see 40 CFR part 92).

(6) Land-based nonroad diesel engines (see 40 CFR part 89).

(7) General marine engines (see 40 CFR parts 89 and 94).

(8) Marine outboard and personal watercraft engines (see 40 CFR part 91).

(9) Small nonroad spark-ignition engines (see 40 CFR part 90).

(c) This part is addressed to you as an engine manufacturer, but it applies equally to anyone who does testing for you, and to us when we conduct testing to determine if you comply with the applicable emission standards.

(d) Follow the provisions of the standard-setting part if they are different than any of the provisions in this part.

(e) For equipment subject to this part and regulated under equipment-based standards, interpret the term ''engine'' in this part to include equipment (see 40 CFR 1068.25).

§ 1065.5 Overview of test procedures.

(a) Some of the provisions of this part do not apply to all types of engines. For example, measurement of particulate matter is not generally required for spark-ignition engines. See the standard-setting part to determine which provisions in this part may not apply. Before using the procedures in this part, you should see the standard-setting part to answer at least the following questions:

(1) How should I warm up the test engine before measuring emissions? Do I need to measure cold-start emissions during this warm-up segment of the duty cycle?

(2) Do I need to measure emissions while the hot-stabilized engine operates over a transient schedule?

(3) Which speed and load points should I include for the steady-state segment of the duty cycle?

(4) Which exhaust constituents do I need to measure?

(5) Are there applicable emission standards that affect the limits on engine operation and ambient conditions?

(6) Do emission standards apply to field testing under normal operation?

(7) Does testing require full-flow dilute sampling? Is raw sampling acceptable? Is partial-flow dilute sampling acceptable?

(8) Do any unique specifications apply for test fuels?

(9) What maintenance steps may I plan to do before or between tests on an emission-data engine?

(10) Are there any unique requirements related to stabilizing emission levels on a new engine?

(11) Are there any unique requirements related to testing conditions, such as ambient temperatures or pressures?

(b) The following table shows how this part divides testing specifications into subparts:

Subpart . . .	This subpart describes . . .
Subpart A	General provisions for test procedures.
Subpart B	Equipment for performing tests.
Subpart C	Fuels and analytical gases for performing the tests.
Subpart D	How to calibrate test equipment.
Subpart E	How to prepare engines for testing, including service accumulation.
Subpart F	How to do an emission test.
Subpart G	How to calculate emission levels from measured data.
Subpart H	How to measure particulate emissions.
Subpart I	How to measure emissions from engines fueled with an oxygenated fuel such as methanol or ethanol.
Subpart J	How to do field testing of in-use vehicles and equipment.
Subpart K	Definitions, abbreviations, and other reference information that applies to emission testing.

§ 1065.10 Other test procedures.

(a) *Your testing.* These test procedures apply for all testing that you do to show compliance with emission standards, with a few exceptions listed in this section.

(b) *Our testing.* These test procedures generally apply for testing that we do to determine if your engines comply with applicable emission standards. We may conduct other testing as allowed by the Act.

(c) *Exceptions.* You may be allowed or required to use test procedures other than those specified in this part in the following cases:

(1) The test procedures in this part are intended to produce emission measurements equivalent to those that would result from measuring emissions during in-use operation using the same engine configuration installed in a piece of equipment. If good engineering judgment indicates that use of the procedures in this part for an engine would result in measurements that are not representative of in-use operation of that engine, you must notify us. If we determine that using these procedures would result in measurements that are significantly unrepresentative and that changes to the procedures will result in more representative measurements that do not decrease the stringency of emission standards, we will specify changes to the procedures. In your notification to us, you should recommend specific changes you think are necessary.

(2) You may ask to use emission data collected using other test procedures, such as those of the California Air Resources Board or the International Organization for Standardization. We will allow this only if you show us that these data are equivalent to data collected using our test procedures.

(3) You may ask to use alternate procedures that produce measurements equivalent to those obtained using the specified procedures. In this case, send us a written request showing that your alternate procedures are equivalent to the test procedures of this part. If you prove to us that the procedures are equivalent, we will allow you to use them. You may not use alternate procedures until we approve them. (Note: We may issue broad approval to all manufacturers for a specific change in the test procedures that allows you to use the alternate procedure without additional approval.)

(4) You may ask to use special test procedures if your engine cannot be tested using the specified test procedures (for example, it is incapable of operating on the specified transient cycle). In this case, send us a written request showing that you cannot satisfactorily test your engines using the test procedures of this part. We will allow you to use special test procedures if we determine that they would produce emission measurements that are representative of those that would result from measuring emissions during in-use operation. You may not use special procedures until we approve them.

(5) Other parts in this chapter (i.e., the parts that define emission standards for your engines) may contain other specifications for test procedures that apply for your engines. In cases where it is not possible to comply with both the test procedures in those parts and the test procedures in this part, you must comply with the test procedures specified in the standard-setting part. Those other parts may also allow you to deviate from the test procedures of this part for other reasons.

§ 1065.15 Engine testing.

(a) This part describes the procedures for performing exhaust emission tests on engines that must meet emission standards.

(b) Testing generally consists of engine operation on a laboratory dynamometer over a prescribed sequence. (Subpart J of this part contains provisions for in-use testing of engines installed in vehicles or equipment.) You need to sample and analyze the exhaust gases generated during engine operation to determine the concentration of the regulated pollutants.

(c) Concentrations are converted into units of grams of pollutant per kilowatt-hour (g/kW-hr) for comparison with the emission standards that apply.

§ 1065.20 Limits for test conditions.

(a) Unless specified elsewhere in this chapter, you may conduct tests to determine compliance with duty-cycle emission standards at ambient temperatures from 20° C (68° F) to 30° C (86° F), ambient pressures from 600 mm Hg to 775 mm Hg, and at any ambient humidity level.

(b) Testing conducted to determine compliance with not-to-exceed standards may be conducted at ambient conditions specified in the standard-setting part.

(c) For laboratory engine testing, you may heat and/or dehumidify the dilution air before it enters the CVS.

(d) For laboratory engine testing, if the barometric pressure observed during the generation of the maximum torque curve changes by more than 25 mm Hg from the value measured at the beginning of the map, you must remap the engine. To have a valid test, the average barometric pressure observed during the exhaust emission test must be within 25 mm Hg of the average observed during the maximum torque curve generation.

Subpart B—Equipment and Analyzers

§ 1065.101 Overview. [Reserved]

§ 1065.105 Dynamometer and engine equipment specifications.

(a) The engine dynamometer system must be capable of controlling engine torque and rpm simultaneously over the applicable test cycle(s). The system should be capable of following the torque and rpm schedules within the accuracy requirements specified in § 1065.530; dynamometers that are not capable of meeting the accuracy requirements specified in § 1065.530 may be used only with advance approval. For transient testing, engine torque and rpm command set points must be issued at 5 Hz or greater (10 Hz recommended) during the tests. Feedback engine torque and rpm must be recorded at least once every second during the test. In addition to these general requirements, for all testing, the engine or dynamometer readout signals for speed and torque must meet the following accuracy specifications:

(1) Engine speed readout must be accurate to within ±2 percent of the absolute standard value. A 60-tooth (or greater) wheel in combination with a common mode rejection frequency counter is considered an absolute standard for engine or dynamometer speed.

(2) Engine flywheel torque readout must be accurate to either within ±3 percent of the NIST true value torque (as defined in § 1065.305), or the following accuracies:

If the full-scale torque value is . . .	Engine flywheel torque readout must be within . . .
T ≤ 550 ft-lbs	±2.5 ft-lbs of NIST true value.
550 < T ≤ 1050 ft-lbs	±5.0 ft-lbs of NIST true value.
T > 1050 ft-lbs	±10.0 ft-lbs of NIST true value.

(3) Option: You may use internal dynamometer signals (i.e., armature current, etc.) for torque measurement, as long as you can show that the engine flywheel torque during the test cycle conforms to the accuracy specifications in paragraph (b)(2) of this section. Your measurement system must include compensation for increased or decreased flywheel torque due to the armature inertia during accelerations and decelerations in the test cycle.

(b) To verify that the test engine has followed the test cycle correctly, you must collect the dynamometer or engine readout signals for speed and torque in a manner that allows a statistical correlation between the actual engine performance and the test cycle (see § 1065.530). Normally this collection process would involve conversion of analog dynamometer or engine signals into digital values for storage in a computer. You must perform the conversion of dynamometer or engine values (computer or other) that are used to evaluate the validity of engine performance in relation to the test cycle while meeting the following criteria:

(1) Speed values used for cycle evaluation are accurate to within 2 percent of the dynamometer or engine speed readout value.

(2) Engine flywheel torque values used for cycle evaluation are accurate to

within 2 percent of the dynamometer or engine flywheel torque readout value.

(c) Option: For some systems it may be more convenient to combine the tolerances in paragraphs (a) and (b) of this section. You may do this if you use the root mean square method (RMS). The RMS values would then refer to accuracy in relationship to absolute standard or to NIST true values.

(1) Speed values used for cycle evaluation must be accurate to within ±2.8 percent of the absolute standard values, as defined in paragraph (a)(1) of this section.

(2) Engine flywheel torque values used for cycle evaluation must be accurate to within ±3.6 percent of NIST true values, as determined in § 1065.305.

§ 1065.110 Exhaust gas sampling system; spark-ignition (SI) engines.

(a) *General.* The exhaust gas sampling system described in this section is designed to measure the true mass of gaseous emissions in the exhaust of SI engines. Additional requirements apply for engines that use oxygenated fuels. In the CVS concept of measuring mass emissions, you must measure the total volume of the mixture of exhaust and dilution air and collect a continuously proportioned volume of sample for analysis. Determine the mass emissions from the sample concentration and total flow over the test period.

(b) *Critical flow venturi.* The operation of the Critical Flow Venturi Constant-Volume Sampler (CFV–CVS) (see Figure B110–1) is based upon the principles of fluid dynamics associated with critical flow. The CFV system is commonly called a constant-volume system (CVS) even though the flow varies. It would be more proper to call the critical flow venturi (CFV) system a constant-proportion sampling system, since proportional sampling throughout temperature excursions is maintained by use of a small CFV in the sample lines. The variable mixture flow rate is maintained at choked flow, which is inversely proportional to the square root of the gas temperature, and is computed continuously. Since the pressure and temperature are the same at all venturi inlets, the sample volume is proportional to the total volume.

(c) *Configuration variations.* Since various configurations can produce equivalent results, you need not conform exactly to the drawings in this subpart. You may use additional components such as instruments, valves, solenoids, pumps and switches to provide additional information and coordinate the functions of the component systems. You may exclude other components such as snubbers, which are not needed to maintain accuracy on some systems, if you exclude them based upon good engineering judgment.

(d) *CFV component description.* The CFV sample system shown in Figure B110–1 consists of a dilution air filter (optional) and mixing assembly, cyclone particulate separator (optional), unheated sampling venturies for the bag sample, critical flow venturi, and associated valves, pressure and temperature sensors. With the exception of the hydrocarbon sampling system for two-stroke engines, the temperature of the sample lines must be more than 3° C above the maximum dew point of the mixture and less than 121° C; it is recommended that you maintain them at 113 ± 8° C. For the hydrocarbon sampling system with two-stroke engines, the temperature of the sample lines must be more than 3° C above the maximum dew point of the mixture (water and/or HC) and less than 200 °C; it is recommended that you maintain them at 190 ± 8° C). The CFV sample system must conform to the following requirements:

(1) Do not artificially lower exhaust system backpressure by the CVS or dilution air inlet system. Make the measurements to verify this in the raw exhaust immediately upstream of the inlet to the CVS. This verification requires the continuous measurement and comparison of raw exhaust static pressure observed during a transient cycle, both with and without the operating CVS. Static pressure measured with the operating CVS system must remain within ±5 inches of water (1.2 kPa) of the static pressure measured without connection to the CVS, at identical moments in the test cycle. (We will use sampling systems capable of maintaining the static pressure to within ±1 inch of water (0.25 kPa) if a written request shows that this closer tolerance is necessary.) This requirement serves as a design specification for the CVS/dilution air inlet system, and should be performed as often as good engineering practice dictates (for example, after installation of an uncharacterized CVS, addition of an unknown inlet restriction on the dilution air, etc.).

(2) The temperature measuring system (sensors and readout) must have an accuracy and precision of ±3.4° F (±1.9° C). The temperature measuring system used in a CVS without a heat exchanger must have a response time of 1.50 seconds to 62.5 percent of a temperature change (as measured in hot silicone oil). There is no response time requirement for a CVS equipped with a heat exchanger.

(3) The pressure measuring system (sensors and readout) must have an accuracy and precision of ±3 mm Hg (0.4 kPa).

(4) The flow capacity of the CVS must be large enough to eliminate water condensation in the system. You may dehumidify the dilution air before it enters the CVS. Heating is also allowed under the following conditions:

(i) The air (or air plus exhaust gas) temperature does not exceed 250° F (121° C).

(ii) Calculation of the CVS flow rate necessary to prevent water condensation is based on the lowest temperature encountered in the CVS prior to sampling. (It is recommended that the CVS system be insulated when heated dilution air is used.)

(iii) The dilution ratio is sufficiently high to prevent condensation in bag samples as they cool to room temperature.

(5) Sample collection bags for dilution air and exhaust samples must be big enough to allow unimpeded sample flow.

(e) *EFC–CFV component description.* The EFC–CFV sample system is identical to the CFV system described in paragraph (b) of this section, with the addition of electronic flow controllers, metering valves, and separate flow meters to totalize sample flow volumes (optional). The EFC sample system must conform to the following requirements:

(1) All of the requirements of paragraph (b) of this section.

(2) The ratio of sample flow to CVS flow must not vary by more ±5 percent from the setpoint of the test.

(3) The sample flow totalizers must meet the accuracy specifications of § 1065.145. You may obtain total sample flow volumes from the flow controllers, with advance approval from us, as long as you can show that they meet the accuracy specifications of § 1065.145.

(f) *Component description, PDP–CFV.* The PDP–CFV sample system is identical to the CFV system described in paragraph (b) of this section with the following changes and additional requirements:

(1) A heat exchanger is required.

(2) You must use positive displacement pumps for the CVS flow and for the sampling system flows.

(3) The gas mixture temperature, measured at a point immediately ahead of the positive displacement pump and after the heat exchanger, must be maintained within ±10° F (±5.6° C) of the average operating temperature observed during the test. (The average operating temperature may be estimated from the average operating temperature from similar tests.) The temperature

measuring system (sensors and readout) must have an accuracy and precision of ±3.4° F (1.9° C). There is no response time requirement for a CVS equipped with a heat exchanger.

§ 1065.115 Exhaust gas sampling system; compression-ignition (CI) engines. [Reserved]

§ 1065.120 Analyzers (overview/general response characteristics).

(a) *General.* The specifications for analyzers and analytical equipment are described in the following sections and subparts:

(1) The analyzers for measuring hydrocarbon, NO_X, CO, and CO_2 emission concentrations are specified in § 1065.125 through § 1065.135 of this chapter.

(2) The analytical equipment for measuring particulate emissions is specified in Subpart H of this part.

(3) The analytical equipment for measuring emissions of oxygenated compounds (for example, methanol) is specified in Subpart I of this part.

(4) The analytical equipment for measuring in-use emissions is specified in Subpart J of this part.

(b) *Response time.* Analyzers must have the following response characteristics:

(1) For steady-state testing and transient testing with bag sample analysis, the analyzer must reach at least 90 percent of its final response within 5.0 seconds after any step change to the input concentration greater than or equal to 80 percent of full scale.

(2) For transient testing with continuous measurement, the analyzer must reach at least 90 percent of its final response within 1.0 second after any step change to the input concentration greater than or equal to 80 percent of full scale.

(c) *Precision and noise.* (1) The precision of the analyzers must be no worse than ±1 percent of full-scale concentration for each range used above 155 ppm (or ppmC), or ±2 percent for each range used below 155 ppm (or ppmC). For the purpose of this paragraph, precision is defined as 2.5 times the standard deviation(s) of 10 repetitive responses to a given calibration or span gas.

(2) The analyzer peak-to-peak response to zero and calibration or span gases over any 10-second period shall not exceed 2 percent of full/scale chart deflection on all ranges used.

(d) *Drift.* (1) The zero-response drift during a 1-hour period shall be less than 2 percent of full-scale chart deflection on the lowest range used. The zero-response is defined as the mean response including noise to a zero-gas during a 30-second time interval.

(2) The span drift during a 1-hour period shall be less than 2 percent of full-scale chart deflection on the lowest range used. The analyzer span is defined as the difference between the span-response and the zero-response. The span-response is defined as the mean response including noise to a span gas during a 30-second time interval.

(e) *Calibration.* Calibration procedures for analyzers are specified in subpart D of this part.

§ 1065.125 Hydrocarbon analyzers.

This section describes the requirements for flame ionization detectors (FIDs).

(a) Fuel the FID with a mixture of hydrogen in helium, and calibrate it using propane.

(b) You do not need to heat the FID for four-stroke SI engines. Heated FIDs are required for two-stroke SI engines. If you use a heated FID, you must keep the temperature below 200° C.

(c) An overflow sampling system is required for heated continuous FIDs. (An overflow system is one in which excess zero gas or span gas spills out of the probe when zero or span checks of the analyzer are made.)

(d) Premixing the FID fuel and burner air is not allowed.

(e) The FID must meet the applicable accuracy and precision specifications of ISO 8178, which is incorporated by reference (see § 1065.1010).

§ 1065.130 NO_X analyzers.

This section describes the requirements for chemiluminescent detectors (CLD).

(a) The CLD must meet the applicable accuracy and precision specifications of ISO 8178, which is incorporated by reference (see § 1065.1010).

(b) The NO to NO_2 converter must have an efficiency of at least 90 percent.

(c) Heated CLDs are not required for SI engine testing.

(d) An overflow sampling system is required for continuous CLDs. (An overflow system is one in which excess zero gas or span gas spills out of the probe when zero or span checks of the analyzer are made.)

§ 1065.135 CO and CO_2 analyzers.

This section describes the requirements for non-dispersive infrared absorption detectors (NDIR).

(a) The NDIR must meet the applicable accuracy and precision specifications of ISO 8178, which is incorporated by reference (see § 1065.1010).

(b) The NDIR must meet the applicable quench and interference requirements of ISO 8178, which is incorporated by reference (see § 1065.1010).

§ 1065.140 Smoke meters. [Reserved]

§ 1065.145 Flow meters.

(a) Flow meters must have accuracy and precision of ±2 percent of point or better, and be traceable to NIST standards.

(b) Flow measurements may be corrected for temperature and/or pressure, provided the temperature and pressure measurements have accuracy and precision of ±2 percent of point or better (absolute).

Subpart C—Test Fuels and Analytical Gases

§ 1065.201 General requirements for test fuels.

(a) For all emission tests, use test fuels meeting the specifications in this subpart, unless the standard-setting part gives other directions. For any service accumulation on a test engine, if we do not specify a fuel, use the specified test fuel or a fuel typical of what you would expect the engine to use in service.

(b) We may require you to test the engine with each type of fuel it can use (for example, gasoline and natural gas).

(c) If you will produce engines that can run on a type of fuel (or mixture of fuels) we do not specify in this subpart, we will allow you to do testing with fuel that represents commercially available fuels of that type. However, we must approve your fuel's specifications before you may use it for emission testing.

(d) You may use a test fuel other than those we specify in this subpart if you do all of the following:

(1) Show that it is commercially available.

(2) Show that your engines will use only the designated fuel in service.

(3) Show that operating the engines on the fuel we specify would increase emissions or decrease durability.

(4) Get our written approval before you start testing.

(e) The test fuel specifications rely on standards established by the American Society for Testing and Methods, which have been incorporated by reference in § 1065.1010.

§ 1065.205 Test fuel specifications for distillate diesel fuel. [Reserved]

§ 1065.210 Test fuel specifications for gasoline.

Gasoline test fuel must meet the specifications in Table 1 of § 1065.210, as follows:

TABLE 1 OF § 1065.210.—GASOLINE TEST FUEL SPECIFICATIONS

Item	Procedure	Value
Distillation Range:		
1. Initial boiling point, °C	ASTM D 86–97	23.9–35.0[2]
2. 10% point, °C	ASTM D 86–97	48.9–57.2
3. 50% point, °C	ASTM D 86–97	93.3–110.0
4. 90% point, °C	ASTM D 86–97	148.9–162.8
5. End point, °C	ASTM D 86–97	212.8
Hydrocarbon composition:		
1. Olefins, volume %	ASTM D 1319–98	10 maximum.
2. Aromatics, volume %	ASTM D 1319–98	35 minimum.
3. Saturates	ASTM D 1319–98	Remainder.
Lead (organic), g/liter	ASTM D 3237	0.013 maximum.
Phosphorous, g/liter	ASTM D 3231	0.005 maximum.
Sulfur, weight %	ASTM D 1266	0.08 maximum.
Volatility (Reid Vapor Pressure), kPa	ASTM D 3231	60.0 to 63.4[1 2]

[1] For testing unrelated to evaporative emissions, the specified range is 55.2 to 63.4 kPa.
[2] For testing at altitudes above 1219 m, the specified volatility range is 52 to 55 kPa and the specified initial boiling point range is 23.9° to 40.6° C.

§ 1065.215 Test fuel specifications for natural gas.

(a) Natural gas test fuel must meet the specifications in Table 1 of § 1065.215, as follows:

TABLE 1 OF § 1065.215.—NATURAL GAS TEST FUEL SPECIFICATIONS

Item	Procedure	Value (mole percent)
1. Methane	ASTM D 1945	89.0 minimum.
2. Ethane	ASTM D 1945	4.5 maximum.
3. C3 and higher	ASTM D 1945	2.3 maximum.
4. C6 and higher	ASTM D 1945	0.2 maximum.
5. Oxygen	ASTM D 1945	0.6 maximum.
6. Inert gases (sum of CO_2 and N_2)	ASTM D 1945	4.0 maximum.

(b) At ambient conditions, the fuel must have a distinctive odor detectable down to a concentration in air of not over one-fifth of the lower flammability limit.

§ 1065.220 Test fuel specifications for liquefied petroleum gas.

(a) Liquefied petroleum gas test fuel must meet the specifications in Table 1 of § 1065.220, as follows:

TABLE 1 OF § 1065.220.—LIQUEFIED PETROLEUM GAS TEST FUEL SPECIFICATIONS

Item	Procedure	Value
1. Propane	ASTM D 2163	85.0 vol. percent minimum.
2. Vapor pressure at 38° C	ASTM D 1267 or 2598[1]	14 bar maximum.
3. Volatility residue (evaporated temp., 35° C)	ASTM D 1837	−38° C maximum.
4. Butanes	ASTM D 2163	5.0 vol. percent maximum.
5. Butenes	ASTM D 2163	2.0 vol. percent maximum.
6. Pentenes and heavier	ASTM D 2163	0.5 vol. percent maximum.

TABLE 1 OF § 1065.220.—LIQUEFIED PETROLEUM GAS TEST FUEL SPECIFICATIONS—Continued

Item	Procedure	Value
7. Propene	ASTM D 2163	10.0 vol. percent maximum.
8. Residual matter (residue on evap. of 100 ml oil stain observ.).	ASTM D 2158	0.05 ml maximum pass.[2]
9. Corrosion, copper strip	ASTM D 1838	No. 1 maximum.
10. Sulfur	ASTM D 2784	80 ppm maximum.
11. Moisture content	ASTM D 2713	Pass.

[1] If these two test methods yield different results, use the results from ASTM D–1267.
[2] The test fuel must not yield a persistent oil ring when 0.3 ml of solvent residue mixture is added to a filter paper, in 0.1 ml increments and examined in daylight after 2 minutes (see ASTM D–2158).

(b) At ambient conditions, the fuel must have a distinctive odor detectable down to a concentration in air of not over one-fifth of the lower flammability limit.

§ 1065.240 Lubricating oils.

Lubricating oils that you use to comply with this part must be commercially available and representative of the oil that will be used with your in-use engines.

§ 1065.250 Analytical gases.

Analytical gases that you use to comply with this part must meet the accuracy and purity specifications of this section. You must record the expiration date specified by the gas supplier and may not use any gas after the expiration date.

(a) *Pure gases.* Use the ''pure gases'' in Table 1 of § 1065.250, as follows:

TABLE 1 OF § 1065.250—PURE GAS CONCENTRATIONS

Gas type	Maximum contaminant concentrations				Oxygen content
	Organic carbon	Carbon monoxide	Carbon dioxide	Nitric oxide (NO)	
Purified Nitrogen	1 ppmC	1 ppm	400 ppm	0.1 ppm	NA
Purified Oxygen	NA	NA	NA	NA	99.5–100.0%
Purified Synthetic Air, or Zero-Grade Air	1 ppmC	1 ppm	400 ppm	0.1 ppm	18–21%

(b) *FID Fuel.* For the flame ionization detector, use a hydrogen-helium mixture as the fuel. The mixture must contain 40 ± 2 percent hydrogen, and may contain no more than 1 ppmC of organic carbon or 400 ppm of CO_2.

(c) *Calibration and span gases.* The following provisions apply to calibration and span gases:

(1) Use the following gas mixtures for calibrating and spanning your analytical instruments:

(i) Propane in purified synthetic air;

(ii) CO in purified nitrogen;

(iii) NO and NO_2 in purified nitrogen (the amount of NO_2 contained in this calibration gas must not exceed 5 percent of the NO content);

(iv) Oxygen in purified nitrogen;

(v) CO_2 in purified nitrogen;

(vi) Methane in purified synthetic air.

(2) The calibration gases in paragraph (c)(1) of this section must be traceable to within one percent of NIST gas standards, or other gas standards we have approved. Span gases in paragraph (c)(1) of this section must be accurate to within two percent of true concentration, where true concentration refers to NIST gas standards, or other gas standards we have approved. All concentrations of calibration gas shall be given on a volume basis (volume percent or volume ppm).

(3) You may use gases for species other than those listed in paragraph (c)(1) of this section (such as methanol in air gases used for response factor determination), as long as they meet the following criteria:

(i) They are traceable to within ±2 percent of NIST gas standards, or other standards we have approved.

(ii) They remain within ±2 percent of the labeled concentration. Demonstrate this by using a quarterly measurement procedure with a precision of ±2 percent (two standard deviations), or other method that we approve. Your measurement procedure may incorporate multiple measurements. If the true concentration of the gas changes by more than two percent, but less than ten percent, you may relabel the gas with the new concentration.

(4) You may generate calibration and span gases using precision blending devices (gas dividers) to dilute gases with purified nitrogen or with purified synthetic air. The accuracy of the mixing device must be such that the concentration of the blended calibration gases is accurate to within ±1.5 percent. This accuracy implies that primary gases used for blending must be known to an accuracy of at least ±1 percent, traceable to NIST gas standards, or other gas standards we have approved. For each calibration incorporating a blending device, verify the blending accuracy between 15 and 50 percent of full scale. You may optionally check the blending device with an instrument that is linear by nature (for example, using NO gas with a CLD). Adjust the span value of the instrument with the span gas directly connected to the instrument. Check the blending device at the used settings to ensure that the difference between nominal values and measured concentrations at each point stays within ±0.5 percent of the nominal value.

(d) *Oxygen interference gases.* Oxygen interference check gases are mixtures of oxygen, nitrogen, and propane. The

oxygen concentration must be between 20 and 22 percent, and the propane concentration must be between 50 and 90 percent of the maximum value in the most typically used FID range. Independently measure the concentration of total hydrocarbons plus impurities by chromatographic analysis or by dynamic blending.

Subpart D—Analyzer and Equipment Calibrations

§ 1065.301 Overview.

Calibrate all analyzers and equipment at least annually. The actual frequency must be consistent with good engineering judgment. We may establish other guidelines as appropriate. Perform the calibrations according to the specifications of one of the following sources:

(a) The recommendations of the manufacturer of the analyzers or equipment.

(b) 40 CFR part 86, subpart N.

§ 1065.305 Torque calibration.

Two techniques are allowed for torque calibration. Alternate techniques may be used if shown to yield equivalent accuracies. The NIST ''true value'' torque is defined as the torque calculated by taking the product of an NIST traceable weight or force and a sufficiently accurate horizontal lever arm distance, corrected for the hanging torque of the lever arm.

(a) The lever-arm dead-weight technique involves the placement of known weights at a known horizontal distance from the center of rotation of the torque measuring device. The equipment required is:

(1) *Calibration weights.* A minimum of six calibration weights for each range of torque measuring device used are required. The weights must be approximately equally spaced and each must be traceable to NIST weights. Laboratories located in foreign countries may certify calibration weights to local government bureau standards. Certification of weight by state government Bureau of Weights and Measures is acceptable. Effects of changes in gravitational constant at the test site may be accounted for if desired.

(2) *Lever arm.* A lever arm with a minimum length of 24 inches is required. The horizontal distance from the centerline of the engine torque measurement device to the point of weight application shall be accurate to within ±0.10 inches. The arm must be balanced, or the hanging torque of the arm must be known to within ±0.1 ft-lbs.

(b) The transfer technique involves the calibration of a master load cell (i.e., dynamometer case load cell). This calibration can be done with known calibration weights at known horizontal distances, or by using a hydraulically actuated precalibrated master load cell. This calibration is then transferred to the flywheel torque measuring device. The technique involves the following steps:

(1) A master load cell shall be either precalibrated or be calibrated per paragraph (a)(1) of this section with known weights traceable to NIST, and used with the lever arm(s) specified in paragraph (b)(2) of this section. The dynamometer should be either running or vibrated during this calibration to minimize static hysteresis.

(2) A lever arm(s) with a minimum length of 24 inches is (are) required. The horizontal distances from the centerline of the master load cell, to the centerline of the dynamometer, and to the point of weight or force application shall be accurate to within ±0.10 inches. The arm(s) must be balanced or the net hanging torque of the arm(s) must be known to within ±0.1 ft.-lbs.

(3) Transfer of calibration from the case or master load cell to the flywheel torque measuring device shall be performed with the dynamometer operating at a constant speed. The flywheel torque measurement device readout shall be calibrated to the master load cell torque readout at a minimum of six loads approximately equally spaced across the full useful ranges of both measurement devices. (Note that good engineering practice requires that both devices have approximately equal useful ranges of torque measurement.) The transfer calibration shall be performed in a manner such that the accuracy requirements of § 1065.105(a)(2) for the flywheel torque measurement device readout be met or exceeded.

Subpart E—Engine Preparation and Service Accumulation

§ 1065.405 Preparing and servicing a test engine.

(a) If you are testing an emission-data engine for certification, make sure you have built it to represent production engines.

(b) Run the test engine, with all emission-control systems operating, long enough to stabilize emission levels. If you accumulate 50 hours of operation, you may consider emission levels stable without measurement.

(c) Do not service the test engine before you stabilize emission levels, unless we approve other maintenance in advance. This prohibition does not apply with respect to your recommended oil and filter changes for newly produced engines.

(d) Select engine operation for accumulating operating hours on your test engines to represent normal in-use engine operation for the engine family.

(e) If you need more than 50 hours to stabilize emission levels, record your reasons and the method you use to do this. Give us these records if we ask for them.

§ 1065.410 Service limits for stabilized test engines.

(a) After you stabilize the test engine's emission levels, you may do scheduled maintenance, other than during emission testing, as specified in the standard-setting part.

(b) You may not do any unscheduled maintenance to the test engine or its emission-control system or fuel system without our advance approval. Unscheduled maintenance includes any adjustment, repair, removal, disassembly, cleaning, or replacement of the test engine.

(1) We may approve unscheduled maintenance if all of the following occur:

(i) You determine that a part failure or system malfunction (or the associated repair) does not make the engine unrepresentative of production engines in the field and does not require anyone to access the combustion chamber.

(ii) Something clearly malfunctions (such as persistent misfire, engine stall, overheating, fluid leakage, or loss of oil pressure) and needs maintenance or repair.

(iii) You give us a chance to verify the extent of the malfunction through audible or visual signals before you do the maintenance.

(2) If we determine that a part's failure or a system's malfunction (or the associated repair) has made the engine unrepresentative of production engines, you may no longer use it as a test engine.

(3) You may not do unscheduled maintenance based on emission measurements from the test engine.

(4) Unless we approve beforehand, you may use equipment, instruments, or tools to identify bad engine components only if you specify they should be used for scheduled maintenance on production engines. In this case, you must also make them available at dealerships and other service outlets.

(c) If you do maintenance that might affect emissions, you must completely test systems for emissions before and after the maintenance unless we waive this requirement.

(d) If your test engine has a major mechanical failure that requires you to

take the engine apart, you may no longer use it as a test engine.

§ 1065.420 Durability demonstration.

Where durability testing is required by the standard-setting part, you must perform the service accumulation in a manner representative of the manner in which the engine is expected to be operated in use. However, you may accumulate service hours using an accelerated schedule (e.g., using continuous operation). The following specifications also apply:

(a) *Maintenance.* (1) You may perform scheduled maintenance that you recommend to operators, but only if it is consistent with any applicable allowable maintenance restrictions of the standard-setting part.

(2) You may performed additional maintenance only if we approve it in advance, as specified in § 1065.410(b).

(3) If your test engine has a major mechanical failure that requires you to take the engine apart, you may no longer use it as a test engine.

(b) *Emission measurements.* (1) Emission testing to determine deterioration factors must be consistent with good engineering judgment and must be spaced evenly throughout the durability period.

(2) Emission tests must be performed according to the provisions of this part and the applicable provisions of the standard-setting part.

Subpart F—Running an Emission Test

§ 1065.500 Overview of the engine dynamometer test procedures.

(a) The engine dynamometer test procedure measures the brake-specific emissions of hydrocarbons (total and nonmethane, as applicable), carbon monoxide, and oxides of nitrogen. To perform this test procedure, you first dilute exhaust emissions with ambient air and collect a continuous proportional sample for analysis, then analyze the composite samples (either in bags after the test or continuously during the test). The general test procedure consists of a test cycle made of one or more segments; check the standard-setting part for specific cycles. The segments are:

(1) Either a cold-start cycle (where emissions are measured) or a warm-up cycle (where emissions are not measured).

(2) A hot-start transient test (some test cycles may omit engine starting from the ''hot-start'' cycle).

(3) A steady-state test.

(b) Power is measured using the torque and rpm feedback signals from the dynamometer. This produces a brake kilowatt-hour value that leads to a calculation of brake-specific emissions (see Subpart G of this part).

(c) Prepare engines for testing according to the following provisions:

(1) When you test an engine or operate it for service accumulation, you need to use the complete engine, with all emission-control devices installed and functioning.

(2) For air-cooled engines, the fan must be installed.

(3) You may install additional accessories (for example, oil cooler, alternators, air compressors, etc.) or simulate their loading if they are typical of in-use operation. This loading must be applied during all testing operations, including mapping.

(4) The engine may be equipped with a production-type starter.

(5) Cool the engine in a way that will maintain the engine operating temperatures (for example, temperatures of intake air, oil, water, etc.) at approximately the same temperatures as would occur during normal operation. You may use auxiliary fans to maintain engine cooling during operation on the dynamometer. You may use rust inhibitors and lubrication additives, up to the levels recommended by the additive manufacturer. You may also use antifreeze mixtures and other coolants typical of those approved for use by the manufacturer.

(6) Use representative exhaust systems and air intake systems. Make sure that the exhaust restriction is between 80 and 100 percent of the recommended maximum specified exhaust restriction, and that the air inlet restriction is between that of a clean filter and the maximum restriction specification. The manufacturer is liable for emission compliance from the minimum in-use restrictions to the maximum restrictions specified by the manufacturer for that particular engine.

§ 1065.510 Engine mapping procedures.

(a) *Power map.* Perform an engine power map with the engine mounted on the dynamometer. Use the torque curve resulting from the mapping to convert the normalized torque values in the engine cycle to actual torque values for the test cycle. The minimum speed range is from the warm no-load idle speed to 105 percent of the maximum test speed. Since, the maximum test speed is determined from the power map, it may be necessary to perform a preliminary power map to determine the full mapping range. You may perform a preliminary power map during engine warmup. To map the engine, do the following things in sequence:

(1) Warm up the engine so oil and water temperatures vary by less than 2 percent for 2 minutes.

(2) Operate the engine at the warm no-load idle speed.

(3) Fully open the throttle.

(4) While maintaining wide-open throttle and full-load, maintain minimum engine speed for at least 15 seconds. Record the average torque during the last 5 seconds.

(5) In 100±20 rpm increments, determine the maximum torque curve for the full speed range. Hold each test point for 15 seconds, and record the average torque over the last 5 seconds.

(6) Fit all data points recorded with a cubic spline, Akima, or other technique we approve in advance. The resultant curve must be accurate to within ±1.0 ft-lbs of all recorded engine torques.

(b) *Power map with continual rpm sweep.* In place of paragraphs (a)(1) through (a)(4) of this section, you may do a a continual sweep of rpm. While operating at wide-open throttle, increase the engine speed at an average rate of 8±1 rpm/sec over the full speed range. Record speed and torque points at a rate of at least one point per second. Connect all points generated under this approach by linear interpolation.

(c) *Alternate mapping.* If you believe the above mapping techniques are unsafe or unrepresentative for any given engine or engine family, you may use alternate mapping techniques. These alternate techniques must satisfy the intent of the specified mapping procedures to determine the maximum available torque at all engine speeds that occur during the test cycles. Report deviations from the mapping techniques specified in this section for reasons of safety or representativeness. In no case, however, may you use descending continual sweeps of rpm for governed or turbocharged engines.

(d) *Replicate tests.* You need not map an engine before each and every test. Remap an engine before a test in any of the following situations:

(1) An unreasonable amount of time has passed since the last map, as determined by good engineering judgment.

(2) The barometric pressure prior to the start of the cold-cycle test has changed more than 1 in. Hg from the average barometric pressure observed during the map.

(3) The engine has undergone physical changes or recalibration that might affect engine performance.

§ 1065.515 Transient test cycle generation.

(a) *Denormalizing test cycles.* The applicable test cycles are contained in the standard-setting parts. These cycles

are comprised of second-by-second specifications for torque and speed. Both torque and speed are normalized in these cycles.

(1) Torque is normalized to the maximum torque at the speed listed with it. Therefore, to denormalize the torque values in the cycle, use the maximum torque curve for the engine in question. The generation of the maximum torque curve is described in § 1065.510.

(2) To denormalize speed, use the following equation:

Actual rpm = (0.01)(%rpm)(Maximum test speed − warm idle speed) + warm idle speed.

(3) Paragraph (d) of this section describes the method of calculating maximum test speed.

(b) *Example of the denormalization procedure.* For an engine with maximum test speed of 3800 rpm and warm idle speed of 600 rpm, denormalize the following test point:

percent rpm = 43, percent torque = 82.

(1) *Calculate actual rpm.* Use the following equation:

Actual rpm = (0.01)(43)(3800 − 600) + 600 = 1976.

(2) *Determine actual torque.* Determine the maximum observed torque at 1976 rpm from the maximum torque curve. Then multiply this value (for example, 358 ft-lbs) by 0.82. This results in an actual torque of 294 ft-lbs.

(c) *Cold-start enhancement devices.* Proper operation of the engine's automatic cold-start enhancement device supersedes the zero-percent speed specified in the test cycles.

(d) *Maximum test speed.* Maximum test speed is used for all the emission testing we require. It occurs on the lug curve at the point farthest from the origin on a plot of power vs. speed. To find this speed, follow these steps:

(1) *Generate the lug curve.* Before testing an engine for emissions, generate data points for maximum measured brake power with varying engine speed (see § 1065.510). These data points form the lug curve.

(2) *Normalize the lug curve.* To normalize the lug curve, do three things:

(i) Identify the point (power and speed) on the lug curve where maximum power occurs.

(ii) Normalize the power values of the lug curve—divide them by the maximum power and multiply the resulting values by 100.

(iii) Normalize the engine speed values of the lug curve—divide them by the speed at which maximum power occurs and multiply the resulting values by 100.

(3) *Determine maximum test speed.* Calculate the maximum test speed from the following speed-factor analysis:

(i) For a given power-speed point, the speed factor is the normalized distance to the power-speed point from the zero-power, zero-speed point. Compute the speed factor's value:

$$\text{Speed factor} = \sqrt{(\text{power})^2 + (\text{speed})^2}$$

(ii) Determine the maximum value of speed factors for all the power-speed data points on the lug curve. Maximum test speed is the speed at which the speed factor's maximum value occurs. Note that this maximum test speed is the 100-percent speed point for normalized transient duty cycles.

(4) *Constant-speed engines.* For constant-speed engines, maximum test speed is the same as the engine's maximum in-use operating speed.

(e) *Intermediate test speed.* Determine intermediate test speed with the following provisions:

(1) If peak torque speed is between 60 to 75 percent of maximum test speed, the intermediate speed point is at that same speed.

(2) If peak torque speed is less than 60 percent of maximum test speed, the intermediate speed point is at 60 percent of maximum test speed.

(3) If peak torque speed is greater than 75 percent of maximum test speed, the intermediate speed point is at 75 percent of maximum test speed.

§ 1065.520 Engine starting, restarting, and shutdown.

Applicable test cycles may contain requirements to start or shut down the engine. This section specifies how to do that.

(a) *Engine starting.* Start the engine according to the manufacturer's recommended starting procedure in the owner's manual, using either a production starter motor or the dynamometer. The speed at which the engine is cranked (motored) with the dynamometer should be equal to the typical in-use cranking speed (nominal speed ±10 percent) with a fully charged battery. The time the dynamometer takes to accelerate the engine to cranking speed should be equal (nominal ±0.5 seconds) to the time required with a starter motor. Terminate motoring by the dynamometer within one second of starting the engine. The free-idle period of the cycle begins when you determine that the engine has started.

(1) If the engine does not start after 15 seconds of cranking, cease cranking and determine the reason for the failure to start. Turn off the gas flow measuring device (or revolution counter) on the constant-volume sampler (and the hydrocarbon integrator when measuring hydrocarbons continuously) during this diagnostic period. Also, either turn off the CVS or disconnect the exhaust tube from the tailpipe during the diagnostic period. If failure to start is an operational error, reschedule the engine for testing (this may require soaking the engine if a cold-start is required for the test).

(2) If longer cranking times are necessary, you may use them instead of the 15-second limit, as long as the owner's manual and the service repair manual describe the longer cranking times as normal.

(3) If an engine malfunction causes a failure to start, you may take corrective action of less than 30 minutes duration and continue the test. Reactivate the sampling system at the same time cranking begins. When the engine starts, begin the timing sequence. If an engine malfunction causes a failure to start and the engine cannot be restarted, the test is void.

(b) *Engine stalling.* Respond to engine stalling according the following provisions:

(1) If the engine stalls during the warm-up period, the initial idle period of test, or the steady-state segment, you may restart the engine immediately using the appropriate starting procedure and continue the test.

(2) If the engine stalls anywhere else during the test, the test is void.

(c) *Engine shutdown.* Shut the engine down according to the manufacturer's specifications.

§ 1065.525 Engine dynamometer test run.

Take the following steps for each test:

(a) Prepare the engine, dynamometer, and sampling system. Change filters or other replaceable items and leak check as necessary.

(b) If you are using bag samples, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(c) Attach the CVS to the engine exhaust system any time prior to starting the CVS.

(d) Start the CVS (if not already started), the sample pumps, the engine cooling fan(s), and the data collection system. Preheat the heat exchanger of the constant-volume sampler (if used) and the heated components of any continuous sampling system(s) to their designated operating temperatures before the test begins.

(e) Adjust the sample flow rates to the desired flow rates and set the CVS gas flow measuring devices to zero. CFV–

CVS sample flow rate is fixed by the venturi design.

(f) Start the engine if engine starting is not part of the test cycle specified in the standard-setting part.

(g) Run the test cycle specified in the standard-setting part and collect the test data.

(h) As soon as practical after the test cycle is completed, analyze the bag samples.

§ 1065.530 Test cycle validation criteria.

(a) *Steady-state emission testing.* Engine speeds and/or loads may not deviate from the set point more than ±2 percent of point during the sampling period for a valid test.

(b) *Transient emission testing performed by EPA.* Emission tests not meeting the specifications of this paragraph (b) are not considered to be in accordance with the test cycle requirements of the standard-setting part, except where the cause of the failure to meet these specifications is determined to be related to the engine rather than the test equipment.

(1) *Shifting feedback signals.* To minimize the biasing effect of the time lag between the feedback and reference cycle values, you may advance or delay the entire engine speed and torque feedback signal sequence with respect to the reference speed and torque sequence. If the feedback signals are shifted, you must shift both speed and torque the same amount in the same direction.

(2) *Brake kilowatt-hour calculation.* Calculate the brake kilowatt-hour for each pair of engine feedback speed and torque values recorded. Also calculate the reference brake kilowatt-hour for each pair of engine speed and torque reference values. Calculations must be done to five significant figures.

(3) *Regression line analysis.* Perform regression analysis to calculate validation statistics according to the following:

(i) Perform linear regressions of feedback value on reference value for speed, torque, and brake power on 1 Hz data after the feedback shift has occurred (see paragraph (b)(1) of this section). Use the method of least squares, with the best fit equation having the form:

$y = mx + b$

Where:

y = The feedback (actual) value of speed (rpm), torque (ft-lbs), or brake power.
m = Slope of the regression line.
x = The reference value (speed, torque, or brake power).
b = The y-intercept of the regression line.

(ii) Calculate the standard error of estimate (SE) of y on x and the coefficient of determination (r^2) for each regression line.

(iii) For the test to be considered valid, the slope, intercept, standard error, and coefficient of determination must meet the criteria in Table 1 of § 1065.530 and the integrated brake kilowatt-hour of the feedback cycle does must be within 5 percent of the integrated brake kilowatt-hour of the reference cycle. Individual points may be deleted from the regression analyses consistent with good engineering judgment. Table 1 follows:

TABLE 1 OF § 1065.530.—STATISTICAL CRITERIA FOR TEST CYCLE VALIDATION

	Speed	Torque	Power
1. Standard error of the estimate of Y on X (SE).	100 rpm	15 percent of maximum torque from power map.	10 percent of maximum power from power map.
2. Slope of the regression line (m)	0.980 to 1.020	0.880 to 1.030	0.880 to 1.030.
3. Coefficient of determination (r^2)	$r^2 \geq 0.970$	$r^2 \geq 0.900$	$r^2 \geq 0.900$.
4. Y intercept of the regression line (b)	$\|b\| \leq 40$ rpm	$\|b\| \leq 5.0$ percent of maximum torque from power map.	$\|b\| \leq 3.0$ percent of maximum torque from power map.

(c) *Transient testing performed by manufacturers.* Emission tests meeting the specifications of paragraph (b) of this section are considered to be in accordance with the test cycle requirements of the standard-setting part. A manufacturer may choose to use a dynamometer not capable of meeting the specifications of paragraph (b) of this section.

Subpart G—Data Analysis and Calculations

§ 1065.601 Overview.

This subpart describes how to use the responses on the anlayzers and other meters to calculate final gram per kilowatt-hour emission rates.

§ 1065.605 Required records.

Retain the following information for each test:

(a) Test number.

(b) System or device tested (brief description).

(c) Date and time of day for each part of the test schedule.

(d) Test results.

(e) Operator's name.

(f) Engine: ID number, manufacturer, model year, emission standards, engine family, basic engine description, fuel system, engine code, and idle rpm, as applicable.

(g) Dynamometer: Dynamometer identification, records to verify compliance with the duty cycle requirements of the test.

(h) Gas analyzers: Analyzer bench identification, analyzer ranges, recordings of analyzer output during zero, span, and sample readings.

(i) Recorder charts: Test number, date, identification, operator's name, and identification of the measurements recorded.

(j) Test cell barometric pressure, ambient temperature, and humidity as required. (Some test systems may require continuous measurements, others may require a single measurement, or measurements before and after the test.)

(k) Temperatures: Records to verify compliance with the ambient temperature requirements throughout the test procedure.

(l) CFV–CVS: Total dilute exhaust volume (Vmix) for each phase of the exhaust test.

(m) PDP–CVS: Test measurements for calculating the total dilute exhaust volume (Vmix), and the Vmix for each phase of the exhaust test.

(n) The humidity of the dilution air. (Note: If you do not use conditioning columns, this measurement is not necessary. If you use conditioning columns and take the dilution air from the test cell, you may use the ambient humidity for this measurement.)

§ 1065.610 Bag sample analysis.

(a) Zero the analyzers and obtain a stable zero reading. Recheck after tests.

(b) Introduce span gases and set instrument gains. To avoid errors, span and calibrate at the same flow rates used to analyze the test sample. Span gases should have concentrations equal to 75 to 100 percent of full scale. If gain has shifted significantly on the analyzers, check the calibrations. Show actual concentrations on the chart.

(c) Check zeroes; repeat the procedure in paragraphs (a) and (b) of this section if necessary.

(d) Check flow rates and pressures.

(e) Measure HC, CO, and NO_X concentrations of samples.

(f) Check zero and span points. If the difference is greater than 2 percent of full scale, repeat the procedure in paragraphs (a) through (e) of this section.

§ 1065.615 Bag sample calculations.

(a) Calculate the dilution factor. The dilution factor is the ratio of the total volume of the raw exhaust to the total volume of the diluted exhaust. It is calculated as 134,000 divided by the sum of the diluted ppmC concentrations of carbon-containing compounds in the exhaust; that is:

$DF = 134{,}000/(CO2_{sample} + THC_{sample} + CO_{sample})$,

Where:

$CO2_{sample}$ and CO_{sample} are expressed as ppm, and THC_{sample} is expressed as ppmC.

(b) Calculate mass emission rates (g/test) for the transient segment using the general equation in paragraph (b)(1) of this section:

(1) The general equation follows:

emission rate = (total dilute exhaust volumetric flow)(ppm)(density factor)/10^6 $M_x = (V_{mix})(C_i)(f_{di})/10^6$

Where:

M_x = Mass emission rate in g/test segment.

V_{mix} = Total dilute exhaust volumetric flow in m^3 per test segment.

C_i = The concentration of species i, in ppm or ppmC, corrected for background contribution according to the equation in paragraph (b)(2) of this section.

f_{di} = The density factor for species i. The density factors are 576.8 g/m^3 for THC, 1913 g/m^3 for NO_X, and 1164 g/m^3 for CO.

(2) The equation for calculating C_i follows:

$C_i = C_{sample} - C_{background}\,[1-(1/DF)]$

Where:

C_{sample} = Concentration of species i in the diluted exhaust sample, in ppm or ppmC.

$C_{background}$ = Concentration of species i in the dilution air background sample, in ppm or ppmC.

DF = Dilution factor, as calculated in paragraph (a) of this section.

(c) Calculate total brake work done during the emissions sampling period of each segment or mode.

(d) Determine the time duration of the emission sampling period.

(e) Calculate emissions in g/kW-hr by dividing the mass emission rate by the total brake work and the duration of the emission sampling period.

Subpart H—Particulate Measurements [Reserved]

Subpart I—Testing With Oxygenated Fuels [Reserved]

Subpart J—Field Testing

§ 1065.901 Applicability.

(a) The test procedures in this subpart measure brake-specific emissions from engines while they remain installed in vehicles or equipment in the field.

(b) These test procedures apply to your engines as specified in the standard-setting part.

§ 1065.905 General provisions.

(a) Unless the standard-setting part specifies deviations from the provisions of this subpart, testing conducted under this subpart must conform to all of the provisions of this subpart.

(b) Testing conducted under this subpart may include any or all normal in-use operation of the engine.

§ 1065.910 Measurement accuracy and precision.

(a) Measurement systems used for in-use testing must be accurate to within ±5 percent compared to engine dynamometer testing conducted according to the test procedures of this part that are applicable for your engine. These systems must also have a precision of ±5 percent or better. Determine accuracy and precision of an in-use system by simultaneously measuring emissions using the engine-dynamometer test procedures of this part and the in-use system. To have a statistically valid sample, measure emissions during at least 3 tests each for at least 3 different engines. You must conduct these verification tests using the test cycle specified in the standard-setting part, unless we approve a different test cycle.

(1) A system must meet the following conditions to be considered sufficiently accurate:

(i) The correlation coefficient (r) for a least-squares linear fit that includes the origin must be 0.95 or higher.

(ii) The average ratio (for all tests) of the emission rate from the in-use system divided by the emission rate from the dynamometer procedure must be between 0.97 and 1.05.

(2) For a system to be considered sufficiently precise, the average coefficient of variance for all engines must be 5 percent or less for each pollutant. (Note: Increasing the length of the sampling period may be an effective way to improve precision.)

(b) Measurement systems that conform to the provisions of §§ 1065.915 through 1065.950 are considered to be in compliance with the accuracy and precision requirements of paragraph (a) of this section.

§ 1065.915 Equipment specifications for SI engines.

This section describes equipment you may use to measure in-use emissions. You may use other equipment and measurement systems that conform to the requirements of §§ 1065.905 and 1065.910.

(a) The primary components of the in-use measurement system are a mass air flow sensor, a portable FID, a zirconia-based NO_X sensor, a zirconia-based air/fuel ratio sensor, and a portable NDIR analyzer.

(1) The mass air flow sensor must meet the requirements of § 1065.930.

(2) The portable FID must meet the requirements of § 1065.935.

(3) The NO_X and air/fuel sensors must meet the requirements of § 1065.940

(4) The NDIR analyzer must meet the requirements of § 1065.941.

(b) You must measure the following parameters continuously at a rate of 3 Hz or higher and store the data electronically:

(1) THC, NO_X, CO concentrations.

(2) Air/fuel ratio.

(3) Intake air flow rate.

(4) Engine speed.

(5) Parameters used to calculate torque.

(c) You must minimize sample line length for any analyzers that require a physical sample be drawn from the exhaust to the analyzer (i.e., THC and CO analyzers). You must draw these samples at a constant flow rate. In no case may you use any combination of sample line length and sample flow rate that would result in the length of time necessary for the analyzer to reach 90 percent of its final response after a step change to the input concentration at the opening of the sample probe being greater than 10 seconds. For residence time delays between 1 and 10 seconds, you must correct the measurements to be consistent with the engine speed, torque, and air intake data. You may

also correct other measurements with less than 1 second lags.

(d) The sample probes and sensors can be inserted into the exhaust pipe, or mounted in an exhaust extension that is connected to the exhaust pipe with negligible leaking. The sample probes and sensors must be located sufficiently close to the center line of the exhaust pipe to minimize boundary layer effects from the wall.

§ 1065.920 Equipment setup and test run for SI engines.

This section describes how to set up the equipment specified in § 1065.915, and how to use it to measure in-use emissions from SI engines.

(a) Inspect the vehicle or equipment to determine whether it meets any applicable requirements of the standard-setting part. This may include requirements related to model year, accumulated hours of operation, fuel specifications, maintenance history, engine temperatures, etc.

(b) Perform calibrations as specified in this subpart. In the field, this generally will require only zeroing and spanning the instruments. However, each instrument must have been fully calibrated according to the instrument manufacturer's specifications. Nonlinear calibrations generated previously from the full calibration may be used after zeroing and spanning the instruments. Spanning can be performed using a single gas bottle, consistent with good engineering practice, and provided that stability of the span mixture has been demonstrated.

(c) Connect the data recorder (with any necessary signal interpreters or converters) to the engine's electronic control module (ECM).

(d) Disconnect the air intake system as necessary to attach the mass air flow sensor. Reconnect the system after attaching the mass air flow sensor.

(e) Attach the sample extension to the exhaust outlet.

(f) Turn on instruments and allow them to warm up as necessary.

(g) Begin sampling. You do not need to begin recording the data at this point.

(h) Begin operating the vehicle or equipment in a normal manner. (Note: We may require you to operate the vehicle or equipment in a specific manner.)

(i) Begin recording engine speed, engine torque (or surrogate), intake air flow, emissions data (THC, NO_X, CO, air/fuel ratio), and time. This is the beginning of the sampling period.

(j) Continue recording data and operating the vehicle or equipment in a normal manner until the end of the sampling period. The length of the sampling period is based on good engineering practice, the precision requirements of § 1065.910, and applicable limits in the standard-setting part.

(k) You may measure background concentrations and correct measured emission values accordingly. However, if any background corrections are equivalent to 5 percent or more of the maximum emissions allowed by the appliacble standard, the test shall be voided and repeated in an environment with lower background concentrations.

§ 1065.925 Calculations.

(a) [Reserved]

(b) Convert emission analyzer data to instantaneous concentrations in ppm (ppmC for the FID).

(c) Calculate instantaneous exhaust volumetric flow rates in m^3/hr:

exhaust flow rate = (intake air flow rate)$(1 - f/a)$

(d) Calculate instantaneous emission rates (g/hr) using the following general equation:

emission rate = (exhaust volumetric flow rate)(ppm)(density factor)/10^6

Where:

density factors are 576.8 g/m^3 for THC, 1913 g/m^3 for NO_X, 1164 g/m^3 for CO.

(e) Integrate instantaneous emission rates for the entire specified sample period.

(f) Determine instantaneous brake torque and speed.

(g) Calculate instantaneous brake power.

(h) Integrate instantaneous brake power for the entire specified sample period.

(i) Divide the integrated emission rates by the integrated brake power. These are your final brake-specific emission rates.

§ 1065.930 Specifications for mass air flow sensors.

(a) Measure the intake air flow using the engine's mass air flow sensor. If the engine is not equipped with a mass air flow sensor, you need to install one.

(b) The sensor design must have an accuracy and precision of ±5 percent under steady-state laboratory conditions.

(c) The sensor must reach at least 90 percent of its final response within 0.3 seconds after any step change to the flow rate greater than or equal 80 percent of full scale.

(d) Calibrate the sensor according to good engineering practice. Prior to testing verify for each engine that the sensor accurately reads the idle intake air flow rate based on measured manifold temperature (T_M) and pressure (P_M). Use the following equation:

Intake air flow = (displacement)(rpm)(volumetric efficiency)(P_M/101.3 kPa)(293.15/T_M)

§ 1065.935 Specifications for THC analyzers.

(a) Use a flame ionization detector (FID).

(b) The analyzer must have an accuracy and precision of ±2 percent of point or better under steady-state laboratory conditions.

(c) The analyzer must reach at least 90 percent of its final response within 1.0 second after any step change to the input concentration greater than or equal 80 percent of full scale.

(d) Zero and span the analyzer daily during testing. Calibrate it according to the analyzer manufacturer's specifications.

§ 1065.940 Specifications for NO_X and air/fuel sensors.

(a) Use stabilized zirconia-based sensors.

(b) The sensors must have an accuracy and precision of ±2 percent of point or better under steady-state laboratory conditions.

(c) The sensors must reach at least 90 percent of its final response within 1.0 second after any step change to the input concentration greater than or equal 80 percent of full scale.

(d) The sensors must be zeroed and spanned daily during testing, and must calibrated according to the sensor manufacturer's specifications.

§ 1065.945 Specifications for CO analyzers.

(a) Use a non-dispersive infrared (NDIR) detector that is compensated for CO_2 and water interference.

(b) The analyzer must have an accuracy and precision of ±2 percent of point or better under steady-state laboratory conditions.

(c) The analyzer must reach at least 90 percent of its final response within 5.0 second after any step change to the input concentration greater than or equal 80 percent of full scale.

(d) The analyzer must be zeroed and spanned daily during testing, and must calibrated according to the analyzer manufacturer's specifications.

§ 1065.950 Specifications for speed and torque measurement.

(a) Determine torque from a previously determined relationship of torque and engine speed, throttle position, and/or manifold absolute pressure. Torque estimates must be between 85 percent and 105 percent of

the true value. You can demonstrate compliance with this accuracy requirement using steady-state labortory data.

(b) Measure speed from the engine's electronic control module. Speed estimates must be within ±5 rpm of the true value.

Subpart K—Definitions and Other Reference Information

§ 1065.1000 Definitions.

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them.

The definitions follow:

Accuracy means the maximum difference between a measured or calculated value and the true value, where the true value is determined by NIST.

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Adjustable parameter means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emission testing or normal in-use operation.

Aftertreatment means relating to any system, component, or technology mounted downstream of the exhaust valve or exhaust port whose design function is to reduce exhaust emissions.

Auxiliary emission-control device means any element of design that senses temperature, engine rpm, motive speed, transmission gear, atmospheric pressure, manifold pressure or vacuum, or any other parameter to activate, modulate, delay, or deactivate the operation of any part of the emission-control system. This also includes any other feature that causes in-use emissions to be higher than those measured under test conditions, except as we allow under this part.

Calibration means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

Certification means obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part.

Compression-ignition means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

Constant-speed engine means an engine governed to operate only at its rated speed.

Designated Officer means the Manager, Engine Compliance Programs Group (6403–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated emissions from an engine.

Emission-data engine means an engine that is tested for certification.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emissions deterioration.

Engine means an engine to which this part applies. For equipment subject to this part and regulated under equipment-based standards, the term engine in this part shall be interpreted to include equipment.

Engine-based means having emission standards related to measurements using an engine dynamometer, in units of grams of pollutant per kilowatt-hour.

Engine family means a group of engines with similar emission characteristics, as specified in the standard-setting part.

Engine manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures an engine for sale in the United States or otherwise introduces a new engine into commerce in the United States. This includes importers. For equipment subject to this part and regulated under equipment-based standards, the term engine manufacturer in this part shall be interpreted to include equipment manufacturers.

Equipment-based means having emission standards related to measurements from an engine installed in a vehicle using a chassis dynamometer, in units of grams of pollutant per kilometer.

Fuel system means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

Good engineering judgment has the meaning we give it in § 1068.5 of this chapter.

Identification number means a unique specification (for example, model number/serial number combination) that allows someone to distinguish a particular engine from other similar engines.

Maximum test torque means the torque output observed with the maximum fueling rate possible at a given speed.

Nonmethane hydrocarbons means the sum of all hydrocarbon species measured by a FID except methane, expressed with an assumed mass 13.876 grams per mole of carbon atoms.

Nonroad means relating to nonroad engines.

Nonroad engine has the meaning given in § 89.2 of this chapter. In general this means all internal combustion engines except motor vehicle engines, stationary engines, or engines used solely for competition.

Oxides of nitrogen means the oxides of nitrogen measured by the specified test equipment. Specifically, this means nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen are expressed quantitatively as if the NO were in the form of NO_2 (assume a molecular weight for oxides of nitrogen equivalent to that of NO_2).

Precision means two times the coefficient of variance of multiple measurements, except where specified otherwise.

Revoking a certificate of conformity means discontinuing the certificate for an engine family. If we revoke a certificate, you must apply for a new certificate before continuing to produce the affected engines. This does not apply to engines you no longer possess.

Round means to round numbers according to ASTM E29–93a, which is incorporated by reference (see § 1065.1010), unless otherwise specified.

Scheduled maintenance means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems that is periodically needed to keep a part from failing or malfunctioning. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

Spark-ignition means relating to a type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark-ignition engines usually use a throttle to regulate intake air flow to control power during normal operation.

Standard-setting part means the part in the Code of Federal Regulations that defines emission standards for a particular engine (see § 1065.1(a)).

Stoichiometry means the proportion of a mixture of air and fuel such that the fuel is fully oxidized with no remaining oxygen. For example, stoichiometric combustion in gasoline engines typically occurs at an air-fuel mass ratio of about 14.7.

Suspending a certificate of conformity means temporarily discontinuing the certificate for an engine family. If we

suspend a certificate, you may not sell engines from that engine family unless we reinstate the certificate or approve a new one.

Test engine means an engine in a test sample.

Test sample means the collection of engines selected from the population of an engine family for emission testing.

Total Hydrocarbon (THC) means the sum of all hydrocarbon species measured by a FID, expressed with an assumed mass 13.876 grams per mole of carbon atoms.

Total Hydrocarbon Equivalent means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as petroleum-fueled engine hydrocarbons. The hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

Voiding a certificate of conformity means invalidating a certificate, so all the engines produced under that engine family for that model year are considered noncompliant. If we void a certificate, you are liable for each engine produced under the certificate and may face civil or criminal penalties or both.

Voiding an exemption means invalidating an exemption, so all the engines produced under that exemption are considered uncertified (or nonconforming). If we void an exemption, you are liable for each engine produced under the exemption and may face civil or criminal penalties or both. You may not produce any additional engines using the exemption.

§ 1065.1005 Symbols, acronyms, and abbreviations.

The following symbols, acronyms, and abbreviations apply to this part:

°C degrees Celsius.
″ inches.
ASTM American Society for Testing and Materials.
cc cubic centimeters.
CFV critical-flow venturi.
CI compression-ignition.
CLD chemiluminescent detector.
CO carbon monoxide.
CO_2 carbon dioxide.
CVS constant-volume sampler.
EFC electronic flow control.
EPA Environmental Protection Agency.
FID flame ionization detector.
g/kW-hr grams per kilowatt-hour.
IBP initial boiling point.
ISO International Organization for Standardization.
kPa kilopascal.
LPG liquefied petroleum gas.
m meters.
mm Hg millimeters of mercury.
NDIR nondispersive infrared.
NIST National Institute for Standards and Testing.
NMHC nonmethane hydrocarbons.
NO nitric oxide.
NO_2 nitrogen dioxide.
NO_X oxides of nitrogen (NO and NO2).
O_2 oxygen.
PDP positive-displacement pump.
ppm parts per million.
rpm revolutions per minute.
SAE Society of Automotive Engineers.
SI spark-ignition.
THC total hydrocarbon.
THCE total hydrocarbon equivalent.
U.S.C. United States Code.

§ 1065.1010 Reference materials.

We have incorporated by reference the documents listed in this section. The Director of the Federal Register approved the incorporation by reference as prescribed in 5 U.S.C. 552(a) and 1 CFR part 51. Anyone may inspect copies at U.S. EPA, OAR, Air and Radiation Docket and Information Center, 401 M Street, SW., Washington, DC 20460 or Office of the Federal Register, 800 N. Capitol St., NW., 7th Floor, Suite 700, Washington, DC.

(a) *ASTM material.* [Reserved]

(b) *ISO material.* Table 2 of § 1065.1010 lists material from the International Organization for Standardization that we have incorporated by reference. The first column lists the number and name of the material. The second column lists the section of this part where we reference it. The second column is for information only and may not be all-inclusive. Anyone may receive copies of these materials from International Organization for Standardization, Case Postale 56, CH–1211 Geneva 20, Switzerland. Table 2 follows:

TABLE 2 OF § 1065.1010.—ISO MATERIALS

Document No. and name	Part 1065 reference
ISO 8178, Reciprocating internal combustion engines—Exhaust emission measurement.	1065.125, 1065.130, 1065.135.

(c) *SAE material.* [Reserved]

§ 1065.1015 Confidential information.

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in § 2.204 of this chapter.

PART 1068—GENERAL COMPLIANCE PROVISIONS FOR NONROAD PROGRAMS

Subpart A—Applicability and Miscellaneous Provisions

Sec.
1068.1 Does this part apply to me?
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Authority: 42 U.S.C. 7401–7671(q).

Subpart A—Applicability and Miscellaneous Provisions

§ 1068.1 Does this part apply to me?

(a) The provisions of this part apply to everyone with respect to the following engines or to equipment using the following engines:

(1) Large nonroad spark-ignition engines we regulate under 40 CFR part 1048.

(2) Snowmobiles, all-terrain vehicles, and off-highway motorcycles we regulate under 40 CFR part 1051.

(b) This part does not apply to any of the following engine or vehicle categories:

(1) Light-duty motor vehicles (see 40 CFR part 86).

(2) Heavy-duty motor vehicles and motor vehicle engines (see 40 CFR part 86).

(3) Aircraft engines (see 40 CFR part 87).

(4) Locomotive engines (see 40 CFR part 92).

(5) Land-based nonroad diesel engines (see 40 CFR part 89).

(6) Marine diesel engines (see 40 CFR parts 89 and 94).

(7) Marine outboard and personal watercraft engines (see 40 CFR part 91).

(8) Small nonroad spark-ignition engines (see 40 CFR part 90).

(c) For equipment subject to this part and regulated under equipment-based standards, interpret the term ''engine'' in this part to include equipment (see § 1068.25).

(d) Follow the provisions of the standard-setting part if they are different than any of the provisions in this part.

§ 1068.5 How must engine manufacturers apply good engineering judgment?

(a) You must use good engineering judgment for decisions related to any requirements under this chapter. This includes your applications for certification, any testing you do to show that your production-line or in-use engines comply with requirements that apply to them, and how you select, categorize, determine, and apply these requirements.

(b) If we send you a written request, you must give us a written description of the engineering judgment in question. Respond within 15 working days of receiving our request unless we allow more time.

(c) We may reject your decision if it is not based on good engineering judgment or is otherwise inconsistent with the requirements that apply, based on the following provisions:

(1) We may suspend, revoke, or void a certificate of conformity if we determine you deliberately used incorrect information or overlooked important information, that you did not decide in good faith, or that your decision was not rational.

(2) If we believe a different decision would better reflect good engineering judgment, but none of the provisions of paragraph (c)(1) of this section apply, we will tell you of our concern (and its basis). You will have 30 days to respond to our concerns, or more time if we agree that you need it to generate more information. After considering your information, we will give you a final ruling. If we conclude that you did not use good engineering judgment, we may reject your decision and apply the new ruling to similar situations as soon as possible.

(d) We will tell you in writing of the conclusions we reach under paragraph (c) of this section and explain our reasons for them.

(e) If you disagree with our conclusions, you may file a request for a public hearing with the Designated Officer as described in subpart F of this part. In your request, specify your objections, include data or supporting analysis, and get your authorized representative's signature. If we agree that your request raises a substantial factual issue, we will hold the hearing according to subpart F of this part.

§ 1068.10 How do I request EPA to keep my information confidential?

(a) Clearly identify any information you consider confidential by marking, circling, bracketing, stamping, or some other method. We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2. This procedure applies equally to the Environmental Appeals Board.

(b) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(c) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in § 2.204 of this chapter.

§ 1068.15 Who is authorized to represent the Agency?

The Administrator of the Environmental Protection Agency or any official to whom the Administrator has delegated specific authority may represent the Agency. For more information, ask for a copy of the relevant sections of the EPA Delegation Manual from the Designated Officer.

§ 1068.20 May EPA enter my facilities for inspections?

(a) If you are a certificate holder, we may inspect your engines, testing, manufacturing processes, engine storage facilities (including port facilities for imported engines), or records to enforce the provisions of this chapter. Inspectors will have authorizing credentials and will limit inspections to reasonable times—usually, normal operating hours.

(b) If we come to inspect, we may or may not have a warrant or court order.

(1) If we do not have a warrant or court order, you may deny us entry.

(2) If we have a warrant or court order, you must allow us to enter the facility and carry out the activities it describes.

(c) We may seek a warrant or court order authorizing an inspection described in this section, whether or not we first tried to get your permission to inspect.

(d) We may select any facility to do any of the following:

(1) Inspect and monitor any aspect of engine manufacturing, assembly, storage, or other procedures, and any facilities where you do them.

(2) Inspect and monitor any aspect of engine test procedures or test-related activities, including test engine selection, preparation, service accumulation, emission duty cycles, and maintenance and verification of your test equipment's calibration.

(3) Inspect and copy records or documents related to assembling, storing, selecting, and testing an engine.

(4) Inspect and photograph any part or aspect of engines and components you use for assembly.

(e) You must give us reasonable help without charge during an inspection. For example, you may need to help us arrange an inspection with the facility's managers, including clerical support, copying, and translation. You may also need to show us how the facility operates and answer other questions. If we ask in writing to see a particular employee at the inspection, you must ensure that he or she is present (legal counsel may accompany the employee).

(f) If you have facilities in other countries, we expect you to locate them in places where local law does not keep us from inspecting as described in this section. We will not try to inspect if we learn that local law prohibits it, but we may suspend your certificate if we are not allowed to inspect.

§ 1068.25 What definitions apply to this part?

The following definitions apply to this part:

Act means the Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Aircraft means any vehicle capable of sustained air travel above treetop heights.

Certificate holder means an engine manufacturer (including importers) with a valid certificate of conformity for at least one engine family in a given calendar year.

Designated Officer means the Manager of the Engine Programs Group (6403–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

Engine means an engine to which this part applies. For equipment subject to this part and regulated under equipment-based standards, the term engine in this part shall be interpreted to include equipment.

Engine-based means having emission standards related to measurements using an engine dynamometer, in units of grams of pollutant per kilowatt-hour.

Engine manufacturer has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures an engine for sale in the United States or otherwise introduces a new engine into commerce in the United States. This includes importers. For equipment subject to this part and regulated under equipment-based standards, the term engine manufacturer in this part shall be interpreted to include equipment manufacturers.

Equipment-based means having emission standards related to measurements from an engine installed in a vehicle using a chassis dynamometer, in units of grams of pollutant per kilometer.

Equipment manufacturer means any company producing a piece of equipment for sale or use in the United States.

New has the meaning we give it in the standard-setting part.

Nonroad engine means:

(1) Except as discussed in paragraph (2) of this definition, a nonroad engine is any internal combustion engine:

(i) In or on a piece of equipment that is self-propelled or serves a dual purpose by both propelling itself and performing another function (such as garden tractors, off-highway mobile cranes and bulldozers); or

(ii) In or on a piece of equipment that is intended to be propelled while performing its function (such as lawnmowers and string trimmers); or

(iii) That, by itself or in or on a piece of equipment, is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

(2) An internal combustion engine is not a nonroad engine if:

(i) The engine is used to propel a motor vehicle or a vehicle used solely for competition, or is subject to standards promulgated under section 202 of the Act; or

(ii) The engine is regulated by a federal New Source Performance Standard promulgated under section 111 of the Act; or

(iii) The engine otherwise included in paragraph (1)(iii) of this definition remains or will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A location is any single site at a building, structure, facility, or installation. Any engine (or engines) that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period. An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the seasonal source. A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and that operates at that single location approximately three months (or more) each year. This paragraph (2)(iii) of this definition does not apply to an engine after the engine is removed from the location.

Operating hours means:

(1) For engine storage areas or facilities, times during which people other than custodians are at work near, and can access, a storage area or facility.

(2) For other areas or facilities, times during which an assembly line operates or any of the following activities occurs:

(i) Testing, maintenance, or service accumulation.

(ii) Production or compilation of records.

(iii) Certification testing.

(iv) Translation of designs from the test stage to the production stage.

(v) Engine manufacture or assembly.

Piece of equipment means any vehicle, vessel, locomotive, aircraft, or other type of equipment using engines to which this part applies.

Placed into service means used for its intended purpose.

Standard-setting part means the part in the Code of Federal Regulations that defines emission standards for a particular engine (see § 1068.1(a)).

Ultimate purchaser means the first person who in good faith buys a new engine without intending to resell it.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, the U.S. Virgin Islands, and the Trust Territory of the Pacific Islands.

We (us, our) means the Administrator of the Environmental Protection Agency and any authorized representatives.

Subpart B—Prohibited Acts and Related Requirements

§ 1068.101 What general actions does this regulation prohibit?

(a) The following prohibitions apply to manufacturers of new engines and manufacturers of equipment containing these engines, except as described in subparts C and D of this part:

(1) You may not sell, offer for sale, or introduce or deliver into commerce in the United States or import into the United States any new engine or equipment after emission standards take effect for that engine or equipment, unless it has a valid certificate of conformity for its model year and the required label or tag. You also may not take any of the actions listed in the previous sentence with respect to any equipment containing an engine subject to this part's provisions, unless the engine has a valid certificate of conformity for its model year and the required engine label or tag. This requirement also covers new engines you produce to replace an older engine in a piece of equipment, unless the engine qualifies for the replacement-engine exemption in § 1068.235. The maximum civil penalty is $27,500 for each engine in violation.

(2) This chapter requires you to record certain types of information to show that you meet our standards. You may not omit these requirements to make and maintain required records (including those described in § 1068.501). You may not deny us access to or copying of your records if we have the authority to see or copy them. Also, you may not delay or omit giving us required reports or information. The maximum civil penalty is $27,500 for each day in violation.

(3) You may not keep us from entering your facility to test engines or inspect if we are authorized to do so. Also, you may not omit tests we require (or omit having the tests done for you). The maximum civil penalty is $27,500 for each day in violation.

(b) The following prohibitions apply to everyone with respect to the engines to which this part applies:

(1) You may not remove or disable a device or element of design that may affect an engine's emission levels. This restriction applies before and after the engine is placed in service. Section 1068.120 describes how this applies to rebuilding engines. For a manufacturer or dealer, the maximum civil penalty is $27,500 for each engine in violation. For anyone else, the maximum civil penalty is $2,500 for each engine in violation. This does not apply in any of the following situations:

(i) You need to repair an engine and you restore it to proper functioning when the repair is complete.

(ii) You need to modify an engine to respond to a temporary emergency and you restore it to proper functioning as soon as possible.

(iii) You modify a new engine that another manufacturer has already certified to meet emission standards, intending to recertify it under your own engine family. In this case you must tell the original manufacturer not to include the modified engines in the original engine family.

(2) You may not knowingly manufacture, sell, offer to sell, or install, an engine part if one of its main effects is to bypass, impair, defeat, or disable the engine's control of emissions. The maximum civil penalty is $2,500 for each part in violation.

(3) For an engine that is excluded from any requirements of this chapter because it is a stationary engine, you may not move it or install it in any mobile equipment, except as allowed by the provisions of this chapter. You may not circumvent or attempt to circumvent the residence-time requirements of paragraph (2)(iii) of the nonroad engine definition in § 1068.25. The maximum civil penalty is $27,500 for each day in violation.

(4) For an engine or piece of equipment that is excluded from any requirements of this chapter because it is to be used solely for competition, you may not use it in a manner that is inconsistent with use solely for competition. The maximum civil penalty is $27,500 for each day in violation.

(c) Exemptions from these prohibitions are described in subparts C and D of this part.

(d) The standard-setting parts describe more requirements and prohibitions that apply to engine manufacturers (including importers) and others under this chapter.

(e) The maximum penalties in paragraphs (a) and (b) of this section and in § 1068.125(b) are in 1970 dollars. The Federal Civil Penalties Inflation Adjustment Act of 1990 (Public Law 101–410, 104 Stat. 890 and 28 U.S.C. 2461) and associated regulations describe how to adjust these figures based on the date of the violation.

§ 1068.105 What other provisions apply to me specifically if I manufacture equipment needing certified engines?

(a) *Transitioning to new standards.* You may use up your normal inventory of engines not certified to new emission standards if they were built before the date of the new standards. However, stockpiling these engines violates § 1068.101(a)(1).

(b) *Installing engines.* You must follow the engine manufacturer's emission-related installation instructions. For example, you may need to constrain where you place an exhaust aftertreatment device or integrate into your equipment models a device for sending visual or audible signals to the operator. Not meeting the manufacturer's emission-related installation instructions is a violation of § 1068.101(b)(1).

(c) *Attaching a duplicate label.* If you obscure the engine's label, you must do three things to avoid violating § 1068.101(a)(1):

(1) Permanently attach to your equipment a duplicate label. Secure it to a part needed for normal operation and not normally requiring replacement.

(2) Make sure your label is identical to the engine label. You may make the label yourself or get it from the engine manufacturer.

(3) Make sure an average person can easily read it.

(d) *Producing nonroad equipment certified to highway emission standards.* You may produce nonroad equipment from complete or incomplete motor vehicles with the motor vehicle engine if you meet three criteria:

(1) The engine or vehicle is certified to 40 CFR part 86.

(2) The engine is not adjusted outside the manufacturer's specifications.

(3) The engine or vehicle is not modified in any way that may affect its emission control. This applies to evaporative emission controls, but not refueling emission controls.

§ 1068.110 What other provisions apply to engines in service?

(a) *Aftermarket parts and service.* As the engine manufacturer, you may not require anyone to use your parts or service to maintain or repair an engine, unless we approve this in your application for certification.

(b) *Certifying aftermarket parts.* As the manufacturer or rebuilder of an aftermarket engine part, you may—but are not required to—certify according to

§ 85.2114 of this chapter that using the part will not cause engines to fail to meet emission standards.

(c) *Defeat devices.* We may test equipment or engines to investigate potential defeat devices. We may also require the engine manufacturer to do this testing. If we choose to investigate one of your designs, we may require you to show us that it does not have a defeat device. To do this, you may have to share with us information regarding test programs, engineering evaluations, design specifications, calibrations, on-board computer algorithms, and design strategies.

(d) *Warranty and maintenance.* Owners may make warranty claims against the engine manufacturer for emission-related parts, as described in § 1068.115. This generally includes any emission-related engine parts that were not in common use before we have adopted emission standards. In general, we consider replacement or repair of any other components to be the owner's responsibility. The warranty period begins when the engine is first placed into service.

§ 1068.115 When must engine manufacturers honor emission-related warranty claims?

(a) As an engine manufacturer, you may not deny emission-related warranty claims based on any of the following:

(1) Maintenance or other service you or your authorized facilities performed.

(2) Engine repair work that an operator performed to correct an unsafe, emergency condition attributable to you, as long as the operator tries to restore the engine to its proper configuration as soon as possible.

(3) Any action or inaction by the operator unrelated to the warranty claim.

(4) Maintenance that was performed more frequently than you specify.

(5) Anything that is your fault or responsibility.

(6) The use of any fuel that is commonly available where the engine operates, unless your written maintenance instructions state that this fuel would harm the engine's emission control system and operators can readily find the proper fuel.

(b) As long as none of the restrictions of paragraph (a) of this section apply, you may deny an emission-related warranty claim if either of the following occurs:

(1) Owners are not able to show they followed your written maintenance instructions, as described in paragraph (c) of this section.

(2) You prove that the warranty claim was caused by any of the following:

(i) The operator abused the engine by using it for purposes for which it was not designed.

(ii) Someone improperly installed an engine part or set engine parameters outside your specified adjustable ranges during any scheduled maintenance related to the affected part or system.

(iii) Someone permanently removed or disabled the engine's emission control system or any of its components during unscheduled maintenance related to the affected part or system.

(c) You may ask owners to show they followed your written maintenance instructions only if you have an objective reason to believe they did not follow these instructions and that this would have caused the defect that is the subject of their warranty claim.

(1) If owners do their own maintenance, they may state that they performed the prescribed maintenance at the approximate intervals (in months or operating hours) and show they bought and used proper parts. You may ask them to show they are able to perform the maintenance properly.

(2) If owners hire others to maintain their engines, they may rely on service receipts or a maintenance log book validated at the approximate intervals (in months or operating hours) by those who performed the maintenance.

§ 1068.120 What requirements must I follow to rebuild engines?

(a) This section describes the steps to take when rebuilding engines to avoid violating the tampering prohibition in § 1068.101(b)(1). These requirements apply to anyone rebuilding an engine subject to this part, but the reporting requirements in paragraphs (i) and (j) of this section apply only to businesses.

(b) The term ''rebuilding'' refers to a partial or complete rebuild of an engine or engine system, including a major overhaul in which you replace the engine's power assemblies or make other changes that significantly increase the service life of the engine. It also includes replacing or rebuilding an engine's turbocharger or aftercooler or its systems for fuel metering or electronic control. For these provisions, rebuilding may or may not involve removing the engine from the equipment. For other maintenance or service that is not rebuilding, you must still not make changes that might increase emissions, but you do not need to keep any records.

(c) If you rebuild an engine, you must have a reasonable technical basis for knowing that the rebuilt engine has the same emissions performance as the engine in its certified configuration. Identify the model year of the resulting engine configuration. You have a reasonable basis if you meet two main conditions:

(1) Install parts—new, used, or rebuilt—so a person familiar with engine design and function would reasonably believe that the engine with those parts will control emissions to the same degree as with the original parts.

(2) Adjust parameters or change design elements only according to the original engine manufacturer's instructions. Or, if you differ from these instructions, you must have data or some other technical basis to show you should not expect in-use emissions to increase.

(d) If the rebuilt engine remains installed or is reinstalled in the same piece of equipment, you must rebuild it to the original configuration or another certified configuration of the same or later model year.

(e) If the rebuilt engine replaces another engine in a piece of equipment, you must rebuild it to a certified configuration that equals the emissions performance of the engine you are replacing.

(f) Do not erase or reset emission-related codes or signals from onboard monitoring systems without diagnosing and responding appropriately to any diagnostic codes. This requirement applies regardless of the manufacturer's reason for installing the monitoring system and regardless of its form or interface. Clear any codes from diagnostic systems when you return the rebuilt engine to service. Do not disable a diagnostic signal without addressing its cause.

(g) When you rebuild an engine, check, clean, adjust, repair, or replace all emission-related components (listed in Appendix I of this part) as needed according to the original manufacturer's recommended practice. In particular, replace oxygen sensors, replace the catalyst if there is evidence of malfunction, clean gaseous fuel system components, and replace fuel injectors (if applicable).

(h) If you are installing an engine that someone else has rebuilt, check all emission-related components listed in Appendix I of this part as needed according to the original manufacturer's recommended practice.

(i) Keep at least the following records:

(1) Identify the hours of operation (or mileage, as appropriate) at time of rebuild.

(2) Identify the work done on the engine or any emission-related control components, including a listing of parts and components you used.

(3) Describe any engine parameter adjustments.

(4) Identify any emission-related codes or signals you responded to and reset.

(j) You must show us or send us your records if we ask for them. Keep records for at least two years after rebuilding an engine. Keep them in any format that allows us to readily review them.

(1) You do not need to keep information that is not reasonably available through normal business practices. We do not expect you to have information that you cannot reasonably access.

(2) You do not need to keep records of what other companies do.

(3) You may keep records based on engine families rather than individual engines if that is the way you normally do business.

§ 1068.125 What happens if I violate the regulations?

(a) *Civil penalties and injunctions.* We may bring a civil action to assess and recover civil penalties and/or enjoin and restrain violations in the United States District Court for the district where you allegedly violated a requirement, or the district where you live or have your main place of business. Actions to assess civil penalties or restrain violations of § 1068.101 must be brought by and in the name of the United States. The selected court has jurisdiction to restrain violations and assess civil penalties.

(1) To determine the amount of a civil penalty and reach a just conclusion, the court considers six main factors:

(i) The seriousness of your violation.

(ii) How much you benefitted or saved because of the violation.

(iii) The size of your business.

(iv) Your history of compliance with Title II of the Act.

(v) What you did to remedy the violation.

(vi) How the penalty will affect your ability to continue in business.

(2) Subpoenas for witnesses who must attend a district court in any district may apply to any other district.

(b) *Administrative penalties.* Instead of bringing a civil action, we may assess administrative penalties if the total is less than $200,000 against you individually. This maximum penalty may be greater if the Administrator and the Attorney General jointly determine that is appropriate for administrative penalty assessment. No court may review such a determination. Before we assess an administrative penalty, you may ask for a hearing (subject to 40 CFR part 22).

(1) To determine the amount of an administrative penalty, we will consider the factors described in paragraph (a)(1) of this section.

(2) An administrative order we issue under this paragraph (b) becomes final 30 days after we issue it, unless you ask for judicial review by that time (see paragraph (c) of this section). You may ask for review by any of the district courts listed in paragraph (a) of this section. Send the Administrator a copy of the filing by certified mail.

(3) We will not pursue an administrative action for a violation if either of the following two conditions is true:

(i) We are separately prosecuting the violation under this part.

(ii) We have issued a final order for a violation, no longer subject to judicial review, for which you have already paid a penalty.

(c) *Judicial review.* If you ask a court to review a civil or administrative penalty, we will file in the appropriate court within 30 days of your request a certified copy or certified index of the record on which the court or the Administrator issued the order.

(1) The judge may set aside or remand any order issued under this section only if he or she believes one of the following is true:

(i) Substantial evidence does not exist in the record, taken as a whole, to support finding a violation.

(ii) The Administrator's assessment of the penalty is an abuse of discretion.

(2) The judge may add civil penalties if he or she believes our penalty is an abuse of discretion that favors you.

(d) *Effect of enforcement actions on other requirements.* Our pursuit of civil or administrative penalties does not affect or limit our authority to enforce any provisions of this chapter.

(e) *Penalties.* In any proceedings, the United States government may seek to collect civil penalties assessed under this section.

(1) Once a penalty assessment is final, if you do not pay it, the Administrator will ask the Attorney General to bring a civil action in an appropriate district court to recover the money. We may collect interest from the date of the final order or final judgment at rates established by the Internal Revenue Code of 1986 (26 U.S.C. 6621(a)(2)). In this action to collect overdue penalties, the court will not review the validity, amount, and appropriateness of the penalty.

(2) In addition, if you do not pay the full amount of a penalty on time, you must then pay more to cover interest, enforcement expenses (including attorney's fees and costs for collection), and a quarterly nonpayment penalty for each quarter you do not pay. The nonpayment penalty is 10 percent of your total penalties plus any unpaid nonpayment penalties from previous quarters.

Subpart C—Exemptions

§ 1068.201 Does EPA exempt any engines from the prohibited acts?

We may exempt new engines from the prohibited acts in subpart B of this part under requirements described in this subpart. We may exempt an engine already placed in service in the United States from the prohibition in § 1068.101(b)(1) if the exemption for engines used solely for competition applies (see § 1068.230).

(a) This subpart identifies which engines qualify for exemptions and what information we need. We may ask for more information.

(b) If you violate any of the terms, conditions, instructions, or requirements to qualify for an exemption, we may void the exemption.

(c) If you use an exemption under this subpart, we may require you to add a permanent label to your exempted engines.

(d) If you produce engines we exempt under this subpart, we may require you to make and keep records, perform tests, make reports and provide information as needed to reasonably evaluate the validity of the exemption.

(e) If you own or operate engines we exempt under this subpart, we may require you to provide information as needed to reasonably evaluate the validity of the exemption.

(f) Subpart D of this part describes how we apply these exemptions to engines you import (or intend to import).

(g) If you want to ask for an exemption or need more information, write to the Designated Officer.

§ 1068.205 What are the provisions for exempting test engines?

(a) We may exempt engines you use for research, investigations, studies, demonstrations, or training.

(b) Anyone may ask for a testing exemption.

(c) If you are a certificate holder, you may request an exemption for engines you intend to include in test programs over a two-year period.

(1) In your request, tell us the maximum number of engines involved and describe how you will make sure exempted engines are used only for this testing.

(2) Give us the information described in paragraph (d) of this section if we ask for it.

(d) If you are not a certificate holder do all of the following:

(1) Show that the proposed test program has a valid purpose under paragraph (a) of this section.

(2) Show you need an exemption to achieve the purpose of the test program (time constraints may be a basis for needing an exemption, but the cost of certification alone is not).

(3) Estimate the duration of the proposed test program and the number of engines involved.

(4) Allow us to monitor the testing.

(5) Describe how you will ensure that you stay within this exemption's purposes. Address at least the following things:

(i) The technical nature of the test.

(ii) The test site.

(iii) The duration and accumulated engine operation associated with the test.

(iv) Ownership of the engines involved in the test.

(v) The intended final disposition of the engines.

(vi) How you will identify, record, and make available the engine identification numbers.

(vii) The means or procedure for recording test results.

(e) If we approve your request for a testing exemption, we will send you a letter or a memorandum for your signature describing the basis and scope of the exemption. It will also include any necessary terms and conditions, which normally require you to do the following:

(1) Stay within the scope of the exemption.

(2) Create and maintain adequate records that we may inspect.

(3) Add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(i) The label heading ''EMISSION CONTROL INFORMATION.''

(ii) Your corporate name and trademark.

(iii) Engine displacement, engine family identification, and model year of the engine or whom to contact for further information.

(iv) The statement ''THIS ENGINE IS EXEMPT UNDER 40 CFR 1068.205 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

(4) Tell us when the test program is finished.

(5) Tell us the final disposition of the engines.

(6) Send us a written confirmation that you meet the terms and conditions of this exemption.

§ 1068.210 What are the provisions for exempting manufacturer-owned engines?

(a) You are only eligible for the exemption for manufacturer-owned engines if you are a certificate holder.

(b) An engine may be exempt without a request if it is a nonconforming engine under your ownership and control and you operate it to develop products, assess production methods, or promote your engines in the marketplace. You may not lease, sell, or use the engine to generate revenue, either by itself or in a piece of equipment.

(c) To use this exemption, you must do three things:

(1) Establish, maintain, and keep adequately organized and indexed information on each exempted engine, including the engine identification number, the use of the engine on exempt status, and the final disposition of any engine removed from exempt status.

(2) Let us access these records, as described in § 1068.20.

(3) Add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(i) The label heading ''EMISSION CONTROL INFORMATION.''

(ii) Your corporate name and trademark.

(iii) Engine displacement, engine family identification, and model year of the engine or whom to contact for further information.

(iv) The statement ''THIS ENGINE IS EXEMPT UNDER 40 CFR 1068.210 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

§ 1068.215 What are the provisions for exempting display engines?

(a) You are only eligible for the exemption for display engines if you are a certificate holder.

(b) A display engine is exempt without a request if it is a nonconforming engine you use only for displays in the interest of a business or the general public. This exemption does not apply to engines displayed for any of the following:

(1) For private use.

(2) For other purposes that are not available to the public daily.

(3) For any other purpose we determine is inappropriate for a display exemption.

(c) You may operate the exempted engine, but only if the operation is part of the display. You may not sell or lease a display engine or use it to generate revenue without a certificate of conformity and an engine label.

(d) To use this exemption, you must add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(1) The label heading ''EMISSION CONTROL INFORMATION.''

(2) Your corporate name and trademark.

(3) Engine displacement, engine family identification, and model year of the engine or whom to contact for further information.

(4) The statement ''THIS ENGINE IS EXEMPT UNDER 40 CFR 1068.215 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

§ 1068.220 What are the provisions for exempting engines for national security?

(a) You are only eligible for the exemption for national security if you are an engine manufacturer.

(b) Your engine is exempt without a request if you produce it for a piece of equipment owned or used by an agency of the federal government responsible for national defense, where the equipment has armor, permanently attached weaponry, or other substantial features typical of military combat.

(c) You may request a national security exemption for engines not meeting the conditions of paragraph (b) of this section, as long as your request is endorsed by an agency of the federal government responsible for national defense. In your request, explain why you need the exemption.

§ 1068.225 What are the provisions for exempting engines for export?

(a) If you export a new engine to a country with emission standards identical to ours, we will not exempt it. These engines must comply with our certification requirements.

(b) If you export an engine to a country with different emission standards or no emission standards, it is exempt from the prohibited acts in this part without a request. If you produce an exempt engine for export and it is sold or offered for sale to someone in the United States (except for export), we will void the exemption.

(c) Label each exempted engine and shipping container with a label or tag showing the engine is not certified for sale or use in the United States. The label must include at least the statement ''THIS ENGINE IS SOLELY FOR EXPORT AND IS THEREFORE IS EXEMPT UNDER 40 CFR 1068.225 FROM U.S. EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

§ 1068.230 What are the provisions for exempting engines used solely for competition?

(a) If you modify an engine after it has been placed into service in the United States so it will be used solely for competition, it is exempt without request. This exemption applies only to the prohibition in § 1068.101(b)(1) and is valid only as long as the engine is used solely for competition.

(b) If you modify an engine under this exemption, you must destroy the original emissions label. If you sell or give one of these engines to someone else, you must tell the new owner in writing that it may be used only for competition.

(c) New engines you produce that are used solely for competition are generally excluded from emission standards. See the standard-setting parts for specific provisions.

§ 1068.235 What are the provisions for exempting new replacement engines?

(a) You are only eligible for the exemption for new replacement engines if you are a certificate holder.

(b) The prohibitions in § 1068.101(a)(1) do not apply to an engine if all the following conditions apply:

(1) You produce a new engine to replace an engine already placed in service in a piece of equipment.

(2) The engine being replaced was manufactured before the emission standards that would otherwise apply to the new engine took effect.

(3) No engine certified to current emission requirements is available with the appropriate physical or performance characteristics for the piece of equipment.

(4) You or your agent takes possession of the old engine.

(5) You clearly label the replacement engine with the following language, or similar alternate language that we approve:

THIS ENGINE DOES NOT COMPLY WITH FEDERAL NONROAD OR HIGHWAY EMISSION REQUIREMENTS. SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN AS A REPLACEMENT ENGINE IN A VEHICLE OR PIECE OF EQUIPMENT BUILT BEFORE JANUARY 1, [INSERT APPROPRIATE YEAR] IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.

(6) You make the replacement engine in a configuration identical in all material respects to the engine being replaced (or that of another certified engine of the same or later model year). This requirement applies only if the old engine was certified to emission standards less stringent than those in effect when you produce the replacement engine.

§ 1068.240 What temporary provisions address hardship due to unusual circumstances?

(a) After considering the circumstances, we may permit you to introduce into commerce engines or equipment that do not comply with emission standards if all the following conditions and requirements apply:

(1) Unusual circumstances that are clearly outside your control and that could not have been avoided with reasonable discretion prevent you from meeting requirements from this chapter.

(2) You exercised prudent planning and were not able to avoid the violation; you have taken all reasonable steps to minimize the extent of the nonconformity.

(3) Not having the exemption will jeopardize the solvency of your company.

(4) No other allowances are available under the regulations in this chapter to avoid the impending violation.

(b) To apply for an exemption, you must send the Designated Officer a written request as soon as possible before you are in violation. In your request, show that you meet all the conditions and requirements in paragraph (a) of this section.

(c) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(d) You must give us other relevant information if we ask for it.

(e) We may include reasonable additional conditions on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit or paying fees to offset any economic gain resulting from the exemption. For example, in the case of multiple tiers of emission standards, we may require that you meet the less stringent standards.

§ 1068.241 What are the provisions for extending compliance deadlines for small-volume manufacturers under hardship?

(a) After considering the circumstances, we may extend the compliance deadline for you to meet new or revised emission standards, as long as you meet all the conditions and requirements in this section.

(b) To be eligible for this exemption, you must qualify under the standard-setting part for special provisions for small businesses or small-volume manufacturers.

(c) To apply for an extension, you must send the Designated Officer a written request. In your request, show that all the following conditions and requirements apply:

(1) You have taken all possible business, technical, and economic steps to comply.

(i) In the case of importers, show that you are unable to find a manufacturer capable of supplying complying products.

(ii) For all other manufacturers, show that the burden of compliance costs prevents you from meeting the requirements of this chapter.

(2) Not having the exemption will jeopardize the solvency of your company.

(3) No other allowances are available under the regulations in this chapter to avoid the impending violation.

(d) In describing the steps you have taken to comply under paragraph (c)(1) of this section, include at least the following information:

(1) Describe your business plan, showing the range of projects active or under consideration.

(2) Describe your current and projected financial standing, with and without the burden of complying with regulations.

(3) Describe your efforts to raise capital to comply with regulations.

(4) Identify the engineering and technical steps you have taken or plan to take to comply with regulations.

(5) Identify the level of compliance you can achieve. For example, you may be able to produce engines that meet a somewhat less stringent emission standard than the regulations in this chapter require.

(e) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(f) You must give us other relevant information if we ask for it.

(g) An authorized representative of your company must sign the request and include the statement: ''All the information in this request is true and accurate, to the best of my knowledge.''.

(h) Send your request for this extension at least nine months before the relevant deadline. If different deadlines apply to companies that are not small-volume manufacturers, do not send your request before the regulations in question apply to the other manufacturers. Otherwise, do not send your request more than three years before the relevant deadline.

(i) We may include reasonable requirements on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit. For example, we may require that you meet a less stringent emission standard or buy and use available emission credits.

(j) We will approve extensions of up to one year. We may review and revise an extension as reasonable under the circumstances.

§ 1068.245 What are the provisions for exempting engines for hardship for equipment manufacturers?

(a) *Equipment exemption.* As an equipment manufacturer in the case of an engine-based standard, you may ask for approval to produce exempted equipment for up to one year. Send the Designated Officer a written request for an exemption before you are in violation. In your request, show you are not at fault for the impending violation and that you would face serious economic hardship if we do not grant the exemption. This exemption is not available if you manufacture the engine you need for your own equipment, unless we allow it elsewhere in this chapter. We may impose other conditions, including provisions to recover the lost environmental benefit.

(b) *Engine exemption.* As an engine manufacturer, you may produce nonconforming engines for the equipment we exempt in paragraph (a) of this section. You do not have to request this exemption for your engines, but you must have written assurance from equipment manufacturers that they need a certain number of exempted engines under this section. Add a permanent, legible label, written in block letters in English, to a readily visible part of each exempted engine. This label must include at least the following items:

(1) The label heading ''EMISSION CONTROL INFORMATION.''

(2) Your corporate name and trademark.

(3) Engine displacement (in liters), rated power, and model year of the engine or whom to contact for further information.

(4) The statement ''THIS ENGINE IS EXEMPT UNDER 40 CFR 1068.245 FROM EMISSION STANDARDS AND RELATED REQUIREMENTS.''.

Subpart D—Imports

§ 1068.301 Does this subpart apply to me?

(a) This subpart applies to you if you import into the United States engines or equipment subject to our emission standards or equipment containing engines subject to our emission standards.

(b) In general, engines that you import must be covered by a certificate of conformity unless they were built before emission standards started to apply. This subpart describes the limited cases where we allow importation of exempt or excluded engines.

(c) The U.S. Customs Service may prevent you from importing an engine if you do not meet the requirements of this subpart. In addition, U.S. Customs Service regulations may contain other requirements for engines imported into the United States (see 19 CFR Chapter I).

§ 1068.305 How do I get an exemption or exclusion for imported engines?

(a) Prepare a written request in which you do the following:

(1) Give your name, address, telephone number, and taxpayer identification number.

(2) Give the engine owner's name, address, telephone number, and taxpayer identification number.

(3) Identify the make, model, identification number, and original production year of each engine.

(4) Identify which exemption or exclusion in this subpart allows you to import a nonconforming engine and describe how your engine qualifies.

(5) Tell us where you will keep your engines if you might need to store them until we approve your request.

(6) Authorize us to inspect or test your engines as the Act allows.

(b) We may ask for more information.

(c) You may import the nonconforming engines you identify in your request if you get prior written approval from us. The U.S. Customs Service may require you to show them the approval letter. We may temporarily or permanently approve the exemptions or exclusions, as described in this subpart.

(d) Make sure the engine meets any labeling requirements that apply, as described in this subpart.

§ 1068.310 What are the exclusions for imported engines?

The emission standards of this part do not apply to excluded engines that you import. If you show us that your engines qualify under one of the following provisions, we will approve your request to exclude engines:

(a) *Engines used solely for competition.* See the standard-setting part for any special provisions that apply to engines used solely for competition. Section 1068.101(b)(4) prohibits using these engines for other purposes.

(b) *Stationary engines.* This includes engines that will be used in a permanently fixed location and engines meeting the criteria for the exclusion in paragraph (2)(iii) of the nonroad engine definition in § 1068.25. Section 1068.101(b)(3) prohibits using these engines for other purposes.

(c) *Hobby engines.* See 40 CFR 90.1.

(d) *Engines used in aircraft.* See 40 CFR part 87.

(e) *Engines used in underground mining.* See 40 CFR 89.1.

§ 1068.315 What are the permanent exemptions for imported engines?

We may approve a permanent exemption for an imported engine under the following conditions:

(a) *National security exemption.* You may an import engine under the national security exemption in § 1068.220.

(b) *Manufacturer-owned engine exemption.* You may import a manufacturer-owned engine, as described in § 1068.210.

(c) *Replacement engine exemption.* You may import a nonconforming replacement engine as described in § 1068.235. To use this exemption, you must be a certificate holder for an engine family we regulate under the same part as the replacement engine.

(d) *Extraordinary circumstances exemption.* You may import a nonconforming engine if we grant hardship relief as described in § 1068.240.

(e) *Hardship exemption.* You may import a nonconforming engine if we grant an exemption for the transition to new or revised emission standards, as described in § 1068.245.

(f) *Identical configuration exemption.* You may import a nonconforming engine if it is identical to certified engines, subject to the following provisions:

(1) You may import only the following engines under this exemption:

(i) Large nonroad spark-ignition engines (see part 1048 of this chapter).

(ii) Recreational nonroad spark-ignition engines and equipment (see part 1051 of this chapter).

(2) You must meet all the following criteria:

(i) You have owned the engine for at least one year.

(ii) You agree not to sell, lease, donate, trade, or otherwise transfer ownership of the engine for at least five years, or until the engine is eligible for the exemption in paragraph (h) of this section. The only acceptable way to dispose of the engine is to destroy or export it.

(iii) You use data or evidence sufficient to show that the engine is in a configuration that is the same as an engine the original manufacturer has certified to meet emission standards that apply at the time the manufacturer finished assembling or modifying the engine in question. If you modify the engine to make it identical, you must follow the original manufacturer's complete written instructions.

(3) We will tell you in writing if we find the information insufficient to show that the engine is eligible for this exemption. In this case, we will not consider your request further until you address our concerns.

(g) *Personal-use exemption.* You may import a nonconforming engine for your personal use.

(1) You may import only the number of engines shown in the following Table 1 during your lifetime:

TABLE 1 OF § 1068.315.—NUMBER OF ENGINES ALLOWED UNDER THE PERSONAL-USE EXEMPTION

Type of engine or equipment	Standard-setting part	Maximum number of engines
Large nonroad spark-ignition engines	1048	1
Recreational nonroad spark-ignition engines and equipment	1051	3

(2) To use this exemption, you must meet both the following criteria:

(i) You have owned the engine for at least one year.

(ii) You agree not to sell, lease, donate, trade, or otherwise transfer ownership of the engine for at least five years, or until the engine is eligible for the exemption in paragraph (h) of this section. The only acceptable way to dispose of the engine is to destroy or export it.

(3) You do not need our approval, but you must send the Designated Officer a form in which you do the following:

(i) Identify the engine importer's name, address, telephone number, and taxpayer identification number.

(ii) Identify your name, address, telephone number, and taxpayer identification number.

(iii) State the number of each type of engine that you have ever imported under this exemption.

(iv) State that you agree not to sell or lease the engine in the United States.

(v) Identify the engine's make, model, and identification number as well as the year the manufacturer finished assembling the engine.

(vi) Authorize us to inspect as the Act and the regulations permit.

(4) Respond promptly if we ask for more information.

(h) Ancient engine exemption. If you are not the original engine manufacturer, you may import a nonconforming engine that was first manufactured at least 21 years earlier, as long as it is still in its original configuration.

§ 1068.320 How must I label an imported engine with a permanent exemption?

(a) For engines imported under § 1068.315 (a), (b), (c), (d), or

(e), you must place a permanent label or tag on each engine. If no specific label requirements from subpart C of this part apply, you must meet the following requirements:

(1) Attach the label or tag in one piece so no one can remove it without destroying or defacing it.

(2) Make sure it is durable and readable for the engine's entire life.

(3) Secure it to a part of the engine needed for normal operation and not normally requiring replacement.

(4) Write it in block letters in English.

(5) Make it readily visible to the average person after the engine is installed in the equipment.

(b) On the engine label or tag, do the following:

(1) Include the heading ''Emission Control Information.''

(2) Include your full corporate name and trademark.

(3) State the engine displacement (in liters) and rated power.

(4) State: ''THIS ENGINE IS EXEMPT FROM THE REQUIREMENTS OF [identify the part referenced in 40 CFR 1068.1(a) that would otherwise apply], AS PROVIDED IN [identify the paragraph authorizing the exemption (for example, ''40 CFR 1068.315(a)'')]. INSTALLING THIS ENGINE IN ANY DIFFERENT APPLICATION IS A VIOLATION OF FEDERAL LAW SUBJECT TO CIVIL PENALTY.''.

(c) Get us to approve alternate label language if it is more accurate for your engine.

§ 1068.325 What are the temporary exemptions for imported engines?

If we approve a temporary exemption for an engine, you may import it under the conditions in this section. We may ask the U.S. Customs Service to require a specific bond amount to make sure you comply with the requirements of this subpart. You may not sell or lease one of these engines while it is in the United States. You must eventually export the engine as we describe in this section unless you get a certificate of conformity for it or it qualifies for one of the permanent exemptions in § 1068.315.

(a) *Exemption for repairs or alterations.* You may temporarily import a nonconforming engine under bond solely to repair or alter it. You may operate the engine in the United States only to repair or alter it or to ship it to or from the service location. Export the engine directly after the engine servicing is complete.

(b) *Testing exemption.* You may temporarily import a nonconforming engine under bond for testing if you follow the requirements of § 1068.205. You may operate the engine in the United States only to allow testing. This exemption expires one year after you import the engine, unless we approve a one-time request for an extension of up to one more year. The engine must be exported before the exemption expires.

(c) *Display exemption.* You may temporarily import a nonconforming engine under bond for display, as described in § 1068.215. This exemption expires one year after you import the engine, unless we approve your request for an extension. We may approve an extension of up to one more year for each request, but no more than three years in total. The engine must be exported by the time the exemption expires or directly after the display concludes, whichever comes first.

(d) *Export exemption.* You may temporarily import a nonconforming engine to export it, as described in § 1068.225. You may operate the engine in the United States only as needed to prepare it for export. Label the engine as described in § 1068.225.

(e) *Diplomatic or military exemption.* You may temporarily import nonconforming engines without bond if you represent a foreign government in a diplomatic or military capacity. In your request to the Designated Officer (see § 1068.305), include either written confirmation from the U.S. State Department that you qualify for this exemption or a copy of your orders for military duty in the United States. We will rely on the State Department or your military orders to determine when your diplomatic or military status expires, at which time you must export your exempt engines.

§ 1068.330 What are the penalties for violations?

(a) *All imported engines.* Unless you comply with the provisions of this subpart, importation of nonconforming engines is violation of sections 203 and 213(d) of the Act. You may then have to export the engines, or pay civil penalties, or both. The U.S. Customs Service may seize unlawfully imported engines.

(b) *Temporarily imported engines.* If you do not comply with the provisions of this subpart for a temporary exemption, you may forfeit the total amount of the bond in addition to the sanctions we identify in paragraph (a) of this section. We will consider an engine

to be exported if it has been destroyed or delivered to the U.S. Customs Service for export or other disposition under applicable Customs laws and regulations. EPA or the U.S. Customs Service may offer you a grace period to allow you to export a temporarily exempted engine without penalty after the exemption expires.

Subpart E—Selective Enforcement Auditing

§ 1068.401 What is a selective enforcement audit?

(a) We may conduct or require you to conduct emission tests on your production engines in a selective enforcement audit. This requirement is independent of any requirement for you to routinely test production-line engines.

(b) If we send you a signed test order, you must follow its directions and the provisions of this subpart. We will tell you where to test the engines. This may be where you produce the engines or any other emission testing facility.

(c) If we select one or more of your engine families for a selective enforcement audit, we will send the test order to the person who signed the application for certification or we will deliver it in person.

(d) Within one working day of receiving the test order, notify the Designated Officer which test facility you have selected for emission testing.

(e) You must do everything we require in the audit without delay.

§ 1068.405 What is in a test order?

(a) In the test order, we will specify the following things:

(1) The engine family and configuration (if any) we have identified for testing.

(2) The engine assembly plant, storage facility, or (if you import the engines) port facility from which you must select engines.

(3) The procedure for selecting engines for testing, including a selection rate.

(4) The test procedures, duty cycles, and test points, as appropriate, for testing the engines to show that they meet emission standards.

(b) We may state that we will select the test engines.

(c) We may identify alternate engine families or configurations for testing in case we determine the intended engines are not available for testing or if you do not produce enough engines to meet the minimum rate for selecting test engines.

(d) We may include other directions or information in the test order.

(e) We may ask you to show us that you meet any additional requirements that apply to your engines (closed crankcases, for example).

(f) In anticipation of a potential audit, you may give us a list of your preferred engine families and the corresponding assembly plants, storage facilities, or (if you import the engines) port facilities from which we should select engines for testing. The information would only apply for a single model year, so it would be best to include this information in your application for certification. If you give us this list before we issue a test order, we will consider your recommendations, but we may select engines differently.

(g) If you also do routine production-line testing with the selected engine family in the same time period, the test order will tell you what changes you might need to make in your production-line testing schedule.

§ 1068.410 How must I select and prepare my engines?

(a) *Selecting engines.* Select engines as described in the test order. If you are unable to select test engines this way, you may ask us to approve an alternate plan, as long as you make the request before you start selecting engines.

(b) *Assembling engines.* Produce and assemble test engines using your normal production and assembly process for that engine family.

(1) Notify us directly if you make any change in your production, assembly, or quality control processes that might affect emissions between the time you receive the test order and the time you finish selecting test engines.

(2) If you do not fully assemble engines at the specified location, we will describe in the test order how to select components to finish assembling the engines. Assemble these components onto the test engines using your documented assembly and quality control procedures.

(c) *Modifying engines.* Once an engine is selected for testing, you may adjust, repair, prepare, or modify it or check its emissions only if one of the following is true:

(1) You document the need for doing so in your procedures for assembling and inspecting all your production engines and make the action routine for all the engines in the engine family.

(2) This subpart otherwise allows your action.

(3) We approve your action in advance.

(d) *Engine malfunction.* If an engine malfunction prevents further emission testing, ask us to approve your decision to either repair the engine or delete it from the test sequence.

(e) *Setting adjustable parameters.* Before any test, we may adjust or require you to adjust any adjustable parameter to any setting within its physically adjustable range.

(1) We may adjust idle speed outside the physically adjustable range as needed until the engine has stabilized emission levels (see paragraph (e) of this section). We may ask you for information needed to establish an alternate minimum idle speed.

(2) We may make or specify adjustments within the physically adjustable range by considering their effect on emission levels, as well as how likely it is someone will make such an adjustment with in-use engines.

(f) *Stabilizing emission levels.* Before you test production-line engines, you may operate the engine to stabilize the emission levels. Using good engineering judgment, operate your engines in a way that represents the way production engines will be used. You may operate each engine for no more than the greater of two periods:

(1) 50 hours.

(2) The number of hours you operated your emission-data engine for certifying the engine family (see 40 CFR part 1065, subpart E).

(g) *Damage during shipment.* If shipping an engine to a remote facility for production-line testing makes necessary an adjustment or repair, you must wait until after the after the initial emission test to do this work. We may waive this requirement if the test would be impossible or unsafe, or if it would permanently damage the engine. Report to us, in your written report under § 1068.450, all adjustments or repairs you make on test engines before each test.

(h) *Shipping engines.* If you need to ship engines to another facility for testing, make sure the test engines arrive at the test facility within 24 hours after being selected. You may ask that we allow more time if you are unable to do this.

(i) *Retesting after invalid tests.* You may retest an engine if you determine an emission test is invalid. Explain in your written report reasons for invalidating any test and the emission results from all tests. If you retest an engine and, within ten days after testing, ask to substitute results of the new tests for the original ones, we will answer within ten days after we receive your information.

§ 1068.415 How do I test my engines?

(a) Use the test procedures in part 1065 of this chapter that apply to your engines to show they meet emission standards. The test order will give further testing instructions.

(b) If no test cells are available at a given facility, you may make alternate testing arrangements with our approval.

(c) Test at least two engines in each 24-hour period (including void tests). However, if your projected U.S. nonroad engine sales are less than 7,500 for the year, you may test a minimum of one engine per 24-hour period. If you request and justify it, we may approve a lower testing rate.

(d) Accumulate service on test engines at a minimum rate of 6 hours per engine during each 24-hour period. The first 24-hour period for service accumulation begins when you finish preparing an engine for testing. The minimum service accumulation rate does not apply on weekends or holidays. You may ask us to approve a lower service accumulation rate. Plan your service accumulation to allow testing at the rate specified in § 1068.415. Select engine operation for accumulating operating hours on your test engines to represent normal in-use engine operation for the engine family.

(e) Test engines is the same order you select them.

§ 1068.420 How do I know when my engine family does not comply?

(a) A failed engine is one whose final deteriorated test results exceed an applicable emission standard for any regulated pollutant.

(b) Continue testing engines until you reach a pass decision for all pollutants or a fail decision for one pollutant.

(c) You reach a pass decision when the number of failed engines is less than or equal to the pass decision number in Appendix A to this subpart for the total number of engines tested. You reach a fail decision when the number of failed engines is greater than or equal to the fail decision number in Appendix A to this subpart for the total number of engines you test. An acceptable quality level of 40 percent is the basis for the pass or fail decision.

(d) Consider test results in the same order as the engine testing sequence.

(e) If you reach a pass decision for one pollutant, but need to continue testing for another pollutant, we will disregard these later test results for the pollutant with the pass decision.

(f) Appendix A to this subpart lists multiple sampling plans. Use the sampling plan for the projected sales volume you reported in your application for the audited engine family.

(g) We may choose to stop testing after any number of tests.

(h) If we test some of your engines in addition to your own testing, we may decide not to include your test results as official data for those engines if there is substantial disagreement between your testing and our testing. We will reinstate your data as valid if you show us that we made an error and your data are correct.

(i) If we rely on our test data instead of yours, we will notify you in writing of our decision and the reasons we believe your facility is not appropriate for doing the tests we require under this subpart. You may request in writing that we consider your test results from the same facility for future testing if you show us that you have made changes to resolve the problem.

§ 1068.425 What happens if one of my production-line engines exceeds the emission standards?

(a) If one of your production-line engines fails to meet one or more emission standards (see § 1068.420), the certificate of conformity is automatically suspended for that engine. You must take the following actions before your certificate of conformity can cover that engine:

(1) Correct the problem and retest the engine to show it complies with all emission standards.

(2) Include in your written report a description of the test results and the remedy for each engine (see § 1068.450).

(b) You may at any time ask for a hearing to determine whether the tests and sampling methods were proper (see § 1068.601).

§ 1068.430 What happens if an engine family does not comply?

(a) We may suspend your certificate of conformity for an engine family if it fails to comply under § 1068.420. The suspension may apply to all facilities producing engines from an engine family, even if you find noncompliant engines only at one facility.

(b) We will tell you in writing if we suspend your certificate in whole or in part. We will not suspend a certificate until at least 15 days after the engine family became noncompliant. The suspension is effective when you receive our notice.

(c) Up to 15 days after we suspend the certificate for an engine family, you may ask for a hearing to determine whether the tests and sampling methods were proper (see § 1068.601). If we agree before a hearing that we used erroneous information in deciding to suspend the certificate, we will reinstate the certificate.

§ 1068.435 May I sell engines from an engine family with a suspended certificate of conformity?

You may sell engines that you produce after we suspend the engine family's certificate of conformity only if one of the following occurs:

(a) You test each engine you produce and show it complies with emission standards that apply.

(b) We conditionally reinstate the certificate for the engine family. We may do so if you agree to recall all the affected engines and remedy any noncompliance at no expense to the owner if later testing shows that the engine family still does not comply.

§ 1068.440 How do I ask EPA to reinstate my suspended certificate?

(a) Send us a written report asking us to reinstate your suspended certificate. In your report, identify the reason for noncompliance, propose a remedy, and commit to a date for carrying it out. In your proposed remedy include any quality control measures you propose to keep the problem from happening again.

(b) Give us data from production-line testing that shows the remedied engine family complies with all the emission standards that apply.

§ 1068.445 When may EPA revoke my certificate under this subpart and how may I sell these engines again?

(a) We may revoke your certificate for an engine family in the following cases:

(1) You do not meet the reporting requirements.

(2) Your engine family fails to meet emission standards and your proposed remedy to address a suspended certificate is inadequate to solve the problem or requires you to change the engine's design or emission-control system.

(b) To sell engines from an engine family with a revoked certificate of conformity, you must modify the engine family and then show it complies with the applicable requirements.

(1) If we determine your proposed design change may not control emissions for the engine's full useful life, we will tell you within five working days after receiving your report. In this case we will decide whether production-line testing will be enough for us to evaluate the change or whether you need to do more testing.

(2) Unless we require more testing, you may show compliance by testing production-line engines as described in this subpart.

(3) We will issue a new or updated certificate of conformity when you have met these requirements.

§ 1068.450 What records must I send to EPA?

(a) Within 30 calendar days of the end of each audit, send us a report with the following information:

(1) Describe any facility used to test production-line engines and state its location.

(2) State the total U.S.-directed production volume and number of tests for each engine family.

(3) Describe your test engines, including the engine family's identification and the engine's model year, build date, model number, identification number, and number of hours of operation before testing for each test engine.

(4) Identify where you accumulated hours of operation on the engines and describe the procedure and schedule you used.

(5) Provide the test number; the date, time and duration of testing; test procedure; initial test results before and after rounding; final test results; and final deteriorated test results for all tests. Provide the emission figures for all measured pollutants. Include information for both valid and invalid tests and the reason for any invalidation.

(6) Describe completely and justify any nonroutine adjustment, modification, repair, preparation, maintenance, or test for the test engine if you did not report it separately under this subpart. Include the results of any emission measurements, regardless of the procedure or type of equipment.

(7) Report on each failed engine as described in § 1068.425.

(b) We may ask you to add information to your written report, so we can determine whether your new engines conform with the requirements of this subpart.

(c) An authorized representative of your company must sign the following statement:

> We submit this report under Sections 208 and 213 of the Clean Air Act. Our testing conformed completely with the requirements of 40 CFR part 1068. We have not changed production processes or quality-control procedures for the engine family in a way that might affect the emission control from production engines. All the information in this report is true and accurate, to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)

(d) Send reports of your testing to the Designated Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(e) We will send copies of your reports to anyone from the public who asks for them. We will release information about your sales or production volumes, which is all we will consider confidential.

§ 1068.455 What records must I keep?

(a) We may review your records at any time, so it is important to keep required information readily available. Organize and maintain your records as described in this section.

(b) Keep paper records for testing under this subpart for one full year after you complete all the testing required for the selective enforcement audit. For additional storage, you may use any format or media.

(c) Keep a copy of the written reports described in § 1068.450.

(d) Keep the following additional records:

(1) The names of supervisors involved in each test.

(2) The name of anyone who authorizes adjusting, repairing, preparing, or modifying a test engine and the names of all supervisors who oversee this work.

(3) If you shipped the engine for testing, the date you shipped it, the associated storage or port facility, and the date the engine arrived at the testing facility.

(4) Any records related to your audit that are not in the written report.

(5) A brief description of any significant events during testing not otherwise described in the written report or in this section.

(e) If we ask, you must give us projected or actual production for an engine family. Include each assembly plant if you produce engines at more than one plant.

(f) We may ask you to keep or send other information necessary to implement this subpart.

Appendix A to Subpart E of Part 1068—Plans for Selective Enforcement Auditing

The following tables describe sampling plans for selective enforcement audits, as described in § 1068.420:

TABLE A–1.—SAMPLING PLAN CODE LETTER

Projected engine family sales	Code letter[1]	Minimum number of tests		Maximum
		to pass	to fail	number of tests
20–50	AA	3	5	20
20–99	A	4	6	30
100–299	B	5	6	40
300–499	C	5	6	50
500+	D	5	6	60

[1] A manufacturer may optionally use either the sampling plan for code letter ''AA'' or sampling plan for code letter ''A'' for Selective Enforcement Audits of engine families with annual sales between 20 and 50 engines. Additionally, the manufacturer may switch between these plans during the audit.

TABLE A–2.—SAMPLING PLANS FOR DIFFERENT ENGINE FAMILY SALES VOLUMES

Stage[a]	AA		A		B		C		D	
	pass #	fail #	pass #	fail #	pass #	fail #	pass #	fail #	pass #	fail #
1										
2										

TABLE A–2.—SAMPLING PLANS FOR DIFFERENT ENGINE FAMILY SALES VOLUMES—Continued

Stage[a]	AA		A		B		C		D	
	pass #	fail #	pass #	fail #	pass #	fail #	pass #	fail #	pass #	fail #
3	0	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	0	.....	0	.....	.....	.....	.....	.....	.....	.....
5	1	5	0	.....	0	.....	0	.....	0	.....
6	1	6	1	6	1	6	0	6	0	6
7	2	6	1	7	1	7	1	7	1	7
8	2	7	2	7	2	7	2	7	2	8
9	3	7	2	8	2	8	2	8	2	8
10	3	8	3	8	3	8	3	9	3	9
11	4	8	3	8	3	9	3	9	3	9
12	4	9	4	9	4	9	4	10	4	10
13	5	9	5	10	4	10	4	10	4	10
14	5	10	5	10	5	10	5	11	5	11
15	6	10	6	11	5	11	5	11	5	11
16	6	10	6	11	6	12	6	12	6	12
17	7	10	7	12	6	12	6	12	6	12
18	8	10	7	12	7	13	7	13	7	13
19	8	10	8	13	8	13	7	13	7	13
20	9	10	8	13	8	14	8	14	8	14
21	.....	.....	9	14	9	14	8	14	8	14
22	.....	.....	10	14	9	15	9	15	9	15
23	.....	.....	10	15	10	15	10	15	9	15
24	.....	.....	11	15	10	16	10	16	10	16
25	.....	.....	11	16	11	16	11	16	11	16
26	.....	.....	12	16	11	17	11	17	11	17
27	.....	.....	12	17	12	17	12	17	12	17
28	.....	.....	13	17	12	18	12	18	12	18
29	.....	.....	14	17	13	18	13	18	13	19
30	.....	.....	16	17	13	19	13	19	13	19
31	.....	.....	.....	.....	14	19	14	19	14	20
32	.....	.....	.....	.....	14	20	14	20	14	20
33	.....	.....	.....	.....	15	20	15	20	15	21
34	.....	.....	.....	.....	16	21	15	21	15	21
35	.....	.....	.....	.....	16	21	16	21	16	22
36	.....	.....	.....	.....	17	22	16	22	16	22
37	.....	.....	.....	.....	17	22	17	22	17	23
38	.....	.....	.....	.....	18	22	18	23	17	23
39	.....	.....	.....	.....	18	22	18	23	18	24
40	.....	.....	.....	.....	21	22	19	24	18	24
41	.....	.....	.....	.....	.....	.....	19	24	19	25
42	.....	.....	.....	.....	.....	.....	20	25	19	26
43	.....	.....	.....	.....	.....	.....	20	25	20	26

TABLE A–2.—SAMPLING PLANS FOR DIFFERENT ENGINE FAMILY SALES VOLUMES—Continued

Stage[a]	AA		A		B		C		D	
	pass #	fail #	pass #	fail #	pass #	fail #	pass #	fail #	pass #	fail #
44							21	26	21	27
45							21	27	21	27
46							22	27	22	28
47							22	27	22	28
48							23	27	23	29
49							23	27	23	29
50							26	27	24	30
51									24	30
52									25	31
53									25	31
54									26	32
55									26	32
56									27	33
57									27	33
58									28	33
59									28	33
60									32	33

[a] Stage refers to the cumulative number of engines tested.

Subpart F—Defect Reporting and Recall

§ 1068.501 How do I report engine defects?

(a) As an engine manufacturer, if you learn that an emission-related defect exists in the number of engines identified as Number to Submit Defect Report in Table 1 of § 1068.501, you must send the Designated Officer a report within 15 working days and follow the other instructions in this section. This requirement applies whether you learn of the defects from a method you established to track safety or performance characteristics, from the investigation procedures set forth in paragraph (d) of this section, or from any other information.

(1) Include each occurrence of the defect in the count of engines, rather than limiting it to individual engine families or a single model year.

(2) Include all defects you observe for the following periods:

(i) For engines with rated power under 225 kW, five years from the end of each engine's model year.

(ii) For engines with rated power 225 kW or greater, eight years from the end of each engine's model year.

(3) Count an engine even if you correct the defect before it reaches the ultimate buyer.

(4) Table 1 follows:

TABLE 1 OF § 1068.501.—NUMBER OF ENGINES FOR FILING REPORT OR COMMENCING INVESTIGATION

Number of engines in family	If component is anything but a catalyst		If component is a catalyst	
	Number to commence Investigation	Number to submit defect report	Number to commence Investigation	Number to submit defect report
10,000	400	25	200	13
20,000	800	50	400	25
30,000	1,200	75	600	38
40,000	1,600	100	800	50
50,000	2,000	125	1,000	63
60,000	2,400	150	1,200	75
70,000	2,800	175	1,400	88
80,000	3,200	200	1,600	100
90,000	3,600	225	1,800	113
100,000	4,000	250	2,000	125
200,000 or more	4000	250	2000	125

(b) Include the following information in your report (in this general outline format):

(1) State your corporate name.

(2) Describe the defect.

(3) Describe which engines may have the defect, including engine model, range of production dates, purchaser, and any other information that may be needed to identify the affected engines.

(4) Estimate the number of each class or category of affected engines that have or may have the defect and explain how you determined this number.

(5) Identify where you produced each class or category of affected engines.

(6) Evaluate the emissions impact of the defect

(7) Describe any operational or performance problems a defective engine might have.

(8) Include any available emission data related to the defect.

(9) Describe your plan for addressing the defect.

(c) If you revise or later obtain information required by paragraph (b) of this section, send it to us as it becomes available.

(d) As an engine manufacturer, you must conduct an investigation to determine if an emission-related defect exists in the Number to Submit Defect Report or more of your engines as follows:

(1) If any of the following contingencies occur you must start an investigation to determine if a defect exists in the Number to Submit Defect Report or more of your engines:

(i) The number of Federal warranty claims for a specific emission-related component is at the number identified as the Number to Commence an Investigation in Table 1 of this section. Federal warranty claims are warranty claims submitted pursuant to any warranty established under Title II of the Clean Air Act or other warranty applicable to an emission-related device or element of design as specified in Appendix VIII of 40 CFR part 85.

(ii) Systems you have for monitoring information from dealers, hot line complaints, or other information systematically submitted, indicates a higher than normal occurrence of potential defects in an emission-related component or element of design.

(iii) Any other information indicates that there may be a defect in an emission-related component or element of design.

(2) If any of the contingencies set forth in paragraph (d)(1) of this section occur, then you shall promptly commence and conduct an investigation to determine if a specific emission-related defect exists and if it is present in the Number to Submit Defect Report or more engines. The investigation shall be performed in a thorough manner, shall include consideration of all relevant information, and shall be conducted in accordance with scientific and engineering principles. Relevant information to be considered shall include information on design, function, rate of failure, use, and any other information available to you.

(3) If an investigation concludes with the determination that there is not an emission-related defect in at least as many engines as the Number to Submit Defect Report, then you shall make a determination whether to commence a continued investigation. A continued investigation should be commenced if there is an indication that there may be new information which would indicate the existence of an emission related-defect in the Number to Submit Defect Report or more engines.

(4) Even if an investigation is being conducted or in any other event, if you have actual knowledge of an emission-related defect in the Number to Submit Defect Report or more of your engines, you must timely submit a report to the Designated Officer, as set forth in paragraph (a) of this section.

§ 1068.505 How does the recall program work?

(a) If we determine that a substantial number of properly maintained and used engines do not meet the requirements of this chapter throughout their useful life, we will tell you in writing. Our notice will identify the class or category of engines affected and describe how we reached our conclusion. If this happens, you must meet the requirements and follow the instructions in this subpart. You must remedy at your expense noncompliant engines that have been properly maintained and used. You may not transfer this expense to a dealer or equipment manufacturer through a franchise or other agreement.

(b) You may ask for a hearing if you disagree with our determination (see § 1068.601)

(c) Unless we withdraw the determination of noncompliance, you must respond to it by sending a remedial plan to the Designated Officer by the later of these two deadlines:

(1) Within 60 days after we notify you.

(2) Within 60 days after a public hearing.

(d) If you learn that your engine family does not meet the requirements of this chapter and we have not ordered you to recall noncomplying engines, you may voluntarily recall them, as described in § 1068.535.

(e) Once you have sold an engine to the ultimate purchaser, we may inspect or test the engine only if he or she permits it, or if state or local inspection programs separately provide for it.

§ 1068.510 How do I prepare and apply my remedial plan?

(a) In your remedial plan, describe all of the following:

(1) The class or category of engines to be recalled, including the number of engines involved and the model year or other information needed to identify the engines.

(2) The modifications, alterations, repairs, corrections, adjustments, or other changes you will make to correct the affected engines.

(3) A brief description of the studies, tests, and data that support the effectiveness of the remedy you propose to use.

(4) The instructions you will send to those who will repair the engines under the remedial plan.

(5) How you will determine the owners' names and addresses.

(6) How you will notify owners; include copies of any notification letters.

(7) The proper maintenance or use you will specify, if any, as a condition to be eligible for repair under the remedial plan. Describe how owners should show they meet your conditions.

(8) The steps owners must take for you to do the repair. You may set a date or a range of dates, specify the amount of time you need, and designate certain facilities to do the repairs.

(9) Which company (or group) you will assign to do or manage the repairs.

(10) If your employees or authorized warranty agents will not be doing the work, state who will and say they can do it.

(11) How you will ensure an adequate and timely supply of parts.

(12) The effect of proposed changes on fuel consumption, driveability, and safety of the engines you will recall; include a brief summary of the information supporting these conclusions.

(13) How you intend to label the engines you repair and where you will place the label on the engine (see § 1068.515).

(b) We may require you to add information to your remedial plan.

(c) We may require you to test the proposed repair to show it will remedy the noncompliance.

(d) Use all reasonable means to locate owners. We may require you to use government or commercial registration

lists to get owners' names and addresses, so your notice will be effective.

(e) The maintenance or use that you specify as a condition for eligibility under the remedial plan may include only things you can show would cause noncompliance. Do not require use of a component or service identified by brand, trade, or corporate name, unless we approved this approach with your original certificate of conformity. Also, do not place conditions on who maintained the engine.

(f) We may require you to adjust your repair plan if we determine owners would be without their engines or equipment for an unreasonably long time.

(g) We will tell you in writing within 15 days of receiving your remedial plan whether we have approved or disapproved it. We will explain our reasons for any disapproval.

(h) Begin notifying owners within 15 days after we approve your remedial plan. If we hold a public hearing, but do not change our position about the noncompliance, you must begin notifying owners within 60 days after we complete the hearing, unless we specify otherwise.

§ 1068.515 How do I mark or label repaired engines?

(a) Attach a label to each engine you repair under the remedial plan. At your discretion, you may label or mark engines you inspect but do not repair.

(b) Make the label from a durable material suitable for its planned location. Make sure no one can remove the label without destroying it.

(c) On the label, designate the specific recall campaign and state where you repaired or inspected the engine.

(d) We may waive or modify the labeling requirements if we determine they are overly burdensome.

§ 1068.520 How do I notify affected owners?

(a) Notify owners by first class mail, unless we say otherwise. We may require you to use certified mail. Include the following things in your notice:

(1) State: ''The U.S. Environmental Protection Agency has determined that your engine may be emitting pollutants in excess of the Federal emission standards, as defined in Title 40 of the Code of Federal Regulations. These emission standards were established to protect the public health or welfare from air pollution.''.

(2) State that you (or someone you designate) will repair these engines at your expense.

(3) If we approved maintenance and use conditions in your remedial plan, state that you will make these repairs only if owners show their engines meet the conditions for proper maintenance and use. Describe these conditions and how owners should prove their engines are eligible for repair.

(4) Describe the components your repair will affect and say generally how you will repair the engines.

(5) State that the engine, if not repaired, may fail an emission inspection test if state or local law requires one.

(6) Describe how not repairing the engine will harm its performance or driveability.

(7) Describe how not repairing the engine will harm the functions of other engine components.

(8) Specify the date you will start the repairs, the amount of time you will need to do them, and where you will do them. Include any other information owners may need to know.

(9) Include a self-addressed card that owners can mail back if they have sold the engine (or equipment in which the engine is installed); include a space for owners to write the name and address of a buyer.

(10) State that owners should call you at a phone number you give to report any difficulty in obtaining repairs.

(11) State: ''To ensure your full protection under the emission warranty on your engine by federal law, and your right to participate in future recalls, we recommend you have your engine serviced as soon as possible. We may consider your not servicing it to be improper maintenance.''.

(b) We may require you to add information to your notice or to send more notices.

(c) You may not in any communication with owners or dealers say or imply that your noncompliance does not exist or that it will not degrade air quality.

§ 1068.525 What records must I send to EPA?

(a) Send us a copy of all communications related to the remedial plan you sent to dealers and others doing the repairs. Mail or e-mail us the information at the same time you send it to others.

(b) From the time you begin to notify owners, send us a report within 25 days of the end of each calendar quarter. Send reports for six consecutive quarters or until all the engines are inspected, whichever comes first. In these reports, identify the following:

(1) The range of dates you needed to notify owners.

(2) The total number of notices sent.

(3) The number of engines you estimate fall under the remedial plan (explain how you determined this number).

(4) The cumulative number of engines you inspected under the remedial plan.

(5) The cumulative number of these engines you found needed the specified repair.

(6) The cumulative number of these engines you have repaired.

(7) The cumulative number of engines you determined to be unavailable due to exportation, theft, retirement, or other reasons (specify).

(8) The cumulative number of engines you disqualified for not being properly maintained or used.

(c) If your estimated number of engines falling under the remedial plan changes, change the estimate in your next report and add an explanation for the change.

(d) We may ask for more information.

(e) We may waive reporting requirements or adjust the reporting schedule.

(f) If anyone asks to see the information in your reports, we will follow the provisions of § 1068.10 for handling confidential information.

§ 1068.530 What records must I keep?

We may review your records at any time, so it is important that you keep required information readily available. Keep records associated with your recall campaign for three years after you complete your remedial plan. Organize and maintain your records as described in this section.

(a) Keep a paper copy of the written reports described in § 1068.525.

(b) Keep a record of the names and addresses of owners you notified. For each engine, state whether you did any of the following:

(1) Inspected the engine.

(2) Disqualified the engine for not being properly maintained or used.

(3) Completed the prescribed repairs.

(c) You may keep the records in paragraph (b) of this section in any form we can inspect, including computer databases.

§ 1068.535 How can I do a voluntary recall for emission-related problems?

(a) To do a voluntary recall, first send the Designated Officer a plan, following the guidelines in § 1068.510. Within 15 days, we will send you our comments on your plan.

(b) Once we approve your plan, start notifying owners and carrying out the specified repairs.

(c) From the time you start the recall campaign, send us a report within 25

days of the end of each calendar quarter, following the guidelines in § 1068.525(b). Send reports for six consecutive quarters or until all the engines are inspected, whichever comes first.

(d) Keep your reports and the supporting information as described in § 1068.530.

§ 1068.540 What terms do I need to know for this subpart?

The following terms apply to this subpart:

Days means calendar days.

Owner means someone who owns an engine affected by a remedial plan or someone who owns a piece of equipment that has one of these engines.

Subpart G—Public Hearings

§ 1068.601 How do I request a public hearing?

(a) File a request for a hearing with the Designated Officer within 15 days of a decision to suspend, revoke, or void your certificate or within 30 days after we send you our conclusions for rejecting your use of good engineering judgment. If you ask later, we may give you a hearing for good cause, but we do not have to.

(b) Include the following in your request for a public hearing:

(1) State which engine family is involved.

(2) State the issues you intend to raise. We may limit these issues, as described elsewhere in the regulations.

(3) Summarize the evidence supporting your position and state why you believe this evidence justifies reinstating the certificate.

(c) We will hold the hearing as described in this subpart.

§ 1068.605 How will EPA set up a public hearing?

(a) A Presiding Officer and one or more Judicial Officers will hold public hearings.

(b) Presiding Officers must be an administrative law judge appointed according to 5 U.S.C. 3105 (see also 5 CFR part 930, as amended).

(c) The Administrator will appoint EPA employees as Judicial Officers. Judicial Officers must meet the following qualifications and perform the following functions:

(1) *Qualifications.* Judicial Officers may be permanent or temporary employees of EPA who handle other duties for the Agency. Judicial Officers may not be employed by the Office of Enforcement and Compliance Assurance or have any connection with preparing or presenting evidence for any hearing held under this section. Judicial Officers must be graduates of an accredited law school and members in good standing of a recognized bar association of any state or the District of Columbia.

(2) *Functions.* The Administrator may consult with the Judicial Officers or delegate all or part of the Administrator's authority to act under this section to the Officers. But the Officers must be able to refer any motion or case to the Administrator whenever appropriate.

(d) We may determine that your request for a hearing does not raise a genuine, substantial question of fact or law concerning suspension of your certificate of conformity. If so, we may enter an order denying your request and reaffirm the suspension or revocation. This order has the force and effect of the Administrator's final decision.

(1) In the case of emission levels causing an engine family to be noncompliant, you may question only our decision on whether the tests and sampling methods were proper.

(2) In the case of violations of prohibited acts, you may question only our decision on whether conditions or circumstances outside your control caused your refusal to comply with the requirements of this chapter.

(e) If we determine you have raised a genuine, substantial question of fact or law under paragraphs (d)(1) and (d)(2) of this section, we will grant your request for a hearing. We will tell the public by publishing a notice in the **Federal Register** or by some other appropriate means.

(f) File with our Hearing Clerk an original and two copies of all documents or papers you must (or may) file. Your filing is timely if you deliver or postmark items within the time this section and any other regulations allow. We will give you an address for filing materials with the Hearing Clerk.

(g) Present testimony in writing as much as possible. We will give everyone copies of written testimony as soon as we can before the hearing starts. We will provide a certificate of service for each document or paper filed with the Hearing Clerk. If you need to give something to the Designated Officer, send it by registered mail (see § 1068.25).

(h) In computing any period of time for this section, do not include the day of the act or event. Include Saturdays, Sundays, and federal legal holidays, but when the period expires on one of these days, extend it to include the next business day. If you must or may do something within a prescribed period, compute this period from the time we notify you, unless we notify you by mail. For notices by mail, add three days to the prescribed period.

(i) The Administrator or Presiding Officers may consolidate two or more proceedings held under this section to speed or simplify resolving one or more issues. You may still raise issues that you could have raised if we did not consolidate proceedings.

(j) As much as possible, we will schedule public hearings to start within 14 days after we receive a request for a hearing.

§ 1068.610 What are the procedures for a public hearing?

(a) *Presiding Officers.* Presiding Officers must hold fair and impartial hearings under the Administrative Procedure Act (5 U.S.C. 554, 556, and 557); dispose of the proceedings as soon as possible; and maintain order. They have power consistent with the Administrative Procedure Act, including the power to do the following:

(1) Administer oaths and affirmations.

(2) Rule on offers of proof and exclude irrelevant or repetitious material.

(3) Regulate the course of the hearing and the conduct of the parties and their counsel.

(4) Hold conferences.

(5) Consider and rule on all procedural and other motions in the hearing.

(6) Require submission of direct written testimony with or without affidavit whenever, in their opinion, oral testimony is not necessary for full and true disclosure of the facts.

(7) Enforce agreements and orders requiring access as authorized by law.

(8) Require the filing of briefs on any matter on which they must rule.

(9) Require any party or witness to state a position on any issue during the hearing.

(10) Depose witnesses or require depositions.

(11) Resolve or recommend resolution for disputed issues on the hearing's record.

(12) Issue protective orders, as described in paragraph (g) of this section, based on good cause.

(b) *Accelerated decision or dismissal.* Presiding Officers may accelerate decisions on all or part of the proceeding, without further hearing or with limited additional evidence (such as affidavits they may require). They may also dismiss any party with prejudice.

(1) Presiding Officers may decide in favor of EPA or you (as manufacturer), based on any party's motion or their own judgment, for any of the following reasons:

(i) Failure to state a claim on which relief can be granted or stating

something that contradicts a previous statement.

(ii) The lack of any genuine, material issue, so a party is entitled to judgment as a matter of law.

(iii) Failure to obey a procedural order of the Presiding Officer.

(iv) Other just reasons.

(2) A Presiding Officer's accelerated decision on all the issues and claims in the proceeding is equal to the decision described in paragraph (l) of this section.

(3) For accelerated decisions on less than all issues or claims in the proceeding, the Presiding Officers must determine without substantial controversy which material facts exist and which are in good faith controverted. Then, they issue an order specifying the facts that are without substantial controversy, as well as the issues and claims on which the hearing will continue.

(c) *Amicus curiae (friend of the court).* Participants in the hearing may move that the Presiding Officer allow a brief from a friend of the court—someone who is not a participant. Anyone who asks for an amicus brief must identify his or her interest and state why the brief is desirable. The Presiding Officer may then accept briefs from someone who is not a party to the proceeding.

(d) *Conferences.* Presiding Officers may hold conferences before ordering any hearing. They direct the Hearing Clerk to tell participants the time and location of conferences. At the Presiding Officer's discretion, other people also may attend. They summarize in writing the results of conferences, including all stipulations not transcribed, and summaries part of the record. At a conference, Presiding Officers may do any of the following:

(1) Get stipulations and admissions, receive requests, order depositions to be taken, identify disputed issues of fact and law, and require or allow any witness or party to submit written testimony.

(2) Set a hearing schedule for oral and written statements, submission of written direct testimony, oral direct examination and cross-examination of a witness, or oral argument as they consider necessary.

(3) Identify matters for official notice.

(4) Limit the number of expert and other witnesses.

(5) Establish the procedures for the hearing.

(6) Take any other action that may speed the hearing or help resolve the issue.

(e) *Primary discovery.* At a prehearing conference or at some other time a Presiding Officer sets before the hearing, all parties must make available to the other parties the names of the expert and other witnesses they expect to call, a brief summary of their expected testimony, and a list of all documents and exhibits they expect to introduce into evidence. After that, a party may move to add exhibits or amend expected testimony. If anyone makes a motion showing good cause, Presiding Officers may restrict or defer disclosure of the name of a witness or a narrative summary of the witness's expected testimony. They also may prescribe other measures to protect a witness. If restricted or deferred disclosure affects a party, they will allow enough time to prepare for presenting that case.

(f) *Other discovery.* Presiding Officers may allow further discovery. If so, they issue orders for taking the discovery, including terms and conditions.

(1) Any party may move for further discovery, as long as the motion includes reasons, the nature of the information discovery will produce, and the proposed time and place for it.

(2) Presiding Officers may approve motions for further discovery if they determine it will not unreasonably delay the proceeding, is the only way to get the information, and is significant to the case. Presiding Officers follow procedures in the Federal Rules of Civil Procedure (28 U.S.C.) and its precedents whenever possible. But no one can take discovery unless a Presiding Officer orders it or all the parties agree to it.

(3) If someone does not comply with an order issued under this paragraph (f), we may infer that the discovery information would harm that person.

(g) *Protective orders for private discovery.* Presiding Officers may enter protective orders to allow a person to testify or disclose information in private, rather than in open hearing.

(1) For this to occur, a party or the person giving discovery information must move for a protective order by showing that some of the discovery information would reveal methods or processes entitled to protection as trade secrets. This information may not include emission data. Any party wanting to use private documents or testimony to present a case must so move to the Presiding Officer with supporting justification.

(2) Presiding Officers may permit anyone seeking a protective order to disclose information in private. They will record the private proceeding . If they enter a protective order following a private session, they will seal and preserve the record and make it available to EPA or the court if anyone appeals. The Presiding Officer may limit attendance at any private proceeding to himself or herself, EPA, and the person or party seeking the protective order.

(3) If Presiding Officers grant a motion for a protective order, they enter an order that governs treatment of the information to protect the parties' rights and prevent unnecessary disclosure. Procedures also cover presentation of the information and oral testimony and related cross-examination in executive session. The protective order must also state that the material will be filed separately from other evidence and exhibits in the hearing.

(4) Disclosing this information is limited to parties to the hearing, their counsel and relevant technical consultants, and authorized representatives of the United States concerned with carrying out the Act. Disclosure by government employees must follow 18 U.S.C. 1905. For all others, disclosure may be limited to counsel if the parties do not have to know the information. Parties or their counsel must sign a sworn statement that they will not disclose information to persons not entitled to receive it under the protective order's terms.

(5) In the submittal of proposed findings, briefs, or other papers, counsel for all parties must try in good faith not to disclose the specific details of private documents and testimony. But they may refer to the documents or testimony and speak generally about their contents If lawyers consider specific details necessary to their presentations, they will place the details in separate proposed findings, briefs, or other paper marked ''confidential.'' These confidential papers will become part of the private record.

(h) *Motions.* All motions, except those made orally during the hearing, must be in writing. Parties must state the grounds for the motion, describe the relief or order sought, file the motion with the Hearing Clerk, and serve it on all parties.

(1) Within the time fixed by the Environmental Appeals Board or Presiding Officers, as appropriate, any party may serve and file an answer to the motion. The Environmental Appeals Board or Presiding Officers may then require the person who made the motion to file reply papers within a specified time.

(2) Presiding Officers rule on all motions filed or made before they file their decisions (or accelerated decisions). The Environmental Appeals Board rules on all motions filed before Presiding Officers are appointed and on all motions filed after Presiding Officers issue decisions. Presiding Officers or the Environmental Appeals Board approve

oral arguing of motions only when necessary.

(i) *Evidence.* Evidence consists of official transcripts and exhibits, together with all papers and requests filed in the proceeding. Presiding Officers will separate and exclude immaterial or irrelevant parts of an admissible document whenever possible. They will also separate documents (or parts of documents) subject to a protective order under paragraph (g) of this section. They may allow evidence at the hearing even though it is inadmissible under the rules of evidence for judicial proceedings. The weight of evidence depends on its reliability and how well it proves a case. Presiding Officers allow parties to examine and cross-examine witnesses as much as necessary for a full disclosure of the facts. Their rulings on admissibility of evidence, propriety of examination and cross-examination, and other procedural matters will appear in the record. We automatically assume parties have taken exception to an adverse ruling.

(j) *The record.* The record consists of official transcripts and exhibits, together with all paper and requests filed in the proceeding. Stenographers will report and transcribe hearings; the original transcripts are part of the record and are the sole official transcript. We will file copies of the record with the Hearing Clerk and make them available during our business hours for public inspection. We may charge a reasonable fee for the service, but may deny a request to see information only based on paragraph (g) of this section.

(k) *Proposed findings and conclusions.* Within four days after the proceedings are closed to new evidence, any party may submit for the Presiding Officer's consideration proposed findings of fact, conclusions of law, or a proposed order, with supporting reasons and briefs. The Presiding Officer may allow a longer time for these proposals. Parties must put these proposals in writing, serve them on all parties, and make sure they contain clear references to the record and other authorities. The record shows the Presiding Officer's ruling on the proposed findings and conclusions, except when the disposal order for the proceeding otherwise informs the parties of these actions.

(l) *Presiding Officer's decisions.* Presiding Officers issue and file decisions with the Hearing Clerk within fourteen days after the period for filing proposed findings (see paragraph (k) of this section). For hearings that challenge an initial suspension of a certificate of conformity, decisions are due within seven days after the period for filing proposed findings. The Environmental Appeals Board may extend the deadline for these decisions.

(1) Decisions must state findings and conclusions on all the material issues of fact or law in the record, with supporting reasons or basis, and an appropriate rule or order. Evidence and consideration of the whole record must support the decision.

(2) Decisions by Presiding Officers become the Environmental Appeals Board's decisions at one of the following times, unless the Board acts to review or stay the effective date of a decision during these periods:

(i) Ten days after the deadlines to appeal, as described in § 1068.615(a) or (b), if no one files a notice of intent to appeal.

(ii) Five days after the deadline to perfect an appeal, as described in § 1068.615(a) or (b), if someone files a notice of intent to appeal but does not perfect the appeal.

(3) At any time before Presiding Officers issue decisions, they may reopen proceedings to receive further evidence.

(4) Except for correcting clerical errors, the Presiding Officers' jurisdiction ends when they issue their decisions.

§ 1068.615 How do I appeal a hearing decision?

(a) *Appeal from the decisions of Presiding Officers.* Any party to a proceeding may appeal these decisions to the Environmental Appeals Board. In all cases except our initial suspension of a certificate of conformity, you must file your notice of intent to appeal within ten days after the Presiding Officer issues a decision. You must perfect your appeal with an appeal brief within twenty days of the decision. Any other party may then file a brief on your appeal within fifteen days of the date you file your brief. All briefs must be 40 pages or less, unless the Environmental Appeals Board approves otherwise. The Board also may allow oral arguments. Your brief must contain the following items in this order:

(1) A subject index of the matter in the brief, with page references, plus a table of cases (alphabetically arranged), textbooks, statutes, and other material cited, with page references.

(2) Specific issues you intend to urge (but see regulations in this chapter defining emission standards for the engines in question, which may limit the range of issues you consider).

(3) Your argument presenting the points of fact and law supporting the position you have taken on each issue, with page references to the record and legal or other material you are relying on.

(4) A proposed order for the Environmental Appeals Board's consideration, if it is different from the order in the Presiding Officer's decision.

(b) *Appeal of decisions on a suspended certificate of conformity.* In this case, you may appeal the Presiding Officer's decision to the Environmental Appeals Board by filing a notice of appeal within ten days of the decision. Make your notice of appeal a brief that meets the requirements in paragraph (a) of this section. Within ten days after you file a notice of appeal under this paragraph, any other party may file a brief on that appeal. All briefs must be 15 pages or less unless the Environmental Appeals Board approves otherwise.

(c) *Review of the Presiding Officer's decision in the absence of appeal.* The hearing Clerk tells the Environmental Appeals Board if no one has filed a notice of intent to appeal the Presiding Officer's decision by the deadline, or has filed notice but not perfected it. The Environmental Appeals Board may then review the decision on its own motion, within the time limits in § 1068.610(l). The Board must tell all parties that they intend to review the decision, describe the scope of their review, and allow for filing briefs.

(d) *Decision of appeal or review by the Environmental Appeals Board.* The Board considers the record as needed to resolve issues under appeal or review. They also may use all the powers they could have used if they had presided at the hearing. They adopt, modify, or set aside the Presiding Officer's findings, conclusions, and order and state the reasons or basis for their action in the decision. If the Board determines they need more information or the parties' views on the rule or order they are issuing, they may wait until they receive them or send the case back to the Presiding Officer. Any decision under this paragraph (d) that disposes of a case is the Board's final decision.

(e) *Reconsideration of the Environmental Appeals Board's decision.* Within 20 days of the Board's decision, you may file a petition with the Board to reconsider their decision.

(1) Your petition must describe the relief you want and the grounds supporting it. Limit your petition to new questions raised by the decision or final order and only those you did not have the chance to argue before the Presiding Officer or the Board. See the regulations in this chapter defining emission standards for the engines in question, which may further limit the questions the Board will review.

(2) Anyone wanting to oppose this petition may file a response within ten days after you file it.

(3) Your petition for reconsideration does not stay the effective date of the decision or order. It also does not start any statutory time period affecting the decision or order, unless the Environmental Appeals Board orders that it does.

§ 1068.620 How does a hearing conclude?

(a) *Conclusion of hearing.* (1) The hearing ends after all periods allowed for appeal and review if no one appeals the Presiding Officer's decision and the Environmental Appeals Board does not move to review the decision by the specified deadlines.

(2) The hearing ends when the Environmental Appeals Board issues a final decision if someone appeals or the Board decides to review the Presiding Officer's decision.

(b) *Judicial review.* If you want to petition for judicial review, you must serve the petition on EPA's General Counsel. We will then tell you the costs involved. After we receive your payment to cover fees, we will forward your petition to the court where the Environmental Appeals Board filed its order.

Appendix I to Part 1068—Emission Related Components, Parameters, and Specifications

I. Basic Engine Parameters—Reciprocating Engines.
1. Compression ratio.
2. Type of air aspiration (natural, Roots blown, supercharged, turbocharged).
3. Valves (intake and exhaust).
a. Head diameter dimension.
b. Valve lifter or actuator type and valve lash dimension.
4. Camshaft timing.
a. Valve opening-intake exhaust (degrees from TDC or BDC).
b. Valve closing-intake exhaust (degrees from TDC or BDC).
c. Valve overlap (degrees).
5. Ports—two stroke engines (intake and/or exhaust).
a. Flow area.
b. Opening timing (degrees from TDC or BDC).
c. Closing timing (degrees from TDC or BDC).

II. Intake Air System.
1. Roots blower/supercharger/turbocharger calibration.
2. Charge air cooling.
a. Type (air-to-air; air-to-liquid).
b. Type of liquid cooling (engine coolant, dedicated cooling system).
c. Performance (charge air delivery temperature (°F) at rated power and one other power level under ambient conditions of 80°F and 110°F, and 3 minutes and 15 minutes after selecting rated power, and 3 minutes and 5 minutes after selecting other power level).
3. Temperature control system calibration.
4. Maximum allowable inlet air restriction.

III. Fuel System.
1. General.
a. Engine idle speed.
2. Carburetion.
a. Air-fuel flow calibration.
b. Idle mixture.
c. Transient enrichment system calibration.
d. Starting enrichment system calibration.
e. Altitude compensation system calibration.
f. Hot idle compensation system calibration.
3. Fuel injection—spark-ignition engines.
a. Control parameters and calibrations.
b. Idle mixture.
c. Fuel shutoff system calibration.
d. Starting enrichment system calibration.
e. Transient enrichment system calibration.
f. Air-fuel flow calibration.
g. Altitude compensation system calibration.
h. Operating pressure(s).
i. Injector timing calibration.
4. Fuel injection—compression ignition engines.
a. Control parameters and calibrations.
b. Transient enrichment system calibration.
c. Air-fuel flow calibration.
d. Altitude compensation system calibration.
e. Operating pressure(s).
f. Injector timing calibration.

IV. Ignition System—Spark-Ignition Engines.
1. Control parameters and calibration.
2. Initial timing setting.
3. Dwell setting.
4. Altitude compensation system calibration.
5. Spark plug voltage.

V. Engine Cooling System.
1. Thermostat calibration.

VI. Exhaust System.
1. Maximum allowable back pressure.

VII. Exhaust Emission Control System.
1. Air injection system.
a. Control parameters and calibrations.
b. Pump flow rate.
2. EGR system.
a. Control parameters and calibrations.
b. EGR valve flow calibration.
3. Catalytic converter system.
a. Active surface area.
b. Volume of catalyst.
c. Conversion efficiency.
4. Backpressure.

VIII. Crankcase Emission Control System.
1. Control parameters and calibrations.
2. Valve calibrations.

IX. Auxiliary Emission Control Devices (AECD).
1. Control parameters and calibrations.
2. Component calibration(s).

X. Evaporative Emission Control System.
1. Control parameters and calibrations.
2. Fuel tank.
a. Volume.
b. Pressure and vacuum relief settings.

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