ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9 and 94

[AMS–FRL–7448–9]

RIN 2060–AJ98

Control of Emissions From New Marine Compression-Ignition Engines at or Above 30 Liters Per Cylinder

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: In this action, we are adopting emission standards for new marine diesel engines installed on vessels flagged or registered in the United States with displacement at or above 30 liters per cylinder. These standards are equivalent to the internationally negotiated standards for oxides of nitrogen and will be enforceable under U.S. law for new engines built on or after January 1, 2004. The certification and compliance program we are adopting is similar to the internationally negotiated program, but contains additional provisions reflecting certain Clean Air Act-specific compliance provisions and the related need to adopt test procedures designed to achieve the emission reductions called for under Clean Air Act section 213. These standards will apply until we adopt a second tier of standards in a future rulemaking. In developing that future rulemaking, which will be completed no later than April 27, 2007, we will consider the state of technology that may permit deeper emission reductions and the status of international action for more stringent standards. We will also consider the application of such a second tier of standards to engines on foreign vessels that enter U.S. ports.

We are also adopting additional standards for new engines with displacement at or above 2.5 liters per cylinder but less than 30 liters per cylinder. These standards, which are currently voluntary, are also equivalent to the internationally negotiated standards for oxides of nitrogen. The standards will apply through 2006. Beginning in 2007, the Tier 2 standards we finalized for these engines in 1999 will go into effect (64 FR 73300, December 29, 1999; 40 CFR part 94).

DATES: This final rule is effective April 29, 2003.

The incorporation by reference of certain publications listed in this regulation is approved by the Director of the Federal Register as of April 29, 2003.

ADDRESSES: Materials relevant to this rulemaking are contained in Public Docket Number A–2001–11 at the following address: EPA Docket Center (EPA/DC), Public Reading Room, Room B–102, EPA West Building, 1301 Constitution Avenue, NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, except on government holidays. You can reach the Air Docket and Reading Room by telephone at (202) 566–1742 and by facsimile at (202) 566–1741. You may be charged a reasonable fee for photocopying docket materials, as provided in 40 CFR part 2.

For further information on electronic availability of this action, see **SUPPLEMENTARY INFORMATION** below.

FOR FURTHER INFORMATION CONTACT: U.S. EPA, Office of Transportation and Air Quality, Assessment and Standards Division hotline, (734) 214–4636, *asdinfo@epa.gov.*

SUPPLEMENTARY INFORMATION:

Affected Entities

This action will affect companies and persons that manufacture, sell, or import into the United States new marine compression-ignition engines for use on vessels flagged or registered in the United States; companies and persons that make vessels that will be flagged or registered in the United States and that use such engines; and the owners or operators of such U.S. vessels. Further requirements apply to companies and persons that rebuild or maintain these engines. Affected categories and entities include the following:

Category	NAICS Code [a]	Examples of potentially affected entities
Industry	333618	Manufacturers of new marine diesel engines.
Industry	336611	Manufacturers of marine vessels.
Industry	811310	Engine repair and maintenance.
Industry	483	Water transportation, freight and passenger.
Industry	324110	Petroleum refineries.
Industry	422710, 422720	Petroleum Bulk Stations and Terminals; Petroleum and Petroleum Products Wholesalers.

[a] North American Industry Classification System (NAICS).

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

Additional Information About This Rulemaking

Emission standards for new marine diesel engines at or above 30 liters per cylinder were considered by EPA in two previous rulemakings, in 1996 and in 1999. The notice of proposed rulemaking for the first rule (for the control of air pollution from new gasoline spark-ignition and diesel compression-ignition marine engines) can be found at 59 FR 55930 (November 1994); a supplemental notice of proposed rulemaking can be found at 61 FR 4600 (February 7, 1996); and the final rule can be found at 61 FR 52088 (October 4, 1996). The notice of proposed rulemaking for the second rule (for the control of air pollution from new marine compression-ignition engines at or above 37 kW) can be found at 63 FR 68508 (December 11, 1998); the final rule can be found at 64 FR 73300 (December 29, 1999). These documents are available on our Web sites, *http://www.epa.gov/otaq/marine.htm* and *http://www.epa.gov/otaq.marinesi.htm.* In addition, we recently adopted emission standards for recreational marine diesel engines (67 FR 68242, November 8, 2003). This final rule relies in part on information obtained for those rulemakings, which can be found in Public Dockets A–92–28, A–97–50, and A–2000–01. Those dockets are incorporated by reference into the docket for this proposal, A–2001–11.

Obtaining Electronic Copies of the Regulatory Documents

The preamble, regulatory language, Final Regulatory Support Document, and other rulemaking documents are 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 final rule is made available on the date 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 features).

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. Background

Marine diesel engines can be significant contributors to local ozone, carbon monoxide (CO), and particulate matter (PM) levels, particularly in commercial ports and along coastal areas.[1,2] This rule addresses these air pollution concerns by adopting national emission standards for the first time for marine diesel engines with per-cylinder displacement at or above 30 liters or more that are installed on vessels flagged or registered in the United States.[3] These engines, also known as Category 3 marine diesel engines, are very large marine engines used primarily for propulsion power on ocean-going vessels such as container ships, tankers, bulk carriers, and cruise ships. Category 3 marine diesel engines have not previously been regulated under our nonroad engine programs. This rule also adopts standards for marine diesel engines with per-cylinder displacement at or above 2.5 liters per cylinder but less than 30 liters per

[1] References to diesel-cycle engines, also referred to as ''diesel engines'' in this document are intended to cover a particular kind of engine technology, *i.e.*, compression-ignition combustion. Compression-ignition engines are typically operated on diesel fuel, though other fuels, such as compressed natural gas, may also be used. This contrasts with otto-cycle engines (also called spark-ignition or SI engines), which typically operate on gasoline. The requirements set out in this action apply only to compression-ignition engines.

[2] Ground-level ozone, the main ingredient in smog, is formed by complex chemical reactions of volatile organic compounds (VOC) 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 emission standards for hydrocarbons. VOCs can also be part of the secondary formation of PM.

cylinder installed on vessels flagged or registered in the United States.

The emission-control program we are adopting in this rule is a continuation of the process of establishing emission standards for nonroad engines and vehicles under Clean Air Action section 213(a).[4]

This is our third action for emission standards for marine diesel engines above 37 kW. In our first action, in 1999, we adopted emission standards for commercial marine engines above 37 kilowatts (kW) (64 FR 73300, December 29, 1999; 40 CFR part 94). The standards adopted in that rule consist of mandatory standards, referred to as our Tier 2 standards, that apply to engines above 37 kW with per-cylinder displacement up to 30 liters (also known as Category 1 and Category 2 marine diesel engines).[5] These Tier 2 standards apply to oxides of nitrogen (NO_X), hydrocarbon (HC), PM and CO emissions and go into effect in 2004–2007, depending on engine size. Our Tier 2 marine diesel engine standards are expected to achieve a 32-percent reduction in NO_X emissions for Category 1 and Category 2 marine diesel engines by 2030 relative to uncontrolled levels. The Tier 2 standards for Category 1 and Category 2 marine diesel engines also contain PM standards that are expected to achieve a 26-percent reduction in PM emissions by 2030. We did not adopt mandatory emission standards for Category 3 marine diesel engines in 1999. Manufacturers of those engines were expected to comply voluntarily with internationally negotiated NO_X standards.

In our second action for marine diesel engines above 37 kW, we adopted standards for recreational marine diesel engines (67 FR 68242, November 8, 2002). These numerical standards are identical to those we finalized for commercial marine diesel engines in 1999. However, the engines are tested using a different duty cycle and the effective date for recreational marine diesel engines is 2006–2009, depending on engine size.

This third action for marine diesel engines above 37 kW was proposed on May 29, 2002 (67 FR 37548). At a public hearing on June 13 and during the public comment period, which ended on July 16, 2002, we heard from over 50 commenters. The emission-control program we are adopting in this action follows from the approach described in our proposal, though we have made numerous adjustments in response to the comments and other information received since the proposal.

B. How Is This Document Organized?

After this introductory section, Section II describes the set of engines that will be required to comply with the standards. Section III contains the standards we are finalizing. Section IV describes the future rulemaking we are committing to pursue. Section V describes various compliance provisions. Section VI summarizes the projected impacts of the standards. Section VII gives an update on the Blue Cruise program we described in our proposal. Finally, Sections VIII and IX contain information about how we satisfied our administrative requirements and about the statutory provisions for this final rule.

Additional information on many of these topics can be found in the Final Regulatory Support Document and the Summary and Analysis of Comments. These documents and all the comments we received are in Docket A–2001–11.

The remainder of this section summarizes the new requirements and the air quality need for the rulemaking. We also provide an update on the status of U.S. ratification of MARPOL Annex VI.

C. What Requirements Are We Finalizing?

We are adopting emission standards for new marine diesel engines installed on vessels flagged or registered in the United States. We are adopting standards for the first time for new Category 3 marine diesel engines, beginning in 2004. We are also adopting additional standards for some Category 1 and all Category 2 marine diesel engines, also beginning in 2004. This section presents a brief description of this emission-control program. More details can be found in Sections III and IV of this preamble and in the Final Regulatory Support Document.

1. Category 3 Marine Diesel Engines

Clean Air Act section 213(a)(3) requires EPA to adopt regulations that contain standards concerning certain pollutants reflecting the greatest degree of emission reductions achievable through the application of technology that will be available, taking into consideration the availability and costs of the technology, and noise, energy, safety factors and existing motor vehicle standards. EPA is also to revise these standards from time to time. The emission-control program we are adopting in this rule meets these criteria through a two-part approach. First, we are adopting near-term Tier 1 standards that will go into effect immediately based on readily available emission-control technology. Second, we are adopting regulations that set a schedule for a future rulemaking to assess and adopt an appropriate second tier of standards. We recognize that manufacturers can achieve additional reductions with more lead time than is provided by the Tier 1 standards. They can do this by expanding the use and optimization of in-cylinder controls, combined with the significant emission reductions that may be achievable with advanced technologies such as selective catalytic reduction or water injection. We believe, however, that it is appropriate to defer a final decision on the longer-term Tier 2 standards to a future rulemaking. While there is a certain amount of information available about the advanced technologies at this time, there are several outstanding technical issues concerning the widespread commercial use of these technologies. Deferring the Tier 2 standards to a second rulemaking will allow us to obtain important additional information on the use of the these advanced technologies that we expect to become available over the next few years. This new information may include (1) new developments as manufacturers continue to make various improvements to the technology and address any remaining concerns, (2) data or experience from recently initiated in-use installations using the advanced technologies, and (3) information from longer-term in-use experience with the advanced technologies that will be especially helpful for evaluating the long-term durability of emission controls. We believe the projected time frame for the future rulemaking is appropriate to allow us to make the best use of information that will be available to have a sound technical basis for assessing the technological capabilities of emission-control systems that include

[3] This final rule applies to "new" marine diesel engines and to "new" marine vessels that include marine diesel engines. In general, a "new" marine diesel engine or a "new" marine vessel is one that is produced for sale in the United States or that is imported into the United States (*See* section II, below). The emission standards established in this final rule, therefore, will typically apply to marine diesel engines that are installed on vessels flagged or registered in the United States.

[4] Section I of the preamble for our proposal contains an extensive description of the regulatory background for this rulemaking, which we are not repeating here (67 FR 37548, May 29, 2002).

[5] EPA treats voluntary standards equivalent to the internationally negotiated oxides of nitrogen standards as Tier 1 standards. The internationally negotiated standards are contained in MARPOL Annex VI (see footnote 5 and associated text). When they go into force, the internationally negotiated standards will apply to new engines above 130 kW installed on vessels constructed on or after January 1, 2000 and engines that undergo a major conversion on or after January 1, 2000.

advanced technologies. We will then be best situated to make a technology-based decision that maximizes emission reductions from these engines, taking into consideration cost and other appropriate factors.

While deferring adoption of the Tier 2 standards to a future rulemaking is appropriate for the reasons described above, an additional reason supporting this approach is to pursue further negotiations in the international arena to achieve more stringent global emission standards for marine diesel engines. As discussed below, adopting appropriate international standards has the potential to maximize the control of emissions from U.S. and foreign vessels.

The near-term Tier 1 standards we are adopting are equivalent to the internationally negotiated NO_X standards established by the International Maritime Organization (IMO) in Annex VI to the International Convention on the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto (more commonly referred to as MARPOL or MARPOL 73/78; the standards are referred to as the Annex VI NO_X standards).[6] As explained in Section III below and in the Final Regulatory Support Document, these standards are achievable almost immediately, with less than one year of lead time, because manufacturers are already achieving and certifying to these standards under our Voluntary Statement of Compliance program for Annex VI. These near-term standards are being achieved through the application of currently available technology, including optimized turbocharging, higher compression ratios, and optimized fuel injection. The certification and compliance program we are adopting is similar to the internationally negotiated program, but contains additional provisions reflecting certain Clean Air Act-specific compliance provisions and the related need to adopt test procedures designed to achieve the emission reductions called for under Clean Air Act section 213. These certification requirements are described in Section V of this preamble. These Tier 1 standards are expected to result in negligible costs because engine manufacturers are already producing engines that meet the MARPOL Annex VI NO_X limits. Engine manufacturers should not have to engage in additional research and development to achieve these standards. Recognizing that some additional lead time is needed for manufacturers in some cases, we are including an interim provision that will allow manufacturers to use their Annex VI test data to show compliance with the Tier 1 standards.

We considered, but rejected, setting near-term Tier 1 standards that would require a level of emission control greater than that necessary to meet the MARPOL Annex VI NO_X limits, for a combination of reasons. We concluded that setting more stringent near-term Tier 1 standards would likely delay achieving greater environmental benefits in the longer term. The additional lead time that would be necessary to set a Tier 1 standard based on further use and optimization of in-cylinder control would lead to two separate—and possibly conflicting—design steps, one for Tier 1 and a second for Tier 2. Dividing manufacturers' resources this way has the potential to delay the Tier 2 standards. For example, manufacturers would potentially need to make initial changes to in-cylinder designs, then pursue an additional development program to optimize the in-cylinder technologies for controlling emissions in conjunction with advanced technologies. We believe the best route to achieving the maximum reductions from Category 3 marine engines is a near-term Tier 1 standard based on the use of existing technologies, followed by a Tier 2 rulemaking in the next few years that focuses on designing the optimum combination of in-cylinder and advanced technology to reduce emissions from these engines.

The second phase of our emission-control program for Category 3 marine diesel engines will consist of more stringent standards that reflect the application of advanced emission-control technologies and further optimization of in-cylinder controls. We understand that further use and optimization of in-cylinder control can achieve emission reductions beyond the levels needed to meet the Tier 1 standards. As discussed in the Final Regulatory Support Document, we believe that manufacturers can, with additional lead time, make greater use and optimization of in-cylinder controls to reduce emissions at least 10 to 15 percent below Tier 1 levels. It is not clear at this time that in-cylinder controls alone could reduce emissions 30 percent below Tier 1 levels. However, in combination with advanced technologies, emission reductions should be greater than 30 percent below Tier 1 levels. In the Tier 2 rulemaking, we therefore expect to focus on standards that would be based on achieving greater emission reductions through optimizing in-cylinder controls and incorporating advanced technologies such as SCR or water. As discussed above, adopting Tier 2 standards at this time based only on in-cylinder controls could lead to two separate and possibly conflicting design steps, potentially delaying introduction of advanced emission-control technologies and their anticipated emission reductions.

At this time, however, there are still several outstanding technical issues involving the use of these advanced emission-control technologies. For example, there are technical issues concerning the impacts of fuel sulfur levels on emissions, the ability of these technologies to achieve emission reductions at low engine loads, and their impacts on PM emissions. With regard to fuel-sulfur content, most of the demonstration engines that currently use these technologies are operated on fuel with a sulfur content ranging from 5,000 to 10,000 ppm. However, the average sulfur content of fuel used by Category 3 marine diesel engines is 27,000 ppm, and it can be as high as 45,000 ppm. At this time, it is not clear how engines will perform with this higher sulfur fuel and what types of adjustments will need to be made to accommodate the higher sulfur. Also, it may be the case that this technology will perform well with fuel at 15,000 ppm, which is the maximum sulfur content allowable for ships operating in SO_X Emission Control Areas pursuant to Annex VI. With regard to emissions at low load, some studies suggest that advanced technologies may not perform as well when the engine is not operating at its optimal fuel-consumption rate. This is important because engines typically operate at low load in port. Once we understand this dynamic better we will be able to evaluate the extent to which it can be addressed technically. With regard to PM emissions, some concerns have been raised that using these advanced technologies to control NO_X emissions may raise PM emissions. Again, once we understand this dynamic better we will be able to evaluate the extent to which it can be addressed technically. Part of this analysis will entail developing a method to measure PM emissions from these very large engines. Each of these issues is discussed in greater detail in Section IV and in the Final Regulatory Support Document.

Engine manufacturers are currently working on many of these issues. Water emulsification has been applied for

[6] Annex VI was adopted by a Conference of the Parties to MARPOL on September 26, 1997, but has not yet entered into force. Copies of the conference versions of the Annex and the NO_X Technical Code can be found in Docket A–97–50, Document II–B–01. Copies of updated versions can be obtained from the International Maritime Organization (*http://www.imo.org*).

some time on the land-based counterparts of these engines, which are primarily used in stationary engines for power generation. Direct water injection and SCR have also been applied in recent years to several engines operating on vessels. These projects are discussed in Section IV and in Chapter 5 of the Final Regulatory Support Document; an Appendix to Chapter 5 provides a list of these vessels. Most of the engines using these technologies have been installed in the past five years. Many of them are on passenger ferries and most are on ships that operate in European waters, with many being delivered only since 1999. To date, the advanced technologies have only been applied in cases where the operating characteristics of the vessels are compatible with the technology. For instance, SCR has primarily been installed on vessels using medium-speed engines, which have higher exhaust temperatures than low-speed engines, and where very low-sulfur fuel is available. Through these projects, engine manufacturers are experimenting with different emission-control techniques and learning about the long-term operation and durability of these systems. These projects will also provide information about the emission levels that can be achieved through the application of these technologies.

Based on these outstanding technical issues, we believe it is not appropriate at this time to attempt to project the engineering answers and solutions to these technical issues. By waiting a few years, we will be able to benefit from the manufacturers' experience as they continue to develop and apply these technologies on marine diesel engines. We can also develop methods to assess the impact of fuel sulfur on emissions, to assess the emission-control potential of these technologies on emissions at low loads, and to measure and address PM emissions. Consequently, we plan to evaluate more stringent Tier 2 standards in a future rulemaking. In the 2004–2005 time frame, engine manufacturers will have five or more years of data on a significant number of vessels. During this period, we will work with manufacturers to learn more about the advanced technologies discussed above and the steps they are taking to resolve operational and technological issues. With this information, we should be in a significantly better position to determine the emission levels that are achievable and appropriate, given appropriate lead time for the use of these advanced technologies.

We have concluded that the standards in this final rule (which are equivalent to the internationally negotiated NO_X standards established under MARPOL Annex VI) are the appropriate controls for the near term. Requiring additional near-term reductions from further use and optimization of in-cylinder controls would potentially delay and disrupt the second tier of standards, which will focus on emission-control systems that rely on optimized in-cylinder controls and advanced technologies to achieve significantly greater reductions. We have also concluded that it is appropriate to defer adoption of Tier 2 standards to a future rulemaking to allow us to take into account several important outstanding technical issues concerning the use of these advanced technologies and address the potential to combine in-cylinder controls with the advanced technologies.

We expect additional information to become available in the next few years that will allow us to more reliably and appropriately determine the level of emission control that is achievable and appropriate for such technologies, given appropriate lead time.

Based on this, we conclude that the near-term Tier 1 emission standards in this final rule satisfy the criteria of Clean Air Act section 213(a)(3) at this time. Section 213(a)(3) directs EPA to promulgate emission standards and from time to time review and revise those standards. This final rule adopts near-term standards and puts EPA on a schedule to review, and if appropriate, revise those standards in accordance with the criteria in section 213(a)(3). We believe this two-step approach is the most appropriate means to address emissions from Category 3 marine engines in the near-term in the face of incomplete information and the significant changes underway in applying emission-reduction technology to very large marine engines.

We are including a regulatory provision in 40 CFR 94.8 that establishes a schedule for a future rulemaking to promulgate additional emission standards for Category 3 marine engines that we determine are appropriate under section 213(a)(3). This rulemaking will reassess the emission standards in light of the developments in and experience with applying emission-reduction technology to Category 3 marine engines. The standards in this final rule will remain in effect until we modify them in a future rulemaking. We are committing to take final action on appropriate standards for marine diesel engines by April 27, 2007, and to issue a proposal no later than approximately one year before. This future rulemaking will allow us to exercise the discretionary authority under Clean Air Act section 213(a)(3), which directs EPA to ''from time to time revise'' regulations under that provision. EPA considers this time as necessary and appropriate to properly take into consideration additional information expected to become available about emerging technologies, as well as any developments in the international negotiations for more stringent emission limits.

In addition to allowing us to benefit from information that engine manufacturers continue to gather on these advanced technologies, delaying adoption of the Tier 2 until a future rule allows us to facilitate negotiations for appropriate consensus international standards. Adoption of international standards has the potential to maximize the level of emission reductions achieved from emission controls on U.S. and foreign vessels. For example, international standards set at an appropriate level would remove the objections to controlling emissions from engines on foreign vessels. Since engines on foreign-flag vessels account for the majority of emissions from Category 3 marine diesel engines impacting U.S. air quality, successful negotiation of international standards that achieve the greatest emission reduction feasible would result in the greatest improvement to air quality here in the U.S. and around the world. Addressing the long-term standards in the future rulemaking could facilitate such international action, but will also allow us to proceed expeditiously on our own if appropriate international standards are not adopted in a timely way.

The United States has already taken a leadership role for more stringent standards at the International Maritime Organization and has requested that organization to begin consideration of a second tier of international standards. Those discussions are likely to begin in 2004, after Annex VI goes into forces, or as part of a review process if enough countries have not ratified it by the end of 2003.

2. Category 1 and Category 2 Marine Diesel Engines

We proposed to adopt a first tier of standards equivalent to the internationally negotiated NO_X limits for marine diesel engines with per-cylinder displacement of 2.5 to 30 liters. We are adopting these standards in this action. By adopting these standards as Tier 1 standards, we are making them mandatory and enforceable for new engines on U.S. vessels. The Tier 1 standards will begin to apply in 2004 and will continue to apply through 2006. Beginning in 2007, the Tier 2 standards we finalized in 1999 will go into effect.

We proposed to apply all the Tier 2 certification and compliance requirements to the proposed Tier 1 standards as well. After considering the public comments, we are finalizing this approach with two exceptions. First, we allow manufacturers to use test data generated using the procedures in the NO_X Technical Code on an interim basis. Second, we will not require manufacturers to perform production-line testing on their Tier 1 engines.

3. Foreign-Trade Exemption

We are eliminating the foreign-trade exemption for all marine diesel engines, which was available for engines installed on U.S. vessels that spend less than 25 percent of total operating time within 320 kilometers of U.S. territory.

4. Fuel Controls

We are not setting standards for the fuel used by marine diesel engines in this final rule. With regard to the residual fuel used by Category 3 marine diesel engines, we remain concerned that regulating fuel sold in the United States would not necessarily ensure that lower-sulfur fuel is used in U.S. waters, since ships could purchase their fuel in other countries. To obtain the benefits of lower-sulfur fuel, we plan to investigate designation of one or more areas in the United States as SO_x Emission Control Areas pursuant to the international process for this purpose. This is described further in Section IV.B.

With regard to the fuel used by Category 1 and Category 2 marine diesel engines, we are considering distillate marine diesel fuel controls as part of the nonroad diesel rule that is currently under development.

D. Why Is EPA Taking This Action?

Category 3 marine diesel engines generate NO_X, HC, PM and CO emissions that contribute to ozone and CO levels above the National Ambient Air Quality Standards (NAAQS) for ozone and CO (*i.e.*, they contribute to ozone and CO nonattainment) as well as adverse health effects associated with ambient concentrations of PM. As described in more detail below and in the Final Regulatory Support Document, Category 3 marine diesel engines accounted for about 1.6 percent of nationwide mobile source NO_X emissions in 2000. They also accounted for about 2.8 percent of nationwide mobile source PM emissions in 2000. These percentages are expected to increase as a result of increased trade and decreases in emissions from other nonroad sources. The contribution of Category 3 marine diesel engines to nationwide mobile source HC and CO levels is small, at 0.1 and 0.02 percent, respectively, in 2000.

The inventory contribution of Category 3 marine diesel engines can be higher on a port-specific basis. We estimate that these engines contribute about 7 percent of mobile source NO_X in Baton Rouge/New Orleans and Wilmington, NC, and about 5 percent in Miami/ Fort Lauderdale and Corpus Christi. These ships can also have a significant impact on inventories in areas without large commercial ports. For example, they contribute about 37 percent of total area NO_X in the Santa Barbara area.

1. What Are the Health and Welfare Effects of Category 3 Marine Diesel Engine Emissions?

There are important public health and welfare concerns related to Category 3 marine diesel engine emissions.[7] This section contains a summary of the general health effects associated with exposure to ozone, PM, and CO. Further information can be found in Chapter 1 of the Final Regulatory Support Document.

a. Ozone. 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 are a large subset of VOC, and to reduce mobile-source VOC levels we set maximum emission limits for hydrocarbon and particulate emissions.

Based on a large number of studies, we have identified several key health effects caused when people are exposed to levels of ozone found today in many areas of the country. 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.

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 at low levels.[8] 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.

The current primary and secondary ozone National Ambient Air Quality Standard (NAAQS) is 0.12 ppm daily maximum 1-hour concentration, not to be exceeded more than once per year on average. EPA is replacing the previous 1-hour ozone standard with a new 8-hour standard. The new standard is set at a concentration of 0.08 parts per million (ppm), and the measurement period is 8 hours. Areas are allowed to disregard their three worst measurements every year and average performance over three years to determine if they meet the standard.

[7] Sections II and VI of the preamble for our proposal contain an extensive description of the air quality problems we are addressing in this rulemaking, which we are not repeating here.

[8] 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–2001–11, Document II–A–55. This document is also available at *http://www.epa.gov/otaq/diesel.htm#documents.*

That is, the standard is set by the 4th highest maximum 8-hour concentration.

Ground level ozone today remains a pervasive pollution problem in the United States. About 51 million people live in areas with design values above the level of the 1-hour ozone standard based on three years of data (1999–2001). In addition, about 111 million people live in areas with design values above the 8-hour ozone standard based on those three years of data. Approximately 61 million of these people live in areas with design values above the 8-hour standard but are below the design standard for the 1-hour ozone standard (*i.e.*, they are attaining the 1-hour standard). The remainder of these people live in areas with design values above the 8-hour ozone standards but are above the design value for the 1-hour ozone standard (*i.e.*, they are not attaining the 1-hour standard).[9] This represents 291 counties with design values above the level of the 8-hour standard.

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 people have increased.[10] 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.

b. Particulate Matter. Category 3 marine engines contribute to ambient levels of particulate matter through direct emissions of particulate matter, especially sulfates.

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.[11] 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. 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.

There are two indicators related to PM NAAQS. The first indicator is PM_{10}, and the second is $PM_{2.5}$. Concentrations above the $PM_{2.5}$ standard are much more widespread than are violations of the PM_{10} standard, and emission reductions needed to attain the $PM_{2.5}$ standards will also lead to attainment of the PM_{10} standards. The NAAQS for PM_{10} was 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. Recent PM_{10} monitoring data indicates that there are 8 serious and 58 moderate PM_{10} nonattainment areas with about 30 million people in 63 mainly western counties. The NAAQS for $PM_{2.5}$ indicator was established in 1997. According to these standards, the short term (24-hour) standard is set at 65 $\mu g/m^3$ based on the 98th percentile averaged over three years. The long-term standard specifies an expected annual arithmetic mean not to exceed 15 $\mu g/m^3$ over three years.

Current $PM_{2.5}$ monitored values for 1999–2001, which cover about a quarter of the nation's counties, indicate that at least 65 million people in 129 counties live in areas where design values of ambient fine particulate matter levels are at or above the $PM_{2.5}$ NAAQS. Three years of complete data are required to make regulatory determinations of attainment or nonattainment but, based on more limited available data, there are an additional 9 million people in 20 counties where levels exceeding the NAAQS are being measured, but there are insufficient data at this time to make an official estimate of the design value. In total, this represents 39 percent of the population in the areas with monitors.[12] To estimate the current 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 performed for the Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control rule (also called the ''HD07'' rule) described

[9] Memorandum to Docket A–2001–11 from Fred Dimmick, Group Leader, Air Trends Group, ''Summary of Currently Available Air Quality Data and Ambient Concentrations for Ozone and Particulate Matter,'' December 3, 2002, Air Docket A–2001–11, Document No. IV–B–3.

[10] 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, (incorporated into Docket A–2001–11 at Document II–A–58).

[11] EPA (1996) Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information OAQPS Staff Paper. EPA452–R–96–013. Docket No. A–2001–11, Document II–A–52. The particulate matter air quality criteria documents are also available at *http://www.epa.gov/ncea/partmatt.htm*.

[12] Memorandum to Docket A–2001–11 from Fred Dimmick, Group Leader, Air Trends Group, ''Summary of Currently Available Air Quality Data and Ambient Concentrations for Ozone and Particulate Matter,'' December 3, 2002, Air Docket A–2001–11, Document No. IV–B–3.

elsewhere.[13] At that time, we conducted 1996 base year modeling to reproduce the atmospheric processes resulting in formation and dispersion of $PM_{2.5}$ across the U.S. This 1996 modeling included emissions subject to this final rule. According to our national model 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 μg/m³ (29 percent of the population).[14]

While the final implementation process for bringing the Nation's air into attainment with the $PM_{2.5}$ NAAQS is still being completed, the basic framework is well defined. EPA's current plans call for designating $PM_{2.5}$ nonattainment areas in late-2004. Following designation, section 172(b) of the Clean Air Act allows states up to three years to submit a revision to their state implementation plan (SIP) that provides for the attainment of the $PM_{2.5}$ standards. We expect states to submit these SIPs in late-2007. Section 172(a)(2) of the Clean Air Act requires that these SIP revisions demonstrate that the nonattainment areas will attain the $PM_{2.5}$ standards as expeditiously as practicable but no later than five years from the date that the area was designated nonattainment. However, based on the severity of the air quality problem and the availability and feasibility of control measures, the Administrator may extend the attainment date ''for a period of no greater than 10 years from the date of designation as nonattainment.'' Therefore, we expect that areas will be ultimately be required to attain the $PM_{2.5}$ air quality standard in the 2009 to 2014 time frame.

c. Diesel Exhaust. Diesel emissions are of concern beyond their contribution to ambient PM. There have been health studies specific to diesel exhaust emissions indicating that potential hazards to human health are specific to this emission source. For chronic exposure, these hazards included respiratory system toxicity and carcinogenicity. Acute exposure also causes transient effects (a wide range of physiological symptoms stemming from irritation and inflammation mostly in the respiratory system) in humans though they are highly variable depending on individual human susceptibility. The chemical composition of diesel exhaust includes several hazardous air pollutants, or air toxics.

EPA recently released its final ''Health Assessment Document for Diesel Engine Exhaust'' (the Diesel HAD).[15] There, we concluded that diesel exhaust is likely to be carcinogenic to humans by inhalation and environmental exposures in accordance with the revised draft 1996/1999 EPA cancer guidelines. A number of other agencies (*e.g.*, National Institute for Occupational Safety and Health, the International Agency for Research on Cancer, the World Health Organization, California EPA, and the U.S. Department of Health and Human Services) have made similar determinations.

EPA concluded in the Diesel HAD that it is not possible to currently calculate a cancer unit risk for diesel particles due to a variety of factors that limit the current studies such as lack of adequate dose-response relations between exposure versus cancer incidence. Even though EPA does not have a carcinogenic potency with which to accurately estimate the carcinogenic impact of diesel exhaust, the likely hazard to humans together with the potential for significant environmental risks leads us to conclude that diesel exhaust emissions should be reduced from nonroad engines in order to protect public health.

d. Carbon Monoxide. Carbon monoxide 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.[16]

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.[17] 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).[18] CO standards for passenger cars and other light-duty trucks and heavy-duty vehicles did not change as a result of other recent rulemakings.

e. *Environmental Effects.* In addition to the health and welfare concerns just described, Category 3 marine diesel engines can contribute to visibility degradation, haze, acid deposition, and eutrophication and nitrophication. Further information on these effects can

[13] See the Final Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (EPA420–R–00–026, December 2000). Docket No. A–2001–11, Document II–A–55. This document is also available at *http://www.epa.gov/otaq/diesel.htm#documents.*

[14] 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; Docket No. A–2001–11, Document II–A–61.

[15] U.S. EPA (2000) Health Assessment Document for Diesel Exhaust: SAB Review Draft. EPA/600/8–90–057E Office of Research and Development, Washington DC. This document is available electronically at *http://cfpub.epa.gov/ncea/cfm/dieslexh.cfm.*

[16] 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–2001–11, Document II–A–59.

[17] 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–2001–11, Document II-A-60. *See also* Air Quality Criteria for Carbon Monoxide, U.S. EPA, EPA 600/P–99/001F, June 2000, at page 3–10; Docket No. A–2001–11, Document II–A–56. This document is also available at *http://www.epa.gov/ncea/coabstract.htm.*

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

be found in Chapter 1 of the Final Regulatory Support Document.

2. What Is the Inventory Contribution From the Marine Diesel Engines That Are Subject to This Rule?

Category 3 marine diesel engines contribute to the health and welfare effects described above through their NO_X, PM, HC, and CO emissions. These emissions are summarized in this section. To estimate these inventory impacts, we used baseline estimates developed under contract with E. H. Pechan and Associates, Inc.[19] Inventory estimates were developed separately for vessel traffic within 25 nautical miles of port areas and vessel traffic outside of port areas but within 175 nautical miles of the coastline. The inventories include all Category 3 traffic, including that on the Great Lakes. Different techniques were used to develop the port and non-port inventories. For port areas we developed detailed emissions estimates for nine specific ports using port activity data including port calls, vessel types and typical times in different operating modes. Emission estimates for all other ports were developed by matching each of those ports to one of the nine specific ports already analyzed based on characteristics of port activity, such as predominant vessel types, harbor draft and region of the country. The detailed port emissions were then scaled to the other ports based on relative port activity. We developed non-port emission inventories using cargo movements and waterways data, vessel speeds, average dead weight tonnage per ship, and assumed cargo capacity factors. More detailed information regarding the development of the baseline emission inventories can be found in Chapter 6 of the Final Regulatory Support Document.

In our inventory estimates work for the proposal we included all Category 3 vessel emissions within 175 nautical miles of the U.S. coastline on the assumption that emission transport would bring these emissions on to shore and affect U.S. ambient air quality. We requested comment on the transport issue, including whether 175 nautical miles was the appropriate distance from shore to consider or whether we should consider a range different from 175 nautical miles as our primary scenario, and whether we should consider different distances from the coast for different areas of the country. We also asked if there was additional information available to help us assess the emission transport issue. In general, the comments received were supportive of including all emissions within 175 nautical miles of the coast in the national emission inventory. While some commenters questioned this distance, we received no substantial new data or information suggesting that a different distance would be more appropriate or that would help us determine what distance from shore we should use in our inventory analysis.

For the purpose of this final rule, we are including all Category 3 vessel emissions within 175 nautical miles of the U.S. coast in our emission inventory estimates. However, we acknowledge that this emission transport issue is complex and requires further investigation. For example, as we noted in the proposal for this rule, the U.S. Department of Defense (DoD) has presented some information to us that suggests a different, shorter (offshore distance) limit be established rather than the proposed 175 nautical miles as the appropriate location where emissions from marine vessels would affect on-shore air quality. DoD's modeling work on the marine vessels issue in Southern California led them to conclude that emissions within 60 nautical miles of shore could make it back to the coast due to eddies and the nature of the sea-breeze effects. They note that this distance seems to be confirmed by satellite data showing a distinct tendency for a curved line of demarcation separating the offshore (unobstructed) or parallel ocean wind flow from a region of more turbulent, recirculated air that would impact on-shore areas. That curved line of demarcation was close to San Nicolas Island, which is about 60 nautical miles offshore. Studies and published information on other coastal areas in California indicates that they experience somewhat a narrower (perhaps 30 nautical miles) region of ''coastal influence.'' Nevertheless, commenters from California support a 175 nautical-mile boundary.

Because of the continued data and modeling uncertainties surrounding this issue, we intend to investigate this issue as part of our future rule. As part of this investigation, we will consider the special characteristics of emission transport in separate parts of the country. For example, we expect that the Gulf Coast and East Coast areas of the United States would have their own unique meteorological conditions that might call for different lines of demarcation between on-shore and off-shore effects due to different prevailing winds in those parts of the country.

We also requested comment on both our future growth estimates and our analysis of emissions from U.S. versus foreign vessels. Commenters suggested that the overall growth that we projected was fine, but that the U.S. vessel contribution to future inventories would likely not change and that all of the future growth would be due to increased foreign vessel traffic. We have modified the future U.S. and foreign vessel emissions split accordingly. Further, in response to comments received and new port calls data we have modified our overall estimates of the relative contributions of U.S. and foreign vessels to be more heavily weighted toward foreign vessels. A complete discussion of these changes to the inventories can be found in the Regulatory Support Document and the Summary and Analysis of Comments.

Baseline emission inventory estimates for Category 3 marine diesel engines in 2000 are summarized in Table I.D–1 in the context of other emission sources. This table shows the contributions of the different mobile-source categories to the overall national mobile-source inventory. Of the total emissions from mobile sources, Category 3 marine diesel engines contributed about 1.6 percent of NO_X and 2.8 percent of PM emissions in the year 2000.

Our emission projections for Category 3 marine diesel engines in 2030 show how emissions from these engines are expected to increase over time after implementation of Tier 1/MARPOL Annex VI NO_X limits. The projections for 2030 are summarized in Table I.D–2 and indicate that Category 3 marine diesel engines are expected to contribute 8.9 percent NO_X and 7.3 percent of PM emissions in the year 2030. Population growth and the effects of other regulatory control programs are factored into these projections. The relative contribution of Category 3 marine diesel engines increases between 2000 and 2030 largely because we have adopted requirements that will substantially reduce emissions from most other categories of nonroad engines. Note that the effectiveness of all control programs is offset by the anticipated growth in engine populations.

[19] ''Commercial Marine Emission Inventory Development.'' E. H. Pechan and Associates, Inc. and ENVIRON International Corporation. April 2002. Air Docket A–2001–11, item II–A–67.

TABLE I.D–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 new standards (U.S. flagged commercial marine—Category 3)	28	0.2	1	0.0	2	0.0	2.5	0.4
Commercial Marine CI—Category 3 (U.S. and foreign)	214	1.6	9	0.1	19	0.02	19.7	2.8
Commercial Marine CI—Categories 1 and 2	703	5.2	22	0.3	103	0.1	20	2.9
Highway Motorcycles	8	0.1	84	1.1	331	0.4	0.4	0.1
Nonroad Industrial SI>19 kW	308	2.3	226	3.1	1,734	2.3	1.6	0.2
Recreational SI	5	0.0	418	5.7	1,120	1.5	12.0	1.7
Recreation Marine CI	38	0.3	1	0.0	6	0.0	1	0.1
Marine SI Evap	0	0.0	100	1.4	0	0.0	0	0.0
Marine SI Exhaust	32	0.2	708	9.6	2,144	2.8	38	5.4
Nonroad SI <19 kW	106	0.8	1,460	19.8	18,359	24.2	50	7.1
Nonroad CI	2,625	19.6	316	4.3	1,217	1.6	253	35.9
Locomotive	1,192	8.9	47	0.6	119	0.2	30	4.3
Total Nonroad	5,231	39	3,391	46	25,152	33	426	60
Total Highway	7,981	60	3,811	52	49,813	66	240	34
Aircraft	178	1	183	3	1,017	1	39	6
Total Mobile Sources	13,389	100	7,385	100	75,982	100	705	100
Total Man-Made Sources	24,532	....	18,246	....	97,735	....	3,102	
Mobile Source percent of Total Man-Made Sources	55	....	40	....	78	....	23	

TABLE I.D–2.—MODELED ANNUAL EMISSION LEVELS FOR MOBILE-SOURCE CATEGORIES IN 2030

[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 new standards (U.S. flagged commercial marine—Category 3)[a]	28	0.5	1	0.0	2	0.0	2.5	0.3
Commercial Marine CI—Category 3 (U.S. and foreign)	531	8.9	26	0.5	57	0.05	54.0	7.3
Commercial Marine CI—Categories 1 and 2	680	11.4	26	0.5	137	0.1	20.0	2.7
Highway Motorcycles	17	0.3	172	3.4	693	0.7	1.0	0.1
Nonroad Industrial SI > 19 kW	44	0.7	17	0.3	265	0.3	2.0	0.3
Recreational SI	20	0.3	294	5.8	1,843	1.9	10.5	1.4
Recreation Marine CI	52	0.9	2	0.0	11	0.0	1.4	0.2
Marine SI Evap	0	0.0	122	2.4	0	0.0	0	0.0
Marine SI Exhaust	64	1.1	269	5.3	2,083	2.1	29	3.9
Nonroad SI < 19 kW	126	2.1	1,200	23.7	32,310	33.3	93	12.6
Nonroad CI	1,994	33.4	158	3.1	1,727	1.8	306	41.6
Locomotive	531	8.9	30	0.6	119	0.1	18	2.4
Total Nonroad	4,059	68	2,316	46	39,245	40	535	73
Total Highway	1,648	28	2,496	49	56,303	58	158	22
Aircraft	262	4	262	5	1,502	2	43	6
Total Mobile Sources	5,969	100	5,074	100	97,050	100	736	100
Total Man-Made Sources	16,177	....	16,094	....	121,428	....	3,297	....

TABLE I.D–2.—MODELED ANNUAL EMISSION LEVELS FOR MOBILE-SOURCE CATEGORIES IN 2030—Continued

[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
Mobile Source percent of Total Man-Made Sources	37	....	32	....	80	....	22	....

[a] These inventories are the same as for 2000 because, based on comments received, we assumed no future increase in U.S. domestic trade.

Further analysis suggests that Category 3 marine diesel engines contribute more significantly in individual port areas. For example, we estimate that these engines contribute about 7 percent of mobile-source NO_X in the Metropolitan Statistical Areas (MSA) of Baton Rouge/New Orleans and Wilmington NC, about 5 percent of mobile-source NO_X in the Miami/ Fort Lauderdale and Corpus Christi MSAs, and about 4 percent in the Seattle/ Tacoma/Bremerton/Bellingham MSA.

In addition, these ships can have a significant impact on inventories even in areas without large commercial ports. For example, Santa Barbara estimates that engines on ocean-going marine vessels currently contribute about 37 percent of total NO_X in their area. These emissions are from ships that transit the area, and ''are comparable to (even slightly larger than) the amount of NO_X produced onshore by cars and truck.'' [20] By 2015 these emissions are expected to increase 67 percent, contributing 61 percent of Santa Barbara's total NO_X emissions. This mix of emission sources led Santa Barbara to point out that they will be unable to meet air quality standards for ozone without significant emission reductions from these vessels, even if they completely eliminate all other sources of pollution.

E. What Are the Internationally Negotiated Standards and What Is the Status of the U.S. Ratification of Annex VI?

In response to growing international concern about air pollution and in recognition of the highly international nature of maritime transportation, the IMO initiated development of international standards for NO_X, SO_x, and a variety of other air emissions arising from marine vessel operations.[21,22] As a result of these discussions, Annex VI was drafted between 1992 and 1997. The Annex VI engine emission standards cover only NO_X emissions; there are no restrictions on PM, HC, or CO emissions. They are based on engine speed and apply to engines above 130 kW. These standards are set out in Table III.A–1. Originally, these standards were expected to reduce NO_X emissions by 30 percent when fully phased in. More recent analysis by EPA, based on newly estimated emission factors for these engines, indicates an expected reduction on the order of only 20 percent when compared to uncontrolled emissions by 2030 when the standards are fully phased-in. The EPA inventory analysis is described in more detail in the Final Regulatory Support Document.

The Annex VI NO_X standards apply to 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. The Annex does not distinguish between marine diesel engines installed on recreational or commercial vessels; all marine diesel engines above 130 kW are subject to the standards regardless of the type of vessel they are used on, and the standards apply to engines installed on vessels only in domestic service as well as to engines on vessels engaged in international voyages. The test procedures to demonstrate compliance are set out in the Annex VI NO_X Technical Code.[23] They are based on ISO 8178 and are performed using distillate fuel. Engines can be pre-certified or certified after they are installed on a vessel. After demonstrating compliance, pre-certified engines would receive an Engine International Air Pollution Prevention (EIAPP) certificate. This document, to be issued by the Administration of the flag country, is needed by the ship owner as part of the process of demonstrating compliance with all the provisions of Annex VI and obtaining an International Air Pollution Prevention (IAPP) certificate for the vessel once the Annex goes into force. The Annex also contains engine compliance provisions based on a survey approach. These survey requirements would apply after the Annex goes into force. An engine is surveyed right after it is installed, every five years after installation, and at least once between five-year surveys. Engines are not required to be tested as part of a survey, however. The surveys can be done by a parameter check, which can be as simple as reviewing the Record Book of Engine Parameters that must be maintained for each engine and verifying that current engine settings are within allowable standards.

After several years of negotiation, the Parties to MARPOL adopted a final version of Annex VI at a Diplomatic Conference on September 26, 1997. However, it will not enter into force until twelve months after the date on which not less than fifteen member 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 the agreement. To date, more than four years after it was adopted, the Annex has been ratified by only 6 countries representing about 26 percent of the world's merchant shipping.[24]

The Annex requires that engines installed on a ship constructed on or after January 1, 2000 must comply with the specifications set forth in Regulation 13 of the Annex and the NO_X Technical Code. In addition, ship owners must bring existing engines into compliance if the engines undergo a major conversion on or after that date.[25]

[20] Memorandum to Docket A–2001–11 from Jean Marie Revelt, *Santa Barbara County Air Quality News,* Issue 62, July-August 2001 and other materials provided to EPA by Santa Barbara County,'' March 14, 2002. Air Docket A–2001–11, Document No. II–A–47.

[21] The Annex covers several aspects air emissions from marine vessels: ozone-depleting substances, NO_X, SO_x, VOCs from tanker operations, incineration, fuel oil quality. There are also requirements for reception facilities and platforms and drilling rigs.

[22] To obtain copies of this document, *see* Footnote 5, above.

[23] To obtain copies of this document, *see* Footnote 5, above.

[24] The countries that have ratified Annex VI are Sweden, Norway, Bahamas, Singapore, Marshall Islands, and Liberia. Information about Annex VI ratification can be found at *http://www.imo.org* (look under Conventions, Status of Conventions—Complete List).

[25] As defined in Regulation 13 of Annex VI, a major conversion means either (i) the engine is

Although the Annex has not yet entered into force and is not yet legally binding, it is widely recognized that the vast majority of marine diesel engines manufactured and installed after January 1, 2000 meet the requirements of the Annex. To facilitate implementation while the Annex is not yet in force and to allow engine manufacturers to certify their engines before the Annex goes into force, we have set up a process for manufacturers to obtain a Statement of Voluntary Compliance.[26] Once Annex VI goes into effect for the United States we will develop a process by which an EPA-issued Statement of Voluntary Compliance can be exchanged for an EIAPP. It should be noted that an engine certificate (EIAPP) or Statement of Voluntary Compliance for an engine installed on a U.S. vessel must be issued by the U.S. EPA. Marine classification or survey societies are not authorized to issue such certificates on behalf of the U.S. government for U.S. vessels.

The U.S. government has prepared the appropriate documents for the President to submit Annex VI to the Senate for its advice and consent to ratification. Besides setting standards for NO_X emissions, Annex VI regulates ozone-depleting emissions, sulfur oxides emissions and shipboard incineration, and contains other environmentally protective measures. In transmitting Annex VI to the Senate, the Administration will work with Congress on new legislation to implement the Annex. The United States government also supports a new effort to revise the Annex VI standards to include a second tier of NO_X standards taking into account the emission-reduction potential of new control technologies. Should the Senate provide its advice and consent to ratification of the Annex, the United States will continue its leadership in promoting environmentally responsible international emission standards at the IMO and recognize the role the IMO plays in protecting the world's marine environment from pollution. As described in Section IV.A.4, we have already requested the Marine Environment Protection Committee to begin consideration of more stringent NO_X emission standards for marine diesel engines. In addition, once the Annex goes into force, amendment of NO_X standards to include a second tier of standards will be made easier through the tacit amendment process that would then apply.

F. Recent European Union Action

In November 2002, the European Union adopted a new strategy to address sulfur emissions from marine engines by reducing the sulfur content of marine fuels used in the European Union. The strategy consists of two documents: A Communication from the Commission to the European Parliament and the Council—A European Union strategy to reduce atmospheric emissions from seagoing ships; and a Proposal for a Directive of the European Parliament and of the Council—amending Directive 1999/32/EC as regards the sulphur content of marine fuel.[27] The strategy contains provisions to push the IMO for more stringent NO_X limits for marine diesel engines. It also encourages the development of a Clean Marine award scheme and market-based instruments to promote emission reductions.

The proposal has two main provisions. The first is a 15,000 ppm sulfur content limit that would apply to the fuel used by all oceangoing vessels in the North Sea, English Channel, and Baltic Sea, and to all regular passenger vessels operating in the EU by 2007. This provision is consistent with the SO_x Emission Control Areas designated under MARPOL Annex VI. The second provision would require ships to use fuel with a maximum sulfur content of 2,000 ppm (0.2%) while they are at berth in ports inside the European Union. This provision is intended to reduce sulfur and particulate matter emissions in populated areas. The analysis accompanying the fuel sulfur proposal estimates that the proposed standards will reduce SO_2 emissions by 507,000 metric tons and PM emissions by 8,000 metric tons, saving about 2,000 lives a year. These benefits are monetized at 2.7 billion Euros. The costs, which they note are likely to be born by shipowners through increased fuel prices, is estimated to be 1.07 billion euros per year.

The strategy was finalized on November 20, 2002. The strategy and communication documents will be sent to the European Parliament and Council. The proposal will be discussed in these legislative bodies, and negotiations are anticipated to take about two years.

G. Statutory Authority

We conducted a study of emissions from nonroad engines, vehicles, and equipment in 1991, as directed by section 213(a) of the Clean Air Act (42 U.S.C. 7547(a)). Based on the results of that study, we determined that emissions of NO_X, volatile organic compounds (including HC), and CO from nonroad engines and equipment contribute significantly to ozone and CO concentrations in more than one nonattainment area (see 59 FR 31306, June 17, 1994). Given this determination, section 213(a)(3) of the Act requires us to establish (and from time to time revise) emission standards for those classes or categories of new nonroad engines, vehicles, and equipment that in our judgment cause or contribute to such air pollution. We have determined that marine diesel engines rated over 37 kW cause or contribute to such air pollution (*see also* the preamble to the proposed rule).

Where we determine that other emissions from new nonroad engines, vehicles, or equipment significantly contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, section 213(a)(4) of the Act authorizes EPA to establish (and from time to time revise) emission standards from those classes or categories of new nonroad engines, vehicles, and equipment that cause or contribute to such air pollution. We have determined that marine diesel engines rated over 37 kW cause or contribute to such air pollution. That finding, which covers PM, was made in our 1999 rulemaking (December 29, 1999, 64 FR 73300; *see also* the preamble to that proposed rule, December 11, 1998, 63 FR 68508).

Clean Air Act section 307(d) applies to this final rule, as provided by section 307(d)(1)(V) (42 U.S.C. 7607(d)(1)(V)).

II. Which Engines Are Covered?

The standards we are adopting in this action will apply to new marine diesel engines installed on vessels flagged or registered in the United States. To clarify this scope of application, we are extending the definitions contained in 40 CFR 94.2 to apply to all sizes of marine diesel engines, no longer excluding those with per-cylinder displacement at or above 30 liters. According to those definitions, a marine diesel engine is subject to the standards if it is:

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replaced by a new engine, (ii) it is substantially modified, or (iii) its maximum continuous rating is increased by more than 10 percent. Any existing engine that undergoes a major conversion on or after January 1, 2000 would be required to comply with the Annex VI NO_X limits. Note that EPA's marine diesel engine emission control program does not have a similar provision for marine diesel engines.

[26] 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 Web site: *http://www.epa.gov/otaq/regs/nonroad/marine/ci/imolettr.pdf* and in Docket A–2001–11, Document No. II–B–01.

[27] More information on the European Union strategy can be found at *http:www.europa.eu.int/comm/environment/air/transport.htm#3.*

- Manufactured after the emission standards become effective, whether it is made in the United States or is imported;
- Installed for the first time in a marine vessel flagged or registered in the United States after having been used in another application subject to different emission standards (or exempt from emission standards); or
- Installed on a new vessel flagged in the United States.

The standards will apply to new marine diesel engines subject to this rule regardless of how they are used. In other words, engine manufacturers will no longer be able to obtain an exemption for engines used on vessels engaged in foreign trade (defined as vessels flagged or registered in the United States that would spend less than 25 percent of total operating time within 320 kilometers of U.S. territory). This exemption was generally targeted at auxiliary engines, which are invariably less than 30 liters per cylinder.

In the remainder of this section we discuss the scope of application of this final rule in greater detail.

A. What Is a Marine Vessel?

For the purpose of our marine diesel engine standards, ''marine vessel'' has the meaning specified in the General Provisions of the United States Code, 1 U.S.C. 3 (*see* 40 CFR 94.2). According to that definition, the word ''vessel'' includes ''every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water.''

B. What Are Category 1, 2, and 3 Marine Diesel Engines?

In our 1999 commercial marine diesel engine rule, we defined ''marine engine'' as an engine that is installed or intended to be installed on a marine vessel. We also differentiated between three types of marine diesel engines. As explained in that rule, this approach is necessary because marine diesel engines are typically derivatives of land-based diesel engines and those land-based engines are not all subject to the same numerical standards, test procedures, and effective dates.

The definitions for the different categories of marine diesel engines are contained in 40 CFR 94.2. Category 1 marine diesel engines, those having a rated power greater than or equal to 37 kilowatts and a per-cylinder displacement less than 5 liters, are similar to land-based nonroad engines used in construction and farm equipment. Category 2 marine diesel engines, those with per-cylinder displacement at or above 5 liters but less than 30 liters, are most often similar to locomotive engines. Category 1 and Category 2 marine diesel engines are used as propulsion engines (*i.e.,* an engine that moves a vessel through the water or directs the movement of a vessel (40 CFR 94.2)) on tugboats, fishing vessels, supply vessels, and smaller cargo vessels. They are also used as auxiliary engines (*i.e.,* a marine engine that is not a propulsion engine (40 CFR 94.2)) to provide electricity for navigation equipment and crew service or other services such as pumping, powering winches, or handling anchors.

Category 3 marine diesel engines, which are the primary focus of this final rule, are defined as having per-cylinder displacement at or above 30 liters. These are very large engines used for propulsion on large vessels such as container ships, tankers, bulk carriers, and cruise ships. Most of these engines are installed on ocean-going vessels, though a few are found on ships in the Great Lakes. Category 3 marine diesel engines have no land-based mobile-source counterpart, though they are similar to engines used to generate electricity in certain power-plant applications. In marine applications they are either mechanical drive or indirect drive. Mechanical drive engines can be direct drive (engine speed is the same as propeller speed; this is common on very large ships) or have a gearbox (*i.e.,* they have reduction gears; this is common on ships using medium-speed Category 3 marine diesel engines). Indirect drive engines are used to generate electricity that is then used to turn the propeller shaft. These are common in cruise ships, since they have heavy electricity demands. Category 3 marine diesel engines typically operate at a lower speed and higher power than Category 1 and Category 2 engines, with the slowest speed being about 60 rpm (*see* Table II.B–1).

TABLE II.B–1.—MARINE ENGINE CATEGORY DEFINITIONS

Category	Displacement per cylinder	hp range (kW)	rpm range
1	Disp. <5 liters (and power ≥37 kW)	37–2,300	1,800–3,000
2	5 ≤disp. <30 liters	1,500–8,000	750–1,500
3	Disp. ≥30 liters	2,500–80,000	60–900

C. What Is a New Marine Diesel Engine?

In the proposal for this rule, we proposed that the emission standards would apply to new engines on vessels flagged or registered in the United States. We also requested comment on whether to modify the definition of a ''new marine engine'' to find that the engine emission standards apply to marine diesel engines that are built after the standards become effective and that are installed on foreign vessels that enter U.S. ports. We have decided to finalize the scope of application as proposed. However, we intend to revisit this issue in our future rule.

1. ''New'' Engines on Vessels Flagged or Registered in the United States

As set out in 40 CFR 94.2, a new marine engine is (i) a marine engine, the equitable or legal title to which has never been transferred to an ultimate purchaser; (ii) a marine engine installed on a vessel, the equitable or legal title to such vessel has never been transferred to an ultimate purchaser; or (iii) a marine engine that has not been placed into service on a vessel. In cases where the equitable or legal title to an engine or vessel is not transferred to an ultimate purchaser prior to its being placed into service, an engine ceases to be new after it is placed into service.

This means that a marine engine is new and is subject to emission standards before its initial sale is completed or it is placed into service. Practically, it means that any engine must meet emission standards that are in effect the first time it is sold or placed into service or the first time the vessel on which it is installed is sold or placed into service. This is true for any engine that is sold for the first time as a marine engine (placed into service on a marine vessel), regardless of whether it has previously been used for other nonroad or highway purposes. This clarification is necessary because some marine engines are made by ''marinizing'' existing land-based nonroad or highway engines. Without this clarification, a used highway or land-based engine converted for marine installation would not be subject to the standards, since its title was already transferred to the initial highway or land-based nonroad user.

With respect to imported marine diesel engines, 40 CFR 94.2 defines ''new'' as an engine that is not covered by a certificate of conformity at the time of importation and that was manufactured after the starting date of the emission standards applicable to such an engine (or which would be applicable to such an engine had it been manufactured for importation into the United States). According to this definition, the standards apply to engines that are imported by any person, whether newly manufactured or used, and whether they are imported as uninstalled engines or if they are already installed on a marine vessel that is imported into the United States. In one example, a person may want to import a vessel with an engine built after the effective date of the standards, but the engine does not have a certificate of conformity from EPA because the engines and vessel were manufactured elsewhere. We would still consider it to be a new engine or vessel, and it would need to comply with the applicable emission standards. This provision is important to prevent manufacturers from trying to avoid the emission standards by building vessels abroad, transferring their title, and then importing them as used vessels.

2. ''New'' Engines on Vessels Flagged or Registered Elsewhere

This final rule does not apply to Category 1, 2, and 3 marine diesel engines that are built after the standards become effective and that are installed on foreign vessels that enter U.S. ports and are not imported into the United States. Section 213 of the Clean Air Act (42 U.S.C. 7547), authorizes regulation of ''new nonroad engine'' and ''new nonroad vehicle.'' However, Title II of the Clean Air Act does not define either ''new nonroad engine'' or ''new nonroad vehicle.'' Section 216 defines a ''new motor vehicle engine'' to include an engine that has been ''imported.'' EPA modeled the current regulatory definitions of ''new nonroad engine'' and ''new marine engine'' at 40 CFR 89.2 and 40 CFR 94.2, respectively, after the statutory definitions of ''new motor vehicle engine'' and ''new motor vehicle.'' This was a reasonable exercise of the discretion provided to EPA by the Clean Air Act to interpret ''new nonroad engine'' or ''new nonroad vehicle.'' *See Engine Manufacturers Assoc.* v. *EPA,* 88 F.3d 1075, 1087 (D.C. Cir. 1996).

The 1999 marine engine rule did not apply to marine engines on foreign vessels. 40 CFR 94.1(b)(3). At that time, we concluded that engines installed on vessels flagged or registered in another country that come into the United States temporarily will not be subject to the emission standards. Those vessels are not considered imported under the U.S. customs laws and did not meet the definition of ''new'' adopted in that rule (64 FR 73300, Dec. 29, 1999).

The May 29, 2002 proposed rule solicited comment on whether to exercise our discretion and modify the definition of a ''new marine engine'' to find that engine emission standards apply to foreign vessels that enter U.S. ports. As discussed earlier, the standards in this rulemaking will go into effect in 2004. We will also conduct a subsequent rulemaking that will address revisions to these standards for future model years. In this subsequent rulemaking, we will consider adopting more stringent standards that require a longer lead time than the standards adopted in this final rule. The issue of applying these more stringent standards to foreign vessels will also be considered in that subsequent rulemaking.

We must therefore determine whether to revise the definition of ''new'' to include foreign vessels for purposes of the near-term standards adopted in this final rule. EPA need not decide whether we have the discretion to interpret ''new'' nonroad engine or vessel in that manner; however, we believe it would be appropriate not to exercise such discretion at this time even assuming we had the discretion to interpret ''new'to include foreign vessels.

As noted above, one of the reasons we intend to address a second phase of more stringent standards in a subsequent rulemaking is to facilitate the development of more stringent consensus international requirements. Adoption of international standards has the clear potential to maximize the level of emission reductions achieved from emission control on U.S. and foreign vessels. For example, consensus international standards of appropriate stringency would facilitate and effectively reduce or remove the legal and policy objections to controlling emissions from foreign vessels, and therefore would facilitate achieving the greatest emission reductions from Category 3 vessels. This is one reason we determined to address the second phase of standards in a subsequent rulemaking timed to facilitate such international action, but also timed to allow us to proceed expeditiously on our own if appropriate international standards are not adopted.

Applying the first phase of standards adopted in this final rule to foreign vessels would require us to determine that we have the discretion to interpret new nonroad engine or vessel in that manner, and that it is a reasonable exercise of discretion to do so. However even assuming we have the discretion to interpret ''new marine engine'' to include engines on foreign vessels, we believe it would be appropriate not to exercise such discretion at this time.

The same reasons that counsel deferring adoption of more stringent standards to a subsequent rulemaking also counsel deferring a decision on applying Clean Air Act standards to foreign vessels to such a rulemaking. We believe that deferring this decision may help facilitate the adoption of more stringent consensus international standards. A new set of internationally negotiated marine diesel engine standards would apply to engines on all vessels, regardless of where they are flagged. Adoption of appropriate international consensus standards has the clear potential to maximize the level of emission reductions from domestic and international vessels.

Our decision to defer application of the standards to engines on foreign flag vessels is not expected to lead to any significant loss in emission reductions. We fully expect that foreign vessels will comply with the MARPOL standards whether or not they are also subject to the equivalent Clean Air Act standards being adopted in this final rule. Consequently, no significant emission reductions would be achieved by treating foreign vessels as ''new'' for purposes of the near-term standards in this final rule and there is no significant loss in emission reductions by not including them.

In conclusion, we are not including foreign engines and vessels in this rulemaking and are not revising the definition of ''new marine engine'' at this time. We do not need to decide now whether we have the discretion to include foreign vessels under the nonroad provisions of the Clean Air Act. In the subsequent rulemaking, we will be in a better position to resolve under what circumstances we may and should define new nonroad engine and vessel to include foreign engines and vessels. As part of that determination, we will also assess the progress made by the international community toward the adoption of new more stringent international consensus standards that reflect advanced emission-control technologies.

D. What Is a New Marine Vessel?

1. Newly Manufactured Vessel

The definition of new vessel is set out in 40 CFR 94.2. This definition is similar to the definition of new engine: a new marine vessel is a vessel whose equitable or legal title has never been transferred to an ultimate purchaser. In the case where the equitable or legal title to a vessel is not transferred to an ultimate purchaser prior to its being placed into service, a vessel ceases to be new when it is placed into service.

2. Modification of an Existing Vessel With Category 1 or Category 2 Main Propulsion Engines

In addition, our definition in 40 CFR 94.2 specifies that a vessel is considered new when it has been modified such that the value of the modifications exceeds 50 percent of the value of the modified vessel. As noted in our 1999 rulemaking, this provision is intended to prevent someone from re-using the hull or other parts from a used vessel to avoid emission standards. This provision is based on a similar provision in our locomotive engine emission control program (*see* 40 CFR 92.2 definition of ''freshly manufactured locomotive''). Since we finalized our 1999 commercial marine diesel engine rule we received several questions about how to apply this provision. The following is intended to clarify this provision.

When applying this provision, the modifications must be completed prior to the effective date of the standards that would otherwise apply. For example, for the Tier 2 engine standards that go into effect in 2007 for Category 1 and Category 2 marine diesel engines, modifications that are completed by December 31, 2006 will not trigger the engine requirements and the engines on that vessel would not have to meet the standards. However, if the vessel modifications are completed on or after January 1, 2007, and they exceed 50 percent of the value of the modified vessel, then the engines on the vessel must meet the standards regardless of whether they have been changed as part of the vessel modification.

The definition in 40 CFR 94.2 refers to the ''value'' of the modifications, rather than the costs. These figures must therefore be based on the appraised value of the vessel before modifications compared with the value of the modified vessel. The following equation demonstrates the calculation, showing that a vessel is new if:

[assessed value after modifications] − [assessed value before modifications] ≥ 0.5 [assessed value after modifications]

If the value of the modifications exceeds 50 percent of the final value of the modified vessel, we would treat the vessel as new under 40 CFR part 94. To evaluate whether the modified vessel would be considered new, one would need to project the fair market value of the modified vessel based on an objective assessment, such as an appraisal for insurance or financing purposes, or some other third-party analysis. While the preliminary decision can be based on the projected value of the modified vessel, the decision must also be valid when basing the calculations on the actual assessed value of the vessel after modifications are complete.

3. Modification of an Existing Vessel With Category 3 Main Propulsion Engines

EPA is adopting a separate definition of ''new vessel'' for those vessels equipped with a Category 3 engine. A separate definition for these vessels is reasonable because large ocean-going vessels are already subject to a different definition of ''new vessel'' pursuant to the U.S. adoption of the requirements in MARPOL Annex I, Regulations for the Prevention of Pollution by Oil.[28] The MARPOL Annex I criteria for determining when the modifications made to an existing vessel make that vessel ''new'' and thereby subject to MARPOL Annex I are contained in its definition for ''major conversion'' of a ship. The goal of the Annex I provision is similar to the goal of our provision: To require ships that have been so modified as to make them substantially new, to comply with the standards otherwise applicable to new vessels.

Note that while the provisions of MARPOL Annex I apply to all vessels, Annex I distinguishes between vessels at or above 400 gross tonnage, which are subject to the specific MARPOL requirements, and those below 400 gross tonnage, which are subject to potentially different provisions, adopted by each Member State to ''ensure that it is equipped as far as practicable and reasonable with [relevant] installations.'' Vessels above 400 gross tonnage, which are likely to be ocean-going vessels equipped with Category 3 main propulsion engines, are therefore subject to the Annex I criteria for determining when an existing vessel is modified in such a way that it is considered ''new'' and subject to MARPOL Annex VI's requirements.

For the purpose of this Clean Air Act regulation, we are adopting a definition of ''new vessel'' for vessels with Category 3 main propulsion engines that is consistent with the way Annex I was adopted into U.S. law (see 40 U.S.C. 2101). According to this approach, an existing vessel with a Category 3 main propulsion engine will be considered a ''new vessel'' and will be subject to the requirements of using a new engine certified to the emissions standards adopted in this final rule if that vessel undergoes a modification that:

- Substantially alters the dimensions or carrying capacity of the vessel;
- Changes the type of the vessel; or
- Substantially prolongs the life of a vessel.

Under our provision, once a vessel with a Category 3 propulsion engine is determined to be ''new'' according to the above criteria, then all the engines on that vessel would have to comply with EPA's marine diesel engine emission limits. To the extent that any judgment is required in interpreting this provision, EPA intends to implement this definition consistently with the application of the MARPOL.

E. Is EPA Retaining the Foreign-Trade Exemption?

In addition to their main propulsion engines, which are generally Category 3 marine diesel engines, ocean-going commercial vessels typically have several Category 1 and Category 2 engines that are used in auxiliary power applications. They provide electricity for important navigational and maneuvering equipment, and crew services.

Several commenters to our earlier marine diesel engine rulemaking expressed concern that requiring ship owners to obtain and use compliant Category 1 and Category 2 engines for vessels that spend most of their time outside the United States could be burdensome for those vessels if these engines need to be repaired or replaced when they are away from U.S. ports. Consequently, we provided a foreign-trade exemption for these engines. A vessel owner could obtain this exemption for Category 1 and Category 2 marine diesel engines if it was demonstrated to the Administrator's satisfaction that the vessel: (a) Will spend less than 25 percent of its total engine operation time within 320 kilometers of U.S. territory; or (b) will not operate between two U.S. ports (40 CFR 94.906(d)).

We are eliminating the foreign-trade exemption because the conditions on

[28] Annex I to the International Convention on the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 Relating Thereto.

which it was based no longer apply. Specifically, we have learned that many spare engine parts are kept onboard vessels to enable ship operators to perform maintenance and repairs while the ship is underway. In addition, obtaining parts that are not kept onboard is not expected to be a problem. Modern package delivery systems allow ship owners to obtain parts quickly, even overnight, and necessary parts can be shipped to the next convenient port on a ship's route. In the unlikely case that an engine fails catastrophically and must be replaced by a compliant engine, we are confident that the ship operator will be able to make arrangements to obtain a certified engine, since the major manufacturers of marine diesel engines operate abroad as well as in the United States. Because the burden associated with repairing or replacing engines away from the United States is not significant, we believe it is appropriate to eliminate the exemption. We do not expect this change to have any impact on shipowners and operators.

III. Standards and Technological Feasibility

The emission standards we are adopting reflect a two-step approach. The first step involves near-term standards designed to be achievable immediately without additional research and development. This section presents these Tier 1 standards and the technologies that will be used to achieve them. The second step consists of a set of long-term standards, discussed in Section IV.

A. What Are the New Emission Standards?

We are adopting standards for marine diesel engines that are equivalent to the internationally negotiated NO_X standards, beginning in 2004. These standards, which are presented in Table III.A–1, apply to marine diesel engines with per-cylinder displacement over 2.5 liters. By adopting these standards, we are making them enforceable under U.S. law for engines on vessels flagged or registered in the United States, regardless of whether Annex VI has entered into force or whether the United States has deposited its instrument of ratification to MARPOL Annex VI.

TABLE III.A–1.—NO_X EMISSION STANDARDS

[g/kW–hr]

Engine Speed (n)		
n ≥ 2000 rpm	2000 > n ≥ 130 rpm	n < 130 rpm
9.8	$45.0 \times n^{-0.2}$	17.0

As described in Section V, we will accept emission data for certification to the near-term standards based on testing with either distillate or residual fuel. Because most or all manufacturers have been using distillate fuel to comply with Annex VI requirements, we expect manufacturers to meet the near-term standards generally by submitting their available emission data from testing with distillate fuels.

For marine diesel engines with per-cylinder displacement between 2.5 and 30 liters, these standards apply from 2004 to 2006, after which the EPA Tier 2 marine engine emission standards established in December 1999 apply (64 FR 73300, December 29, 1999). Testing to show compliance for these engines is generally based on emission measurements with distillate fuels meeting the specifications in 40 CFR 94.108.

We are not adopting the internationally negotiated standards for engines under 2.5 liters per cylinder. This is because our Tier 2 standards for most of those engines are effective in 2004. Marine diesel engines below 0.9 liters per cylinder need not meet EPA emission standards until 2005, but most of those engines are under 130 kW and are therefore not subject to Annex VI standards.

In the December 1999 final rule, we included a requirement to measure or prevent crankcase emissions. We have clarified in the final regulations that this applies only for engines subject to Tier 2 standards. As a result, none of the emission standards in this final rule include requirements related to crankcase emissions.

B. When Do the Engine Emission Standards Apply?

Adopting emission standards for new Category 3 marine engines starting in 2004 allows less than the usual lead time for meeting EPA requirements. We note, however, that manufacturers are generally already meeting the internationally negotiated standards, which apply to engines installed on vessels built on or after January 1, 2000. The near-term standards will require no additional development, design, or testing beyond what manufacturers are already doing to meet the internationally negotiated Annex VI NO_X standards.

Engine manufacturers will need to comply with emission standards for all engines produced after January 1, 2004. For Category 1 and Category 2 engines, the date of manufacture is the date of the final assembly of the engine. However, we recognize that Category 3 engines are often disassembled for shipment to the site at which it is installed in the ship. Therefore, for Category 3 engines, the date of manufacture is based on the first full assembly of the engine.

Shipbuilders and owners are not required to certify their vessels under the program we are adopting in this action. However, shipbuilders are prohibited from selling vessels with noncompliant engines if they initiate construction of a vessel after the date that regulations begin to apply.

C. What Technologies Will Engine Manufacturers Use To Meet the Tier 1 Emission Standards?

The near-term Tier 1 standards are interim standards. They are intended to ensure that Category 3 engines achieve the greatest reductions achievable in this time frame, until the more stringent long-term standards we adopt go into effect. The short lead time associated with these interim standards means they call for the use of engine technologies that already have been or can be applied immediately, with little or no lead time.

The Tier 1 standards are achievable immediately because engine manufacturers are already producing engines that meet these standards. The short lead time involved in meeting Tier 1 standards by January 2004 allows manufacturers only enough time to work through this program's compliance requirements and do all the testing and paperwork required to complete the certification process.

Setting Tier 1 standards that are more stringent than the internationally negotiated NO_X standards (for example, one requiring further development and optimization of in-cylinder controls), would require more lead time to allow engine manufacturers to develop and to optimize existing in-cylinder technologies and apply them to these engines. Moreover, as discussed in Section I.C, adopting an emission standard now that is based only on in-cylinder control technologies would likely delay the adoption of future more stringent emission standards that may be based on optimized in-cylinder controls in combination with advanced technologies such as SCR or water injection.

Similarly, we are not adopting Tier 1 emission standards for HC or CO emissions because the short lead time does not allow manufacturers sufficient time to do the testing and design work that would be necessary to ensure compliance with such standards. As described in the proposal, the focus of controlling emissions from Category 3 engines is on NO_X. The standards we contemplated for HC and CO in the proposal would have achieved modest reductions from baseline levels or, more likely, merely prevented increases in these pollutants as manufacturers apply emission-control technologies to address NO_X emissions. Manufacturers do not have a complete data set to characterize HC and CO emissions from their Category 3 engines, so some engines may well have emission rates above the level we would consider to be a cap that would merely prevent increasing emissions. The short lead time associated with the Tier 1 standards is too short to allow manufacturers in these cases to address this potential. As a result, we believe it is most appropriate to include appropriate emission standards for HC and CO emissions in the future rulemaking, as described below.

Engine manufacturers are meeting the Annex VI standards today with a variety of emission-control technologies. These basic emission-control technologies include a variety of in-cylinder technologies, generally including optimized turbocharging, higher compression ratio, and optimized fuel injection, which may include timing retard or changes to the number and size of injector holes to increase injection pressure.

D. Voluntary Low-Emission 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 that for commercial marine diesel engines. The general purposes of such programs are to provide incentives to manufacturers 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. 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. These incentive programs can be put in place by users and state and local governments.

To be designated as a Blue Sky engine, an engine must have emissions at least 80 percent below Annex VI NO_X levels. The specific voluntary low-emission NO_X standard is expressed as $9.0 \times n^{-0.2}$ (in g/kW–hr), with a cap of 3.4 g/kW–hr for engines with rated speed over 130 rpm (no specific standard applies to engines over 2000 rpm, because Category 3 engines all have engine speeds well below 2000 rpm). Data suggest that engines utilizing selective catalytic reduction should be able to meet these emission levels. Establishing an objective qualifying level for voluntary low-emission engines allows state and local governments or individual port authorities to develop meaningful incentive-based programs to encourage preferential use of these very low-emitting engines.

Engines certified to the voluntary low-emission standards must also meet HC and CO standards reflecting baseline emission levels for these pollutants. As described in the proposal, we believe the appropriate levels to cap emissions of these pollutants are 0.4 g/kW–hr for HC and 3.0 g/kW–hr for CO.

IV. Future Actions

The standards we are adopting in this action are equivalent to the internationally negotiated standards contained in MARPOL Annex VI and are expected to achieve a 20-percent reduction in the national Category 3 NO_X inventory by 2030. As noted in Section I, the inventory contribution of these engines to local NO_X and PM inventories, particularly around commercial ports and coastal areas, can be significant. We recognize that manufacturers can achieve additional reductions with more lead time than is provided by the Tier 1 standards. They can do this by expanding the use and optimization of in-cylinder controls and by incorporating advanced technologies, such as selective catalytic reduction or water injection, that may achieve much greater reductions. We believe, however, that it is appropriate not to make a final decision on setting the longer-term Tier 2 standards in this final rule. This section describes how we plan to conduct a future rulemaking that will address a new tier of standards.

Separately, we also intend to pursue additional action to set controls for the fuels used by these engines. The sulfur content of these fuels is considerably higher than the fuel used in land-based nonroad engines. This high sulfur content leads to high PM and SO_X emissions. MARPOL Annex VI contains a provision that would require ships to use lower sulfur fuel when operating in specially designated SO_X Emission Control Areas, or be equipped with an exhaust gas cleaning system or other system that reduces the total SO_X emissions from the ship to 6.0 g/kW-hr or less. If the Annex goes into force, we will assist the other federal agencies in investigating and developing an application to the IMO by the United States for designating relevant coastal and port areas as SO_X Emission Control Areas. If the Annex does not go into force, we may address this issue under our existing authority in a future rule. In addition, we are considering fuel controls as part of the nonroad diesel rule that is currently under development that could affect the distillate fuels used by marine vessels.

A. Future Rulemaking for Engine Standards

1. What Is the Timetable for the Future Rule?

We are adopting a regulatory provision in 40 CFR 94.8 that establishes a schedule for a future rulemaking to promulgate additional engine controls that EPA determines are appropriate under section 213(a)(3) of the Act. This future rulemaking will reassess the standards in place at the time using information about the feasibility of optimizing in-cylinder controls and applying advanced NO_X and PM control technologies to these engines. We intend to consider an additional tier of standards for all marine diesel engines and will also consider application of these standards to engines on foreign vessels that enter U.S. ports. We will also include in our evaluation an assessment of the status of international action to set more stringent standards. The standards in this final rule will remain in effect unless modified by a future rulemaking. We are committing to take final action on appropriate standards for marine diesel engines by April 27, 2007, and to issue a proposal no later than approximately one year before. This future rulemaking will allow us to exercise the discretionary authority under Clean Air Act section 213(a)(3), which directs EPA to ''from time to time revise'' regulations under that provision.

This schedule for our future rule will allow us to coordinate with future actions of the U.S. government with respect to negotiations for a future tier of standards under MARPOL. As described in Section IV.A.4 below, in 2000 the United States requested the Marine Environment Protection Committee to consider more stringent emission controls for marine diesel engines. We are hopeful that the committee will begin these discussions in the next year or so. At the same time, while harmonizing with future, more stringent MARPOL emission limits is desirable, the standards contained in our future rule will be promulgated pursuant to the Clean Air Act, as described in the next section.

EPA considers this time as necessary and appropriate to properly take into consideration additional information expected to become available about emerging technologies, as well as any developments in the international negotiations for more stringent emission limits.

2. What Standards Will EPA Consider in the Future Rule?

a. Standards for Category 3 Marine Diesel Engines. For the future rule, we intend to set more stringent standards for Category 3 marine diesel engines based on the greatest degree of emission control achievable from technologies that will be available with appropriate lead time. In our proposal, we considered a 30-percent reduction below Annex VI levels to be the primary option for adopting long-term standards for Category 3 marine diesel engines. At the time we believed this could be achieved through the use of in-cylinder controls. However, further review of information on this technological approach shows that these technologies are already being used to meet the internationally negotiated standards. At this point we are not confident that in-cylinder controls alone would reduce emissions much more than 10 or 15 percent below the Tier 1 levels.

We are concerned that, if we were to implement standards based on traditional in-cylinder controls to reduce emissions beyond Annex VI levels, either in this or a future rule, manufacturers would need to divert resources from their advanced technology development programs. In addition, manufacturers would need to optimize their use of in-cylinder controls again when incorporating the advanced emission-control technologies. As a result, the readiness of this technology could be delayed in return for a standard based on traditional in-cylinder controls alone, which may not be capable of reducing NO_X emissions by an additional 30 percent.

We are therefore now considering Tier 2 standards that would focus on optimizing in-cylinder controls with the advanced technologies presented in the proposal, which together are projected to reduce NO_X emissions by significantly more than 30 percent. This approach was supported by commenters representing environmental and state interests, who strongly objected to emission standards that rely on engine-based technologies because of the expectation that these other advanced technologies are available and appear to be cost-effective.

We are, however, not finalizing such Tier 2 standards in this final rule because we believe there are substantial outstanding issues associated with water technologies and selective catalytic reduction. These issues, which include fuel compatibility, low-load effectiveness, and PM impacts, are discussed below in Section IV.A.3.

During the next few years we will have the opportunity to develop a better understanding of the issues that prevent us from adopting standards based on advanced technologies now. For example, several vessels have been equipped recently with selective catalytic reduction, as described in Chapter 5 of the Final Regulatory Support Document. Observing these installations will allow us to gain insight into the effectiveness and durability of these systems, while highlighting any potential technical constraints or problems. We would also have opportunity to learn with engine manufacturers and other industry contacts who are actively pursuing development and implementation of the advanced technologies.

In the future rulemaking, we will also consider the need to adopt emission standards for HC and CO emissions. Although HC and CO emissions are generally low from diesel engines, HC emissions nevertheless combine with NO_X emissions to form ozone; HC and CO can also have direct health impacts. Setting standards for HC and CO may achieve modest emission reductions, but more importantly, may be necessary to prevent HC and CO emission increases that might otherwise result from controlling NO_X emissions alone.

Regarding PM from Category 3 marine engines, the majority of emissions comes directly from the high concentration of sulfur in the residual fuel used by these engines. Short of changing in-use fuel quality, emission-control technologies only address the remaining portion of PM, because engine technologies are ineffective at reducing sulfur-related PM emissions. Furthermore, no acceptable procedure exists for measuring PM from Category 3 marine engines, because currently established PM test methods show unacceptable variability when sulfur levels exceed 0.8 weight percent. Both distillate and residual marine fuels used in these engines commonly exceed that level. No PM test method or calculation methodology has yet been developed to correct that variability. However, the additional time available to prepare the future rulemaking will allow us to take into account any developments related to regulation of in-use fuel quality and PM measurement equipment and procedures as we consider the appropriateness of adopting a PM standard for Category 3 marine diesel engines.

We also intend to revisit various other issues raised in the proposal. For example, we continue to be concerned about controlling emissions at low-power test modes and at operating points between test modes. As described in the proposal, we would like to take steps to ensure that engines meet emission standards when operating on residual fuel, including an appropriate means to correct for the nitrogen content of the test fuel. We also believe that basing emission standards on engine displacement instead of rated speed warrants further consideration. We will also revisit several compliance issues such as onboard NO_X monitoring, adjustable parameters, deterioration factors with advanced technologies, post-certification testing (PLT), broader test conditions, defect reporting, and test fuel. These compliance issues are discussed in Section V.

b. Standards for Category 1 and Category 2 Marine Diesel Engines. For Category 1 and Category 2 marine diesel engines, we have already established Tier 2 emission standards based on in-cylinder controls. However, there are several differences between these engines and Category 3 engines, which made this possible. First, for Category 1 and Category 2 marine diesel engines, manufacturers are able to transfer emission-control technology already developed for the land-based counterparts to these engines. Second, Category 1 and Category 2 engines are produced in much greater volumes than Category 3 engines which allows manufacturers to more easily amortize their research and development costs. Third, because Category 3 engines generally operate on residual fuel, this provides an additional constraint on what can be achieved through in-cylinder control.

While this final rule primarily addresses Category 3 engines, we intend to use the future rulemaking as an opportunity to reconsider Tier 3 emission standards for Category 1 and Category 2 standards. We proposed Tier 3 standards for these engines on December 11, 1998 (63 FR 68508, December 11, 1998), but chose not to finalize the Tier 3 standards at that time. Given the current and expected advances in emission-control technologies for land-based diesel engines and the need to coordinate standards for all categories of marine engines, we believe this will be the appropriate context to reopen the proposed Tier 3 standards. In the future rulemaking we would also be able to consider applying compliance provisions such as onboard NO_X monitoring to Category 1 and Category 2 engines. This may be especially appropriate for certain applications, such as ferries and tugboats that operate closest to metropolitan areas.

3. What Technologies Will EPA Consider in the Future Rule?

As discussed above, the future rulemaking will focus on technologies we believe can be used to reduce NO_X emissions by significantly more than 30 percent below Tier 1 levels for Category 3 marine diesel engines. These emission-control systems are expected to include a combination of optimized in-cylinder controls and advanced technologies such as selective catalytic reduction and water. These advanced technologies are discussed below. Although we do not believe it is appropriate to set standards for Category 3 marine engines based on these approaches at this time, we believe that remaining technological and operational issues can be addressed in the future. Technologies that could be used to achieve emission reductions beyond the Tier 2 standards for Category 1 and Category 2 marine diesel engines were discussed in an earlier proposal (63 FR 68508, December 11, 1998).[29]

[29] Further analysis of potential Tier 3 standards for Category 1 and Category 2 marine diesel engines may be found in the Draft Regulatory Impact Analysis associated with this proposal which is available in Air Docket A–97–50.

a. Water-based technologies. We believe that significant NO_X control of approximately a 50-percent reduction can be achieved in the future, once certain technical and practical challenges are overcome, by introducing water into the combustion process in combination with appropriate in-cylinder controls. Water can be used in the combustion process to lower maximum combustion temperature, and therefore lower NO_X formation, with an insignificant increase in fuel consumption. Water has a high heat capacity, which allows it to absorb enough of the energy in the cylinder to reduce peak combustion temperatures. Data presented below and in the Final Regulatory Support Document suggest that NO_X reductions significantly more than 30 percent below the Tier 1 standards can be achieved, depending on the ratio of water to fuel and on the method of introducing water into the combustion chamber. These data are primarily based on developmental engines; however, given enough lead time, we believe that introducing water into the combustion process may become an effective emission-control strategy.

Water may be introduced into the combustion process through emulsification with the fuel, direct injection into the combustion chamber, or saturating the intake air. Water emulsification refers to mixing the fuel and water prior to injection. This strategy is limited by the instability of suspending water in fuel. To increase the effective stability, a system can be used that emulsifies the water into the fuel just before injection. Another option is to stratify the fuel and water through a single injector. The Final Regulatory Support Document presents data on these approaches showing a 30–40 percent reduction in NO_X with water fuel ratios ranging from 0.3 to 0.4.

More effective control of the water injection process can be achieved through the use of an independent nozzle for water. Using a separate injector nozzle for the water allows larger amounts of water to be added to the combustion process because the water is injected simultaneously with the fuel, and larger injection pumps and nozzles can be used for the water injection. In addition, the fuel injection timing and the amount of water injected can be better optimized. Data presented in the Final Regulatory Support Document show NO_X reductions of 40 to 70 percent with water-to-fuel ratios ranging from 0.5 to 0.9 if a separate nozzle is used for injecting water. Direct water injection has been installed on medium-speed Category 3 engines on more than a dozen vessels, and there are plans for using it on additional vessels. These vessels are primarily ferries and roll-on roll-off (ro-ro) vessels operating in European waters where there are economic incentives for reducing NO_X emissions. In addition, they make relatively short trips, so water storage is not a significant issue.

Other strategies for introducing water into the combustion process are being developed that will allow much higher water-to-fuel ratios. These strategies include combustion air humidification and steam injection. With combustion air humidification, a water nozzle is placed in the engine intake and an air heater is used to offset condensation. With steam injection, waste heat is used to vaporize water, which is then injected into the combustion chamber during the compression stroke. Data on initial testing, presented in the Final Regulatory Support Document, show NO_X reductions of more than 80 percent with water-to-fuel ratios as high as 3.5.

We believe that the results from initial testing of water introduction strategies is encouraging. We will continue to evaluate this technology in the future. However, we believe there are still outstanding technical issues concerning the use of water-introduction technologies for widespread application on marine engines. These issues are discussed below.

A primary concern with the use of water in the combustion process is the effect on PM emissions. The water in the cylinder reduces NO_X, which is formed at high temperatures, by reducing the temperature in the cylinder during combustion. However, PM oxidation is most efficient at high temperatures. At this time, we do not have sufficient information on the effect of water emulsification and injection strategies on PM emissions to quantify this effect.

Fresh water is necessary for any of these water-based NO_X-reduction strategies. Introducing salt water into the engine could result in serious deterioration due to corrosion and fouling. For this reason, a ship using water strategies would need either to produce fresh water through the use of a desalination or distillation system or to store fresh water on board. Cruise ships may already have a source of fresh water that could be used to enable this technology. This water source is the ''gray'' water, such as drainage from showers, which could be filtered for use in the engine. However, the use of gray water would have to be tested on these engines, and systems would have to be devised to ensure proper filtering. For example, it would be necessary to ensure that no toxic wastes are introduced into the gray waste-water stream. One manufacturer stated that today's ships operating with direct water injection carry the amount needed to operate the system between ports (two to four days).

Depending on the amount of water necessary, other vessels that use Category 3 marine engines may not be able to generate sufficient amounts of water for this technology, especially at low loads where less heat is available from the engine. These ships would have to carry the water or be outfitted with new or larger distillation systems. Both of these options could displace cargo space. Finally, it should be noted that vessels currently equipped with water-based NO_X-reduction technologies are four-stroke engines and include fast ferries, cruise ships, and cargo ships. The specific vessels travel relatively short distances between stops and need a much smaller volume of fresh water for a trip than would be required for crossing an ocean. More information is needed regarding operation on ocean-going vessels. If the ships were to use this technology only while traveling from 175 nautical miles of the U.S. coast to port, less water-storage capacity would be needed than if the ship used this NO_X reduction strategy at all times. However, ships operating primarily within 175 nautical miles of the U.S. coast would need to be able to carry a volume of water of about one-half the volume of fuel they carry if they wish to keep the same refueling schedule. Ships making long runs, such as from California to Alaska, would have to be able to store enough water for that trip even if the ship travels that route infrequently. Because the standards would not be retroactive to existing vessels, ships could be designed to carry this water, however, this space would not be available to carry cargo or fuel. Lastly, if this technology were applied to two-stroke engines there may be lubricity concerns with the cylinder liner. One manufacturer is developing a strategy to use direct water injection with exhaust gas recirculation to minimize water requirements on such engines.

b. Selective catalytic reduction. Selective catalytic reduction is one of the most effective means of reducing NO_X from large diesel engines. In SCR systems, a reducing agent such as ammonia, is injected into the exhaust. The exhaust then goes through a catalyst where NO_X emissions are reduced. As discussed in the Final Regulatory Support Document, SCR can be used to achieve NO_X reductions of 90 percent or more below the Tier 1 limits, at exhaust temperatures above 300 °C. Lower-cost SCR systems can also be designed for less effective control of NO_X emissions by reducing the amount of reducing agent used in the SCR unit. These systems are being successfully used for stationary applications, which operate under constant, high-load conditions. These systems are also installed in Category 3 engines used on ferries and cruise ships where they operate largely at high loads and over short distances so exhaust temperature and urea storage are not primary issues.

As discussed in the Final Regulatory Support Document, manufacturers are demonstrating similar NO_X reduction using SCR technology for marine applications. These SCR demonstrations include both test systems and in-use vessels. One manufacturer has demonstrated a standard SCR system on eight vessels and a compact SCR system, which uses an oxidation catalyst upstream of the SCR reactor to reduce reactor size, on four vessels. Combined, these twelve vessels are equipped with a total of 40 medium-speed Category 3 marine engines. Another manufacturer has installed systems on 56 Category 2 or Category 3 marine engines. The majority of these engines were in ferries and ro-ros operating in European waters where there are economic incentives to use SCR. In addition, these engines are four-stroke medium-speed engines, which have higher exhaust temperatures than two-stroke low-speed engines which better enables the use of SCR. To prevent sulfur poisoning of the catalysts, the fuel used by these vessels ranges from 0.1 to 1.0 percent sulfur. This fuel includes both residual fuel and marine distillate fuel. In addition, they make relatively short trips between European ports, so urea availability and storage are not significant issues. Also, the relatively short trips allow time for maintenance and provide better access to any needed parts compared with ocean-going trips.

In one case, SCR was equipped on vessels with two-stroke low-speed engines. The goal of this program was to reduce the emissions emitted during the transportation of steel to a facility in Pittsburg, California. Because the vessels were equipped with two-stroke low-speed engines, the exhaust temperatures were low. In addition, the vessels operate at low load near the coast; therefore, certain modifications to the system were necessary. Primarily, the exhaust system was reconfigured to provide the maximum heat to the reactor, which had negative impacts on transient response and efficiency. Also, the catalyst was formulated to be effective at temperatures as low as 270°C. Because such a reactive catalyst is vulnerable to sulfur poisoning, the vessels operate only on 0.05 percent sulfur fuel when the SCR unit is active. These vessels make about 6 calls to California per year and the SCR unit is active for about 12 hours per call, when the vessel is within about 50 miles from the port.

We believe that the results from initial applications of SCR systems are encouraging. We will continue to evaluate this technology in the future. However, we believe there are still outstanding technical issues concerning the use of SCR for widespread application on marine engines. These issues are discussed below.

Lower-sulfur fuel is necessary to ensure the durability of the SCR system because sulfur can be trapped in the active catalyst sites and reduce the effectiveness of the catalyst. This sulfur poisoning can require additional maintenance of the system. We need more information on the impacts of fuel sulfur on SCR. As discussed above, SCR units in service today are operating on fuel ranging from 500 to 10,000 ppmS. Even if these systems can be made to operate on 15,000 ppmS fuel, an infrastructure would be necessary to ensure that ships could refuel with 15,000 ppmS fuel at ports they visit. Lower-sulfur residual fuel is available in areas that provide incentives for using such fuel, including the Baltic Sea; however, such fuel is not yet available at ports throughout the United States. During the next few years we expect to develop a better understanding of the availability of lower-sulfur fuels through the process related to designating SO_X Emission Control Areas under Annex VI. We also intend to learn more about the sensitivity of SCR systems to fuel-sulfur concentrations.

Another issue is the effectiveness of SCR during low-load engine operation. SCR systems available today are effective only over a narrow range of exhaust temperatures (generally above 300 °C). The effectiveness of the SCR system is decreased at reduced temperatures that occur during engine operation at partial loads. Most of the engine operation in and near commercial ports and waterways close to shore is likely to be at these partial loads. In fact, reduced-speed zones can be as large as 100 miles for some ports. Because of the cubic relationship between ship speed and engine power required, engines may operate at less than 25 percent power in a reduced-speed zone. During this low-load operation, no NO_X reduction would be expected, so SCR would be less effective while operating near ports. Some additional heat to the SCR unit can be gained by placing the reactor upstream of the turbocharger; however, this temperature increase would not be large at low loads and the volume of the reactor would diminish turbocharger response when the engine changes load. The engine could be calibrated to have higher exhaust temperatures; however, this could affect durability if this calibration also increased temperatures at high loads (depending on the fuel used). For an engine operating on residual fuel, vanadium in the fuel can cause damage by reacting with the valves at higher temperatures. In addition, a catalyst that is formulated to be more reactive at lower temperatures is also more sensitive to sulfur poisoning. Any information that becomes available over the next few years would help us understand the potential for SCR systems to control emissions at low engine loads and ensure proper operation in port areas, where emission reductions are most important. This will help ensure that we adopt requirements with an appropriate expectation regarding the effectiveness of the anticipated emission-control technologies.

Sulfur in fuel is also a concern with an oxidation catalyst because, under the right conditions, sulfur can also be oxidized to form direct sulfate PM. At higher temperatures, up to 20 percent of the sulfur could be converted to direct sulfate PM in an oxidation catalyst compared to about a 2 percent conversion rate for a typical diesel engine without aftertreatment. Depending on the precious metals used in the SCR unit, it could be possible to convert some sulfur to direct sulfate PM in the reactor as well. Manufacturers would have to design their exhaust system (and engine calibration) such that temperatures would be high enough to have good conversion of NO, but low enough to minimize conversion of sulfur to direct sulfate PM. Direct sulfate PM emissions could be reduced by using lower sulfur fuel such as distillate.

SCR systems traditionally have required a significant amount of space on a vessel; in some cases the SCR unit is as large as the engine itself. However, at least one manufacturer is developing a compact system that uses an oxidation catalyst upstream of the reactor to convert some NO to NO_2, thus reducing the reactor size necessary. The reactor size is reduced because the NO_2 can be reduced without slowing the reduction of NO. The catalytic reaction is faster by reducing NO_X through two mechanisms. This compact SCR unit is designed to fit into the space already used by the silencer in the exhaust system. If designed correctly, this could also be used to allow the SCR unit to operate effectively at somewhat lower exhaust temperatures. The oxidation catalyst and engine calibration would need to be optimized to convert NO to NO_2 without significant conversion of sulfur to direct sulfate PM. NO_X reductions of 85 to 95 percent have been demonstrated with an extraordinary sound attenuation of 25 to 35 dB(A).[30]

A vessel using an SCR system would also require an additional tank to store ammonia (or urea to form ammonia). This storage tank would be sized based on the vessel use, but could be large for a vessel that travels long distances in U.S. waters between refueling, such as between California and Alaska. Urea consumption increases operating costs. If lower sulfur diesel fuel were required to ensure the durability of the SCR system or to minimize direct sulfate PM emissions, this lower sulfur fuel would also increase operating costs. The operational characteristics of ocean-going vessels may interfere with correct maintenance of the SCR system. Ferries that have incorporated this technology do not run continuously and therefore any maintenance necessary can be performed during regular down times. The availability of time for repair can be an issue for ocean-going vessels that operate continuously for long periods.

Because SCR units are so easily adjustable, if allowed, ship operators may choose to turn off the SCR unit when not operating near the U.S. coast. If they were to use this approach, they would need to construct a bypass in the exhaust to prevent deterioration of the SCR unit when it is not in use. To ensure that the SCR system is operating properly within 175 nautical miles of the U.S. coast, we would need to consider continuous monitoring of NO_X emissions for engines using SCR. This is discussed in more detail below.

If the combustion is not carefully controlled, some of the ammonia can pass through the combustion process and be emitted as a pollutant. This is less of an issue for Category 3 marine engines, which generally operate under steady-state conditions, than for other mobile-source applications. In addition, in ships where banks of engines are used to drive power generators, such as cruise ships, the engines generally operate under steady-state conditions near full load. If ammonia slip still occurred, an oxidation catalyst could be used downstream of the reactor to burn off the excess ammonia.

Slow-speed marine engines generally have even lower exhaust temperatures than medium-speed engines due to their two-stroke design. However, we are aware of four slow-speed Category 3 marine engines that have been successfully equipped with SCR units. Because of the low exhaust temperatures, the SCR unit is placed upstream of the turbocharger to expose the catalyst to the maximum exhaust heat. Also, the catalyst design required to operate at low temperatures is very sensitive to sulfur. Especially at the lower loads, the catalyst is easily poisoned by ammonium sulfate that forms due to the sulfur in the fuel. To minimize this poisoning on these four in-service engines, highway diesel fuel (0.05% sulfur) is required. In addition, these ships operate with the exhaust routed through the SCR unit only when they enter port in the United States, which is about 12 hours of operation every 2 months. Therefore, the sulfur loading on the catalyst is much lower than it would be for a vessel that continuously used the SCR system. To prevent damage to the catalyst due to water condensation, this system needs to be warmed up and cooled down gradually using an external system. Another issue associated with the larger slow-speed engines and lower exhaust temperatures is that a much larger SCR system would be necessary than for a vessel using a smaller medium-speed engine. Size is an issue because of the limited space on most ships.

c. Fuel cells. A third advanced technology that may allow for significant reduction of NO_X emissions involves the use of fuel cells to power the vessel in place of an internal-combustion engine. A fuel cell is like a battery, except where batteries store electricity, a fuel cell generates electricity. The electro-chemical reaction taking place between two gases, hydrogen and oxygen, generate the electricity from the fuel cell. The key to the energy generated in a fuel cell is that the hydrogen-oxygen reaction can be intercepted to capture small amounts of electricity. The byproduct of this reaction is the formation of water. Current challenges include the storage or formation of hydrogen for use in the fuel cell and cost of the catalyst used within the fuel cell.

Recently, several efforts to apply fuel cells to marine applications have been conducted. These include grants from the Office of Naval Research and the U.S. Navy. The Office of Naval Research initiated a three-phase advanced development program to evaluate fuel

[30] Paro, D., ''Effective, Evolving, and Envisaged Emission Control Technologies for Marine Propulsion Engines,'' presentation from Wartsila to EPA on September 6, 2001 (Docket A–2001–11; document II–A–72).

cell technology for ship service power requirements for surface combatants in 1997. In early 2000, the U.S. Navy sponsored an effort to continue the development of the molten carbonate fuel cell for marine use. The Society of Naval Architects and Marine Engineers released the technical report ''An Evaluation of Fuel Cells for Commercial Ship Applications.'' The report examines fuel cells for application in commercial ships of all types for electricity generation for ship services and for propulsion.

Fuel cell research is currently supported by several sources including the U.S. Maritime Administration (MARAD) and the state of California's Fuel Cell Partnership. MARAD's Division of Advanced Technology has also included the topic of fuel cells as a low air emission technology that should be demonstrated. California's Fuel Cell Partnership seeks to achieve four main goals which include (1) demonstrate vehicle technology by operating and testing the vehicles under real-world conditions in California; (2) demonstrate the viability of alternative fuel infrastructure technology, including hydrogen and methanol stations; (3) explore the path to commercialization, from identifying potential problems to developing solutions; and (4) increase public awareness and enhance opinion about fuel cell electric vehicles, preparing the market for commercialization. At this time, we consider fuel cell technology still be in the early stages of development. Because a mature fuel cell system could have significant environmental benefits, we will consider fuel cells in the future rulemaking.

4. Will the International Community Also Consider More Stringent Standards?

At the time the Annex VI NO_X limits were adopted in September 1997, several Member States expressed concern that the NO_X limits were not stringent enough and would not result in the emission reductions they were intended to achieve. Due to the efforts of these Member States, the Conference of the Parties adopted a resolution that provides for review of the emission limits with the aim of adopting more stringent limits, taking into account the adverse effects of such emissions on the environment and any technological developments in marine engines. This review is to occur at a minimum of five-year intervals after entry into force of the Annex, with amended NO_X limits to reflect more stringent controls if appropriate.

In March 2000, the United States requested the Marine Environment Protection Committee (MEPC) to begin consideration of more stringent emission limits for marine diesel engines.[31] EPA's analysis of emission-control technology for our 1999 rulemaking indicated that more stringent standards are feasible for all Category 1 and Category 2 marine diesel engines. Engine manufacturers were also beginning to apply these emission-control strategies to Category 3 marine diesel engines, as well as more advanced strategies such as water emulsification and selective catalytic reduction. Reflecting the potential emission reductions that could be obtained from applying these strategies to all marine diesel engines, the United States recommended Annex VI Tier 2 NO_X limits be set at 25 to 30 percent below the existing Annex VI NO_X limits for all engines subject to the regulation (engines above 130 kW), to go into effect in 2007. This would allow a seven-year period of stability for the Annex VI NO_X limits, permit engine manufacturers to adjust their engine designs to include new emission-control technologies, and allow manufacturers of marine diesel engines at or above 30 liters per cylinder to develop emission-control strategies for those large engines. This recommendation was discussed at the 44th session of the MEPC (London, March 3–16, 2000), but the committee took no action.

The United States will continue to promote more stringent standards at IMO and encourage MEPC to adopt a second tier of emission limits that will reflect available technology and reduce the impact of marine diesel engines on the world's air quality. Technology has continued to advance since we made our request for review in 2000. EPA now believes that Member States of the IMO should consider further reductions of significantly more than 30 percent from the NO_X limits currently stipulated under Regulation 13 of the Annex, to be applicable to engines installed on vessels constructed on or after a date to be determined. Consideration should be given to use of emission-control systems that include a combination of optimized in-cylinder controls and advanced technologies such as selective catalytic reduction and water-based control technologies.

[31] MEPC 44/11/7, Prevention of Pollution from Ships, Revision of the NO_X Technical Code, Tier 2 Emission Limits for Marine Diesel Engines at or Above 130 kW, submitted by the United States. This document is available at Docket A–2001–11, Document No. II–A–16.

B. Fuel Controls

The majority of Category 3 engines are designed to run on residual fuel. This fuel is made from the very end products of the oil refining process, formulated from residues remaining after the primary distilling stages of the refining process. It has higher contents of ash, metals, and nitrogen that may increase emissions of exhaust pollutants. Residual fuel also has sulfur content up to 45,000 ppm; the global average sulfur concentration is currently about 27,000 ppm, though fuel sold in the United States has sulfur levels somewhat above the average.[32] Operating on fuels with such high sulfur contents results in high SO_X and direct sulfate PM emissions.

Using a residual fuel with a lower sulfur content would reduce the fraction of PM emissions from ash and metals. Using distillate fuel instead of residual fuel could result in even lower emissions. The simpler molecular structure of distillate fuel may result in more complete combustion with reduced levels of carbonaceous PM. Operation on distillate fuel would also reduce NO_X emissions because distillate fuel generally contains less nitrogen and has better ignition qualities. In general, engines that are designed to operate on residual fuel are capable of operating on distillate fuel. For example, if the engine is to be shut down for maintenance, distillate fuel is often used to flush out the fuel system. However, there are several complications associated with using distillate fuel to reduce emissions. Switching to distillate fuel requires 20 to 60 minutes, depending on how slowly the operator wants to cool the fuel temperatures. According to engine manufacturers, switching from a heated residual fuel to an unheated distillate fuel too quickly could cause damage to fuel pumps. There could also be fuel pump durability problems if the engine is operated on distillate fuel for more than a few days. For continued operation on distillate, ships would need to have separate (or modified) pumps and lines. In addition, modification to the fuel tanks may be necessary to ensure sufficient capacity for lower-sulfur fuel.

1. Is EPA Adopting Fuel Requirements?

In our proposal, we requested comment on whether we should set standards for the fuel that ships use and, if so, what form the standards should take. After reviewing the comments and

[32] Sulphur Monitoring 2002. Report to Marine Environmental Protection Committee, 47th Session. MEPC 47/INF.2, August 28, 2001. A copy of this document can be found in Docket A–2001–11, Document No. II–E–9.

other information, we have decided not to set fuel-based regulations at this time. We remain concerned that regulating fuel sold in the United States would not necessarily ensure that distillate fuel was used in U.S. waters. It is not clear under the Clean Air Act whether we can set standards for more than the fuel sold in the United States. If so, then a fuel sulfur standard would be unlikely to have a significant impact on emissions because ships may choose to refuel before entering or after leaving the United States.

However, as we noted in our proposal, Regulation 14 of MARPOL Annex VI allows areas in need of SO_X emission reductions to petition to be designated as SO_X Emission Control Areas. After the Annex goes into force, ships operating in these designated areas must use fuel with a sulfur content not to exceed 15,000 ppm or an exhaust gas cleaning system to reduce total vessel SO_X emissions to 6.0 g/kW-hr or less. The United States may propose designation of one or more areas in the future pending a review of the relevant emissions, the potential benefits, and the associated costs. However, if the Annex does not go into effect, we will address this issue in the future to the extent appropriate under the Clean Air Act.

2. What Are the MARPOL Annex VI Fuel Provisions?

MARPOL Annex VI contains requirements for fuels used onboard marine vessels. These requirements, which will be effective if and when the Annex goes into force, consist of two parts. First, Annex VI specifies that the sulfur content of fuel used onboard ships cannot exceed 45,000 ppm (4.5 percent). Information gathered in an international monitoring program indicates refiners are currently complying with this requirement and that the current sulfur level of marine bunker fuels ranges between 5,000 and 45,000 ppm with an average sulfur content of about 27,000 ppm. Second, the Annex provides a mechanism to designate SO_X Emission Control Areas, within which ships must either use fuel with a sulfur content not to exceed 15,000 ppm or an exhaust-gas cleaning system or other technology to reduce total vessel SO_X emissions (including both auxiliary and main propulsion engines) to 6.0 kW-hr or less. To date, two SO_X Emission Control Areas have been designated: the North East Atlantic (North Sea, Irish Sea, and English Channel) and the Baltic Sea. After the Annex goes into forces, ships operating in these designated areas must use fuel with a sulfur content not to exceed 15,000 ppm or an exhaust gas cleaning system to reduce total vessel SO_X emissions to 6.0 g/kW-hr or less.

Refiners can produce lower-sulfur residual fuel from a lower-sulfur crude oil or they can put the fuel through a de-sulfonation step in the refinery process. They can also produce it by blending marine distillate fuel, which typically has fuel sulfur levels between 2,000 and 3,000 ppm.

3. How Will SO_x Emission-Control Areas Be Designated in the United States?

Annex VI stipulates that any proposal for designation of a SO_x Emission Control Area (SECA) must meet certain requirements before it will be taken under consideration by the Parties through IMO's Marine Environment Protection Committee (MEPC). The specific requirements, as set out in Appendix III to Annex VI, are:

- A clear delineation of the area and its boundaries;
- A description of the land and sea areas at risk from the impacts of maritime SO_x emissions;
- An assessment that describes the impact of SO_x emissions on terrestrial and aquatic ecosystems, areas of natural productivity, critical habitats, water quality, human health, and areas of cultural and scientific significance, if applicable. The source of relevant data including methodologies used, shall be identified;
- Relevant information pertaining to the meteorological conditions in the proposed area of application and the land and sea areas at risk, in particular prevailing wind patterns, or to topographical, geological, oceanographic, morphological, or other conditions that may lead to an increased probability of higher localized air pollution or levels of acidification;
- The nature of the ship traffic in the proposed area, including the patterns and density of such traffic; and
- A description of the control measures taken by the proposing Party or Parties addressing land-based sources of SO_x emissions affecting the area at risk that are in place and operating concurrent with the consideration of the proposal.

The Treaty does not establish arbitrary limits to the geographic extent of the area to be designated. Instead, it stipulates that the proposing Party or Parties support the size and extent of the proposed area by the relevant science. The two most important factors in determining the offshore boundaries of the area are meteorological conditions in the proposed area and how they influence emission transport to areas ashore and the volume and patterns of maritime traffic.

We plan to begin investigating designation of one or more areas in the future, including a review of the relevant emissions, the potential benefits that could be attained and the associated costs. The first step will be to identify the areas we would like to be considered for SECA designation. Then, we will need to identify data necessary to support any such applications, and the organizations (other federal agencies, State agencies, ports, *etc.*) who are likely to have that data. Once we obtain the data, we will use it to develop any such applications. EPA will work with interested states to consider whether the designation of specific SO_x Emission Control Areas under the Treaty would offer significant benefits to air quality (including PM), considering associated costs. Depending upon the outcome of these consultations and the analysis of the relevant vessel traffic and emissions, the United States may propose designation of one or more areas by amendment to Regulation 14(3) of Annex VI.

4. Are There Other Fuel-Based Controls That May Be Considered?

Additional particulate matter emission benefits could be achieved from engines that use distillate marine diesel fuel by controlling the sulfur content of that fuel. Distillate marine diesel fuel is used in Category 1 and Category 2 marine diesel engines, and is used in Category 3 marine diesel engines for specific purposes such as engine maintenance and, sometimes, for maneuvering and in-port operations. Distillate marine diesel fuel is similar to land-based nonroad diesel fuel and currently has a sulfur content in the range of 2,000 to 3,000 ppm (0.2–0.3 percent).

As noted in Section I.F, above, the European Union is considering a requirement for ships to use fuel with a maximum sulfur content of 2,000 ppm while at port. This generally means that these vessels would use distillate marine diesel fuel for those operations.

In the United States, we recently set fuel standards applicable to distillate highway diesel fuel. Today, the sulfur content of this fuel is under 500 ppm; a 15-ppm cap will apply beginning in 2007. We are currently developing a separate rulemaking that will set limits for the sulfur content of distillate non-road diesel fuel. Among other things, this rule will address what level of sulfur content would be appropriate for distillate marine diesel fuel.

V. Demonstrating Compliance

We are finalizing many, but not all of the compliance provisions that we proposed. As described earlier, we are only finalizing an initial tier of standards in this final rule. Given the nature of these standards, which are equivalent to the internationally negotiated NO_X standards, we are adopting an interim compliance program for Category 3 engines that is harmonized with the international program to the maximum extent possible. This compliance program will apply only for the initial tier of standards in this final rule. Nevertheless, we continue to believe that additional compliance requirements, such as those that we proposed, may be appropriate for later tiers of standards. See Section V.F. for more information about the kinds of additional compliance provisions that we expect to include for later standards. The certification and compliance provisions for the internationally negotiated NO_X standards contained in MARPOL Annex VI are set out in the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (the NO_X Technical Code).[33]

For those Category 1 and Category 2 engines for which we proposed Tier 1 emission standards (*i.e.*, engines over 2.5 liters per cylinder), we proposed to apply all the Tier 2 requirements for the proposed Tier 1 standards. (Note that we established those Tier 2 requirements in a previous rulemaking, in which we set the Tier 2 standards.) After considering the public comments, we are finalizing this approach with two exceptions. First, we allow manufacturers to use test data generated using the procedures in the NO_X Technical Code on an interim basis, as described below. Second, we will not require manufacturers to perform production-line testing on their Tier 1 engines. Commenters expressed concerns about the lead time available to meet the Tier 1 requirements, and the burdens of deviating from the Annex VI requirements. We believe that these comments are particularly relevant to production-line testing. Given the nature of the Tier 1 standards that are being finalized, we do not believe that the burdens associated with starting a production-line testing program with less than two years lead time would be appropriate. We do not believe that the remainder of the existing compliance program for these engines will be particularly burdensome or require additional lead time. The compliance program that was promulgated previously for Tier 2 engines is not being changed, and will remain in effect as specified in 40 CFR part 94.

Except as noted, the remainder of this section addresses the compliance program for Category 3 engines.

A. Overview of Certification

1. How Do I Certify My Engines?

We are adopting certification and compliance requirements for new Category 3 marine engines that are similar to those already in place for Category 1 and Category 2 marine engines. These provisions are contained in 40 CFR part 94 and were described in detail in the preamble to the final rule establishing those regulations (64 FR 73300, December 29, 1999). In general, these provisions require that a manufacturer do the following things to certify engines:

- Divide engines into groups of engines with similar emission characteristics. These groups are called ''engine families''.
- Test the highest emitting engine configuration within the family.
- Determine deterioration rate for emissions and apply it to the ''zero-hour'' emission rate. The deterioration rate is essentially the difference between the emissions of the engine when produced and the point at which it will need to be rebuilt.
- Determine the emission-related maintenance that will be necessary to keep the engines in compliance with the standards.
- Submit the test data to EPA along with other information describing the engines within the engine family. This submission is called the ''application for certification''.

The certification provisions for new Category 3 engines are discussed more fully below, including discussions of the differences between the requirements the NO_X Technical Code (NTC) and this final rule.

2. How Are These Certification Requirements Different From Those of the NO_X Technical Code?

Our certification process is similar to the NTC pre-certification process. However, the Clean Air Act specifies certain requirements for our certification program that are different from the NTC requirements. The EPA approach differs from NTC in three areas: (1) We allow, but do not require witness testing, (2) we include various provisions to hold the engine manufacturer responsible for the durability of emission controls (*see* Section V.B.5), and (3) we specify broader temperature ranges and allow manufacturers less discretion in setting engine parameters for testing, with the goal of adopting test procedures that represent a wide range of normal in-use operation. Note also, as described in Section III.B, that the timing of the new standards is based on the date of first full assembly of the engine, while NTC generally applies the standards based on the start-date of the manufacture of the vessel, which may occur before the engine is fully assembled.

We believe the regulations in this final rule are sufficiently consistent with NTC that manufacturers can use a single harmonized compliance strategy to certify under both systems. If manufacturers have used good engineering judgment in exercising their discretion for test parameters under the TNC, there will be little or no difference between the two systems. However, we are aware that the short lead time may not allow manufacturers to take whatever steps may be necessary to address any potential differences. As a result, we are adopting an interim provision in 40 CFR 94.12 to allow manufacturers to rely on test data generated under NTC provisions in place of EPA provisions for certifying all categories of engines through the 2006 model year. Beginning with the 2007 model year, EPA may extend this waiver on a case-by-case basis, provided the manufacturer satisfies EPA that any differences between its application of the NO_X Technical Code test procedures and the test procedures contained in this rule will not adversely affect NO_X emission rates. For the Category 1 and Category 2 engines subject to this rule, manufacturers will start certifying to EPA's Tier 2 standards starting in 2007. For Category 3 engines, the standards don't change in 2007, but this marks an appropriate time to expect manufacturers to make any minor adjustments that might be necessary to fully comply with the EPA provisions for testing and certification.

The relationship between our program and the NTC requirements is described in more detail in Section V.D.

3. How Does a Certificate of Conformity Relate to a Statement of Voluntary Compliance or an EIAPP?

The Clean Air Act requires that manufacturers obtain a certificate of conformity before they introduce a new engine into commerce. Once it goes into force, MARPOL Annex VI will require manufacturers to obtain an ''Engine International Air Pollution Prevention

[33] A copy of the conference version of the NO_X Technical Code can be found in Docket A–97–50, Document II–B–01. Copies of updated versions can be obtained from the International Maritime Organization (*http://www.imo.org).*

Certificate'' (EIAPP). We anticipate that engines that receive an EPA certificate of conformity will also be eligible for an Engine International Air Pollution Prevention Certificate, since the near-term emission limits are the same as the Annex VI NO_X limits.

Note that EIAPPs will not be issued until the Annex goes into force and can be issued only by the flag-state Administration. Prior to entry into force of the Annex, and to encourage vessel owners to purchase MARPOL Annex VI compliant engines, we have developed a voluntary certification program. Under this program, the engine manufacturer can apply for and obtain a Statement of Voluntary Compliance to the MARPOL Annex VI NO_X limits.[34] It is anticipated that ship owners will be able to exchange this Statement of Voluntary Compliance for an EIAPP after the Annex enters into force. If a shipowner does not have a valid Statement of Voluntary Compliance for an engine, it may be necessary to recertify the engine to obtain an EIAPP after the Annex enters into force. Finally, note that obtaining an EIAPP in this way requires a Statement of Voluntary Compliance from EPA. A shipowner with a Statement of Voluntary Compliance issued by another Administration or by a classification society will have to apply for EPA certification to obtain an EIAPP.

4. What Are the Roles of the Engine Manufacturer and Ship Owner After the Engine Is Installed?

Unlike the provisions of MARPOL Annex VI, the Clean Air Act makes the engine manufacturer responsible for in-use compliance of properly maintained engines. Manufacturers must demonstrate that their engines can meet emission standards through the engine's ''useful life'' (as described below, the useful life generally refer to the first rebuild cycle). Manufacturers are responsible for correcting failures that occur during that period. The ship owner must ensure that all proper maintenance is performed during the entire ''service life'' of the engine (service life is the period during which the engine is in service, including the periods after it has been rebuilt). Under both Annex VI and the regulations adopted in this final rule for Category 3 engines, the ship owner is also responsible for compliance with the recordkeeping provisions contained in the NO_X Technical Code. EPA and Coast Guard will work together to develop procedures to verify onboard performance of Annex VI requirements, as Coast Guard has general authority to carry out such procedures on vessels.

While this final rule does not require operators or owners of Category 1 or Category 2 engines to comply with the recordkeeping provisions contained in the NO_X Technical Code, we believe operators will generally choose to comply with these Annex VI recordkeeping requirements anyway, for three reasons. Most importantly, once Annex VI is ratified, compliance with these recordkeeping provisions will be required for U.S. ships that go overseas. Also, full compliance with the maintenance logging requirements under Annex VI would be a simple way to show that an operator is not tampering with the engine. Finally, manufacturers often condition warranty coverage to some degree on proper maintenance of the engine. Thus, having the Annex VI log would facilitate warranty claims.

B. Other Certification and Compliance Issues

1. How Are Engine Families Defined?

Engine grouping for the purpose of certification is accomplished through the application of an ''engine family'' definition. Engines expected to have similar emission characteristics throughout their useful life are classified in the same engine family. As a default, we are defining engine families consistent with Annex VI. However, to provide for administrative flexibility, we may separate engines normally grouped together or combine engines normally grouped separately, based upon a manufacturer's request, substantiated with an evaluation of emission characteristics over the engine's useful life. It is worth noting that we are not adopting the Annex VI definition of ''engine groups''. Under Annex VI, manufacturers can choose to certify their engines under a more narrowly defined engine group than an engine family. Annex VI allows more in-use adjustment of these engine group-certified engines.

2. Which Engines Are Selected for Testing?

Manufacturers must select the highest-emitting engine (*i.e.*, ''worst-case'' engine) in a family for certification testing. This is consistent with the NTC requirements. In making that determination, the manufacturer must use good engineering judgment (considering, for example, all engine configurations and power ratings within the engine family and the range of installation options allowed). By requiring the worst-case engine to be tested, we are assured that all engines within the engine family are complying with emission standards for the smallest number of test engines. If manufacturers believe that the engine family is grouped too broadly, they may request separating engines with dissimilar calibrations (based on an evaluation of emission characteristics over the engine's useful life) into separate engine families.

For these large marine engines, conventional emission testing on a dynamometer becomes more difficult. Often the engine mock-ups that are used for the development of these engines use a single block for many years, while the power assemblies are changed out. For Category 3 engines, certification tests may be performed on these engine mock-ups, as long as their configuration is the same as that of the production engines. In addition, manufacturers may conduct single-cylinder tests, since this should give the same brake-specific emission results as a full engine test, as long as each cylinder in an engine is equivalent in all material respects.

Manufacturers must allow EPA to perform confirmatory testing using their certification engines. In other rules, we have required manufacturers to provide us with actual engines for our confirmatory testing program. However, this would be impractical for Category 3 engines because of their size and cost. Thus, confirmatory testing of Category 3 engines would most likely require the manufacturer to test a specific engine model according to our specifications. For example, we might require that an engine be retested in our presence or tested with specific settings for adjustable parameters.

3. How Does EPA Treat Adjustable Parameters?

Diesel engines are often designed with adjustable components. For example, it is common to be able to adjust the fuel injection timing of an engine. EPA has historically required that these important adjustable parameters be physically limited to the range over which an engine would comply with the standards. Thus, while an uncontrolled diesel engine would typically have a broad (or even unlimited) range of adjustability, EPA-certified engines have a very narrow range of adjustability. Typically, this narrow range is enforced through physical stops on the adjustable parts. In some cases, manufacturers seal a component after final assembly to prevent any adjustment in use. Disabling physical stops, breaking seals, or otherwise adjusting an engine outside

[34] Information on how to obtain a Statement of Voluntary Compliance can be found on our Web site *http://www.epa.gov/otaq/marine.htm.*

of the certified range is considered tampering with the emission controls, and is a violation of section 203(a) of the Clean Air Act.

For marine engines, broad adjustability allows engines to be adjusted for maximum efficiency when used in a particular application. This practice simplifies marine diesel engine production, since the same basic engine can be used in many applications. While we recognize the need for this practice, we are also concerned that the engine meet the proposed emission limits throughout the range of adjustment. Therefore, the Agency has established provisions for Category 2 engines to allow manufacturers to specify in their applications for certification the range of adjustment for these components across which the engine is certified to comply with the applicable emission standards, and demonstrate compliance only across that range. We will also allow such adjustments for Category 3 engines. Practically, this requirement means that a manufacturer would specify different fuel injection timing calibrations for different conditions. These different calibrations would be designed to account for differences in fuel quality, which can be very significant for Category 3 engines. Operators would then be prohibited by the anti-tampering provisions from adjusting engines to a calibration different from the calibration specified by the manufacturer. The operators have to maintain records onboard the vessel demonstrating compliance, and must submit these records to EPA upon request. NTC also allows engines to be adjusted in use, and requires the engine manufacturer to include a description of the allowable adjustments in the Technical File for the engine.

4. How Must Engines Be Labeled?

Each new engine must have a permanent emission label on the engine block or on some other part of the engine that is not normally replaced during maintenance or rebuild. This label must include specific emission-related information such as engine family name, model year, and basic maintenance specifications. The inclusion of this information on the label is in addition to the recordkeeping requirements specified in the NO_X Technical Code.

5. How Does EPA Ensure Durable Emission Controls?

To achieve the full benefit of the emission standards, we need to ensure that manufacturers design and build their engines with durable emission controls. It is also necessary to encourage the proper maintenance and repair of engines throughout their lifetime. The goal is for engines to maintain good emission performance throughout their in-use operation. Therefore, we believe it is necessary to adopt measures to address concerns about possible in-use emission performance degradation. The durability provisions described in the following sections are intended to help ensure that engines are still meeting applicable standards when operated in use. Most of these provisions are carried over from our program for smaller marine diesel engines.

The most fundamental issue related to durability is the concept of useful life. The Clean Air Act specifies that useful life is the period during which an engine is required to meet the emission standards. For Category 3 marine engines subject to our standards, the useful life is the period during which an engine is expected to be properly functioning with respect to reliability and fuel consumption without being rebuilt. For engines that are rebuilt completely at one time, the useful life would be the expected period between original manufacture and the first engine rebuild. For engines that are maintained by replacing individual power assemblies, the useful life would be the expected period between original manufacture and the point at which the last power assembly is replaced. We expect that this period will vary to some degree among engine models. Manufacturers must therefore specify the useful life for their engines at the time of certification. The specified useful life is subject to EPA approval and may not be less than 3 years or 10,000 hours of operation (based on total engine operation, not just operation in or near U.S. waters). This specification does not limit in-use operation. Rather it gives the manufacturer direction for addressing emission deterioration by defining the period during which the manufacturer must demonstrate to EPA that the engine will meet the standards. The useful life period may also not be less than any mechanical warranty that the manufacturer offers for the engine.

These minimum useful life values are lower than the minimum values for Category 2 engines due to the effect of using residual fuel, which generally has much higher sulfur levels than distillate fuels. The high sulfur levels create a more corrosive environment within the combustion chamber, which decreases durability. The period of years (three years) is also affected by the higher usage rate in terms of hours per year.

6. What Are the Manufacturer's Responsibilities for the Emission Warranty and Defect Reporting?

Tied to the useful life is the minimum period for the emission warranty required under section 207(a) of the Clean Air Act. We believe it is important to ensure that the engine manufacturer has designed and built the engine to ensure that it will comply with the emission standards throughout its useful life, as long as it is properly maintained. We therefore specify that the period for the emission warranty is equal to the useful life period (*e.g.*, 10,000 hours or 3 years). The engine manufacturer is responsible for any emission-related repairs to any properly maintained and properly used engine that fails to meets the standard in use during the warranty period. Engine operators are responsible to repair any engines that fail to meet the standards because of improper maintenance during the service life of the engine.

We are also adopting defect-reporting requirements. These provisions require Category 3 engine manufacturers to report to us whenever a specific emission-related defect occurs in two or more engines (or two or more cylinders within the same engine). We generally expect manufacturers to identify defects as part of their normal warranty process. The manufacturer must, however, report all defects, without regard to how they were identified. Note that the defect reporting requirements do not expressly require the manufacturer to collect new information. However if their practice for safety and production defects is to collect new information or conduct investigations, then they must do so with respect to emission-related defects under this regulation. Manufacturers must also track and report information they obtain through normal business practice.

7. What Are Deterioration Factors?

To further ensure that the emission standards are met in use, we require manufacturers to apply a deterioration factor (DF) to engines to evaluate emission-control performance throughout the useful life. The emissions from new engines are mathematically adjusted using the DF to account for potential deterioration in emissions due to aging of emission-control technologies or devices. The resulting emission level is intended to represent the expected emissions at the end of the useful life period for a properly maintained engine. We believe the effectiveness of some emission-control technologies, such as aftertreatment, sophisticated fuel-delivery controls, and some cooling systems, can decline as these systems age. The DF is applied to the certification emission test data to represent emissions at the end of the useful life of the engine. We are proposing that marine diesel engine DFs be determined by engine manufacturers in accordance with good engineering practices. This is more flexible than some more prescriptive approaches that are required for other program. The DFs, however, are subject to EPA approval and must be consistent with in-use test data. Manufacturers must calculate DF values based on the worst-case engine configuration offered within the engine family.

It is not our intent to require a great deal of data gathering on engines that use established technology for which the manufacturers have the experience to develop appropriate DFs. New DF testing may not be needed where sufficient data already exists. However, we are applying the DF requirement to all engines so we can be sure that reasonable methods are being used to determine the capability of engines to meet standards throughout their useful lives. Consistent with other programs, we allow manufacturers the flexibility of using durability emission data from a single engine for other engine families that are being certified to the same standards.

DFs are calculated as an additive value (*i.e.*, the arithmetic difference between the emission level at full useful life and the emission level at the test point) for engines without exhaust aftertreatment devices. In contrast, DFs are calculated as a multiplicative value (*i.e.*, the ratio of the emission level at full useful life to the emission level at the test point) for engines using exhaust aftertreatment devices. This is consistent with the DF requirements applicable to other diesel engines, based on observed patterns of emission deterioration. Given the type of emission controls projected to be used to meet the near-term standards (calibration changes and combustion chamber redesign, but not aftertreatment), it is possible that NO_X emissions may actually decrease with time as the piston rings and cylinder liners wear (thereby reducing peak pressures). In such cases, manufacturers would not be allowed to use a negative DF, and would instead be required to use a DF of zero.

One of the reasons we are adopting a very flexible DF program for this rulemaking is that we do not expect deterioration to be a major problem for these engines. Our history with in-cylinder NO_X control suggests that engine-out NO_X emissions are relatively stable over time. If we eventually adopt an aftertreatment-forcing standard or a standard for PM, we would likely consider more specific requirements for calculating DFs. For example, it might be appropriate to apply to these engines the more specific DF provisions that have been developed for heavy-duty highway engines (40 CFR 86.004–26).

8. What Requirements Apply to In-Use Maintenance?

In previous rules, we have required manufacturers to furnish the ultimate purchaser of each new nonroad engine with written instructions for the maintenance needed to ensure proper functioning of the emission-control system. (Generally, manufacturers require the owners to perform this maintenance as a condition of their emission warranties.) If such required maintenance is not performed by the engine operator, then in-use emission deterioration can result. We therefore require operators of vessels with Category 3 to perform the emission-related maintenance specified by the manufacturer, which we approve as part of the application for certification. This provision is comparable to our requirement for railroads to perform emission-related maintenance for locomotives (40 CFR 92.1004). In that approach, locomotive owners who fail to properly maintain a locomotive are subject to civil penalties for tampering. For marine engines, we consider rebuilding engines and power assemblies to be a part of emission-related maintenance. We believe these requirements are generally consistent in practice with the provisions specified for ship operators in Technical File required by the NO_X Technical Code.

Unlike our regulation for smaller marine engines, we are not adopting minimum allowable maintenance intervals for Category 3 marine diesel engines. This is also consistent with our approach for locomotives. In both cases, we believe the engine manufacturers, allowing for input from the engine owner, can assess what should be the specific maintenance schedules before completing the sale of the engine. The engine manufacturer will then provide those specific maintenance instructions to the ship operator or owner as part of the required maintenance information.

9. What Requirements Apply to Rebuilding Engines?

We are adopting in-use maintenance provisions that require operators to properly perform emission-related maintenance throughout the service life of the engine. This also applies whenever an engine or engine subsystem is rebuilt. In general, we require that all rebuilds return the engine to its original certified condition. We consider failure to rebuild an engine to its original certified condition to be tampering with the emission controls. We believe these maintenance and rebuild provisions address the vast majority of in-use servicing of these engines.

10. What Are the Prohibited Acts and Related Requirements?

We are regulating Category 3 engines under 40 CFR part 94. This means that we are extending the general compliance provisions for smaller marine engines to Category 3 marine engines. These include the general prohibition against introducing an uncertified engine into commerce, as well as the tampering and defeat-device prohibitions. These prohibitions are listed in 40 CFR 94.1103. As discussed above, certain prohibitions applying to ship owners and ship operators are also described in this section.

11. What General Exemptions Apply?

We are applying the exemptions for smaller marine engines to Category 3 marine engines. These include, for example, exemptions for the purpose of national security and exemptions for engines built in the United States for export to other countries. These exemptions, described in 40 CFR part 94, subpart J, typically exempt the engines from emission standards and other requirements, but require the manufacturer to keep records and label exempted engines.

12. What Regulations Apply for Imported Engines?

We are extending the current importation provisions found in 40 CFR part 94 for smaller marine engines to Category 3 marine engines. Imported engines are generally subject to the same requirements, based on their date of original manufacture. The existing provisions for smaller engines include permanent and temporary exemptions from this requirement.

13. What Are a Manufacturer's Recall Responsibilities?

Section 207(c)(1) of the Act specifies that manufacturers must recall and repair in-use engines if we determine that a substantial number of them do not comply with the regulations in use. We are proposing to apply the existing provisions for smaller marine engines to Category 3 marine engines. These provisions are described in 40 CFR part 94, subpart H.

14. What Responsibilities Apply to Ship Owners and Operators?

In this final rule we are requiring ship owners and operators to maintain all records of maintenance, repair, and adjustment of the ship's engines as it relates to emission-control performance. We believe these records currently are kept by most ship operators as part of normal recordkeeping associated with engines of this magnitude, initial investment, and cost of operation. These records would be essential for both the ship operator and the Administration to determine compliance with the applicable requirements. This is especially important for Category 3 marine engines, because operators need to be able to make adjustments that significantly affect the engine's ability to control emissions. These records must be maintained on-board the vessel and be provided to EPA upon request. It is a separate violation of the record keeping and submission requirements to fail to meet the requirements with respect to each required submission or record. Penalties are assessed for each day of each such violation.

In order to maintain the proper emission-control performance of the engine, the ship owner and operator are responsible for maintaining all adjustable parameters within the certified ranges specified by the engine manufacturer, and for ensuring that the engine is rebuilt pursuant to the regulatory requirements. The regulations establish that any adjustment outside the range specified by the manufacturer for proper emission-control performance constitutes a violation of the regulations and the Clean Air Act. Additionally, the regulations require the ship owner and operator to correct any noncompliance within a two-hour period. Failure to correct the noncompliance within a two-hour period is a violation of the regulations, with each two-hour period considered a separate violation. These provisions, like the other maintenance-related provisions, are intended to ensure that owners and operators perform adjustments properly to avoid the significant increase in emissions associated with improper adjustments. In effect, the timely correction of the improperly adjusted parameter is considered a required maintenance event, and failure to properly perform this required maintenance is considered tampering. Given the significant emission increases that can occur with improper adjustments, the reasonable time needed to correct an improper adjustment, and the need for an effective deterrent, the regulations establish a recurring two-hour period as the appropriate requirement.

As a minimum measure of compliance, the ship owner is required to comply with certain basic recordkeeping, as described above, and to review those records periodically to ensure compliance. Specifically, owners must perform an end-of-year review of the applicable maintenance and repair records and send us an annual statement confirming that they have met the emission-related requirements of the regulations for the previous year, or acknowledging any noncompliance, as appropriate. If the ship is operated by a company not controlled by the ship owner, then both companies are responsible to meet this reporting requirement. If EPA receives a valid compliance statement regarding a particular vessel from either the owner or the operator of the vessel, EPA will consider both the owner and the operator to have complied with the reporting requirement.

As described in Section I.E, the NO_X Technical Code Section 2.1 will require each engine covered by the Annex VI NO_X requirements to be surveyed to ensure that it complies with the NO_X limits (this requirement will apply once Annex VI goes into force). Two of the surveys, the pre-certification survey and initial certification survey, are required as part of a ship's initial survey and the issuance of an International Air Pollution Prevention certificate for the vessel. Section 2.1 also contains a requirement for periodic and intermediate surveys ''to ensure the engine continues to fully comply with the provisions of the Code.'' The periodic and interim surveys are to occur every five and every 2½ years, respectively. Annex VI also requires additional unscheduled surveys unless the scheduled surveys are carried out on an annual basis. These surveys are required for engines installed on vessels of 400 gross tonnage or above, as specified in Regulation 5 of the Annex. For smaller vessels, it is up to each country to establish appropriate programs.

The periodic and interim surveys are somewhat similar to the annual compliance statement we are finalizing today. However, while the Annex VI surveys will be carried out by government surveyors, the annual compliance statement described in this section must be completed by the owner of the vessel and therefore creates a liability requirement for the vessel owner. In addition, it is not clear at this time whether the Annex VI survey will be designed only to inspect the engine to make sure it is in compliance at the time of the survey or if it will be designed to ascertain whether the engine has been taken out of compliance (*i.e.*, if there has been tampering) during the interim period. This is because the U.S. Senate has not yet ratified Annex VI, so the implementing legislation and corresponding regulations for adopting the Annex VI and NO_X Technical Code requirements into U.S. law have not yet been adopted. For both of these reasons, we believe it is necessary to include this annual compliance statement requirement in this rule. However, it is possible that the additional documentation required by Annex VI and the associated surveys may be sufficient to ensure compliance. Therefore, in light of this possibility, EPA will reconsider the need for this annual compliance statement in the context of the development of the implementing legislation and supporting regulations for U.S. implementation of MARPOL Annex VI. If such reconsideration leads EPA to rely in the future on the Annex survey in lieu of the annual statement of the compliance, the owner and operator of the vessel would remain liable for all other compliance provisions of the regulations adopted today. This would include maintaining all records of maintenance, repair and adjustment of the ship's engines as it relates to emission-control performance, and maintaining the proper emission-control performance of the engine. The annual compliance certification requirement will remain in effect unless it is specifically rescinded.

C. Test Procedures for Category 3 Marine Engines

Engine manufacturers are currently testing according to the test procedures outlined in The Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (hereafter referred to as ''NO_X Technical Code'').[35] The new EPA standards are based on these Annex VI test procedures, with some modifications described below. These modifications are necessary to ensure that the test data used for certification are consistent with the requirements of the Clean Air Act.

1. What Duty Cycle Do I Use To Test My Engines?

The duty cycle used to measure emissions is intended to simulate operation in the field. Testing an engine for emissions consists of exercising it

[35] A copy of the conference version of the NO_X Technical Code can be found in Docket A–97–50, Document II–B–01. Copies of updated versions can be obtained from the International Maritime Organization (*http://www.imo.org*).

over a prescribed duty cycle of speeds and loads, typically using an 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-control performance of engines designed to those standards.

To address operational differences between engines, we are adopting two different duty cycles for different types of Category 3 marine engines. Engines that operate on a fixed-pitch propeller curve must be certified using the E3 duty cycle adopted by the International Organization for Standardization (ISO). This is a four-mode steady-state cycle developed to represent in-use operation of marine diesel engines. The four modes lie on an average propeller curve based on the vessels surveyed in the development of this duty cycle. We are adopting the ISO E2 duty cycle for propulsion engines that operate at a constant speed. These are the same cycles specified by Annex VI.

2. How Do I Account for Variable Test Conditions?

We are not limiting certification testing based on barometric pressure or ambient humidity. We limit the allowable ambient air temperature for laboratory testing to a range between 13°C and 30°C and charge air cooling water between 17°C and 27°C. This is somewhat broader than is specified by the NTC. We are adopting the NTC correction factors for temperature and humidity for certification testing in this temperature range. These corrections adjust emission measurements to be equivalent to measurements taken at 25°C and a humidity of 10.71 g/kg. We will allow the use of the corrections for a broader range of test conditions, as long as the manufacturer verifies the accuracy of the correction factors outside of the range of test conditions for certification.

3. How Does Laboratory Testing Relate to Actual In-Use Operation?

If done properly, laboratory testing can provide emission measurements that are the same as measurements taken from in-use operation. However, improper measurements may be unrepresentative of in-use operation. We are therefore adopting regulatory provisions to ensure that laboratory measurements accurately reflect in-use operation. The regulations include a general requirement that manufacturers must use good engineering judgment in applying the NO_X Technical Code test procedures to ensure that the emission measurements accurately represent emission-control performance from in-use engines. We are adding specific requirements for manufacturers to ensure that intake air and exhaust restrictions and coolant and oil temperatures are consistent with in-use operation. Most importantly, we require that manufacturers' simulation of charge-air cooling replicate the performance of in-use coolers within ±3°C.

The definition of maximum test speed, (the maximum engine speed in revolutions per minute, or rpm) is an important aspect of the test cycles. Under the NO_X Technical Code, engine manufacturers are allowed to declare the rated speeds for their engines, and to use those speeds as the maximum test speeds for emission testing. However, we are concerned that a manufacturer might declare a rated speed that is not representative of the in-use operating characteristics of its engine in order to influence the parameters under which their engines may be certified. We are therefore applying the current definition of ''maximum test speed'', which is already specified for Category and Category 2 engines 40 CFR 94.107, to Category 3 engines. We will also allow manufacturers to ask us to use the maximum in-use engine speed as the maximum test speed.

D. Comparison to NO_X Technical Code Compliance Requirements

1. How Are EPA's Compliance Requirements Different From the NO_X Technical Code Requirements?

We have attempted to define compliance requirements that are sufficiently consistent with the NO_X Technical Code (NTC) to allow manufacturers to use a single harmonized compliance strategy to certify under both systems. This has involved making several changes to proposal to align the certification and compliance program with that specified by NTC. For example, (1) the final rule specifies a test fuel based on engine operation with cleaner-burning distillate fuel; (2) we are not requiring engine manufacturers to test engine emissions to verify compliance after engines are installed in vessels; and (3) operators do not need to conduct onboard emission measurements after adjusting the engines (or before they enter U.S. territorial waters) to demonstrate that the engine continues to meet the standards after such adjustments. We intend to revisit these issues in our future rulemaking.

We are adopting several provisions in our compliance program that are different from the NTC requirements. The differences are based on certain Clean Air Act-specific compliance provisions and the related need to adopt test procedures designed to achieve the emission reductions called for under Clean Air Act section 213. These differences are discussed in detail in Section V.A.2 above and are summarized as follows:

- Liability for in-use compliance—We require that the engine manufacturer be responsible for designing and producing an engine that will comply with the emission standards for the full useful life of the engine, while the NTC program makes the ship operators solely responsible for ensuring in-use compliance. Both the EPA regulations and the NTC provisions require ship operators to properly maintain their engines and to keep records of the maintenance and engine adjustment throughout the service life of the engine. Under NTC, these records are referred to as the Record Book of Engine Parameters.
- Durability demonstration—We require that the engine manufacturer demonstrate prior to production that a properly maintained and used engine will comply with the emission standards for the full useful life of the engine (*see* Section V.B.5). The NTC program only requires manufacturers to demonstrate that the engine meets the standards when it is installed in the vessel; there is no durability demonstration under NTC.
- Witness testing—We allow, but do not require, witness testing for U.S. compliance. Some other countries require witness testing for marine engines. Manufacturers must take this into consideration if they plan to sell the same engines in the United States and those other countries.
- Test conditions—We certify Category 3 marine engines using the NTC test procedures with certain modifications. Annex VI specifies narrow ranges for air and water temperature. This can make it easier for manufacturers to certify, because they might not design for the wide ranges of conditions that actually occur. We believe it is necessary to specify wider temperatures to achieve the level of emission reductions called for under the Act. Test procedures based on real operating parameters provide a robust method of measuring emissions. To address the concern for varying emission levels under extreme conditions, we correct emissions back to standard conditions using Annex VI correction factors.
- Test parameters—NTC allows manufacturers full discretion to adjust certain engine parameters to appropriate

settings. For engine parameters such as aftercooler and backpressure simulation, these parameters may significantly affect emission levels. As with the test conditions for air and water temperatures, to avoid unrealistic parameter settings, we simply require good engineering judgment to select representative values for such engine parameters. Also, under NTC, manufacturers may specify a maximum test speed for engine testing that selectively includes lower-emission operation, even if those speeds do not represent an engine's actual operation when installed on a vessel. We instead define an objective way of identifying an engine's maximum test speed, based on the way the engine will operate in use.

- Compliance date for standards—As described in Section III, we apply the new emission standards based on the date the engine is fully assembled for the first time, while Annex VI applies the standards based on the date that the vessel is manufactured. Note that this difference would not matter for the near-term standards, since the effective date of the Annex VI limits has already passed (January 1, 2000).
- Parameter adjustment—We are allowing manufacturers to specify in their applications for certification the range of adjustment across which the engine is certified to comply with the applicable emission standards. This would allow a manufacturer to specify different fuel injection timing calibrations for different conditions. These different calibrations would be designed to account for differences in fuel quality. Operators would then be prohibited by the anti-tampering provisions from adjusting engines to a calibration different from the calibration specified by the manufacturer. The NTC would also prohibit operators from adjusting engines to a calibration different from the calibration specified by the manufacturer.

The durability requirements of the Clean Air Act represent the most fundamental differences between the NTC certification program and the program required by the Clean Air Act. The Act requires that a certificate of conformity be based on a demonstration of compliance with the engine standards, and the engine standards require that the engine manufacturer produces an engine that will comply with the emission standards for the specified useful life of the engine. The NTC certification provisions do not include this kind of requirement, instead making the ship operators solely responsible for ensuring in-use compliance through periodic survey requirements. Nevertheless, since requiring compliance with both would be at least partially duplicative, this rule harmonizes the Act and NTC requirements as closely as possible.

The requirements related to representative engine testing are important to ensure that engines are not designed with emission-control systems that operate well in the laboratory, with less effective control during in-use operation. However, based on our expectation that manufacturers are designing their engines properly today, we will allow manufacturers to rely on test data generated under NTC on an interim basis, as described in Section V.A.2,

2. Can a Manufacturer Comply With EPA Requirements and Annex VI Requirements at the Same Time?

Manufacturers complying with EPA requirements will need to do very little additional work to meet the Annex VI requirements. Engine manufacturers must give the operator a Technical File that has more information than we require. The manufacturer may also need to ensure that the relevant emission testing is witnessed appropriately.

For manufacturers already complying with the NTC, the amount of additional work necessary to satisfy the new EPA requirements depends on how they conducted emission testing. The NTC allows more discretion in testing engines than we allow under our regulations, and does not necessarily require that the engine be tested fully consistent with in-use operation. Under the EPA regulations tests of engines that are not consistent with in-use operation would not be allowed, unless the manufacturer could demonstrate that the test results were equivalent to test results that would result from testing conducted in accordance with the proposed regulations. In these cases, manufacturers would need to repeat the tests according to the proposed test procedures. However, we recognize that some additional lead time is needed for manufacturers that will be repeating tests. Therefore, we have included in 40 CFR 94.12(f) of the final regulations an interim provision which will allow manufacturers to use their Annex VI test data to show compliance with Tier 1 standards. Manufacturers would not need prior approval to do this. We are limiting this allowance to the first three model years of the Tier 1 standards. Beginning with model year 2007, manufacturers would need to make a showing of equivalence before they could deviate from the EPA test procedures.

On the other hand, manufacturers that used good engineering judgment to test their engines consistent with their in-use operation may generally use the same test data for EPA certification. For future testing, manufacturers may test their engines in a way that allows them to simultaneously meet the NTC and EPA requirements.

With respect to other EPA compliance requirements not related to certification testing, manufacturers must do the following things in addition to the Annex VI requirements:

- Demonstrate prior to production that the engines will comply with the emission standards for the useful life of the engine.
- Warrant to the purchasers that the engines will comply with the EPA requirements for the useful life of the engine.
- Specify how the operator should adjust the engine in use and how proper adjustment should be verified through testing.

E. Technical Amendment to 40 CFR Part 94

The regulations in 40 CFR 94.7(d) require that a marine engine be equipped with a connection in the exhaust system for the temporary attachment of gaseous and/or particulate emission-sampling equipment. This provision is intended to facilitate in-use emission testing. Where the engine manufacturer does not add a sample port, for example when an inadequate amount of the exhaust system is supplied to make such an installation practical, the engine manufacturer would have to provide installation instructions for the sample port. If the engine manufacturer properly supplies such instructions, the engine would be covered by the applicable engine certificate when the engine manufacturer provides the engine to the vessel manufacturer for the purposes of installation. The vessel manufacturer would then have to follow these installation instructions or the vessel manufacturer's sale or placement of the vessel into service could be a violation of the prohibited acts. Manufacturers expressed concern that the wording of this requirement could be taken to mean that a failure to install the sample port by the vessel manufacturer could affect their engine certificate. This was clearly not the intent of this provision. To further clarify this issue, we are amending 40 CFR 94.7(d) by deleting the words ''invalidate a certificate and'' from the last sentence of that regulatory provision.

F. Compliance Issues To Be Considered for Future Rulemaking

The compliance program being finalized in this final rule is appropriate to implement the Tier 1 standards. However, we continue to believe that additional compliance provisions will be necessary for later standards that require more advanced technology and more challenging calibrations. These include provisions related to (1) parameter adjustment, (2) off-cycle emissions, (3) test fuels, and (4) post-certification testing. These issues were discussed in detail in the proposal for this rule, along with potential compliance provisions that could address our concerns. We intend to assess the need for such compliance provisions in our future rulemaking.

1. What Are EPA's Concerns About Parameter Adjustment?

Given the broad range of ignition properties for in-use residual fuels, we expect that our in-use adjustment allowance for Category 3 engines would result in a broader range of adjustment than is expected for Category 2 engines. Because of this broader allowance, we proposed that operators be required to perform a simple field measurement test to confirm emissions after a parameter adjustment or maintenance operation, using onboard emission measurement systems with electronic-logging equipment. We expect that this issue will be equally important for more advanced engines that rely on water injection or after treatment for emission reductions. In addition, in most cases, these advanced technologies can be turned on and off by the operator. Thus, we expect there to be a need for an onboard verification system for these engines as well.

We envision a simpler measurement system than the type specified in Chapter 6 of NO_X Technical Code. As is described in the Final Regulatory Support Document, we believe that onboard emission equipment that is relatively inexpensive and easy to use could be used to verify that an engine is properly adjusted and is operating to the specifications of the engine manufacturer. Note that Annex VI includes specifications allowing operators to choose to verify emissions through onboard testing, which suggests that Annex VI also envisioned that onboard measurement systems could be of value to operators.

We proposed to allow vessel operators to adjust an engine's operating parameters different from the manufacturer's specification when the vessel is sufficiently far from the U.S. coastline. This flexibility is not included in the NTC provisions. Under the proposed approach, engine adjustments different from engine manufacturer's specifications would have been conditional on readjusting the engine's parameters within its certified range and confirming that emissions are within the range of emissions to which the engine is certified to comply before a vessel approaches the U.S. coastline. Failure to take these actions would have constituted tampering with the engine in violation of Clean Air Act section 203(a)(3)(A) and 40 CFR 94.1103(a)(3)(i). While we are finalizing our Tier 1 program without this flexibility, we will continue to evaluate whether it is appropriate for more advanced standards.

While we may revisit some of these issues in our future rulemaking, under this final rule ship operators may not adjust the parameters outside of the ranges specified by engine manufacturers in their application for certification. Any adjustment outside of the certification range would be considered tampering (*see* Sections V.B.3 and V.B.14).

2. What Are EPA's Concerns About Off-Cycle Emissions?

We are concerned about emission-control performance when the engine is not operating on the ISO E3 test cycle points. For Category 1 and Category 2 engines, we adopted ''not-to-exceed'' provisions to define an objective measure to ensure that engines would be reasonably controlling emissions under the whole range of expected normal operation, as well as the defeat-device prohibition. Since these smaller engines are mass produced for a wide range of vessels used in many different applications, we expected ''normal operation'' for these engines to vary considerably around the ideal propeller curve. Generally, Category 3 engines are intended to operate on a propeller curve matched with a propeller for custom installation on a specific vessel. However, we remain concerned that Category 3 engines may have higher emissions between test modes. While the defeat device provisions prohibit manufacturers from producing their engines to control emissions more effectively at established test points than at other points not included in the test, it can be a difficult prohibition to enforce. We expect to revisit this issue in our future rulemaking. For example we may require manufacturers to develop emission targets to allow the operator to ensure that the engine has been readjusted to have performance equivalent to the certified configuration. These emission targets would vary with operating conditions and would include targets for engine speeds other than the test points speeds. In the proposal we defined equivalent control to be either the use of the same injection timing map for the tested and nontested engine speeds, or following a linear interpolation between test points for NO_X emissions at nontest speeds.

In addition, we remain concerned that Category 3 engines operate at relatively low power levels when they are operating within range of a port. Ship pilots generally operate engines at reduced power for several miles to approach a port, with even lower power levels very close to shore. Because of the relatively low weighting of the low-power test modes in the ISO E3 test cycle, it is very possible that manufacturers could meet emission standards without significantly reducing emissions at the low-power modes that are more prevalent for these engines as they operate close to commercial ports. This issue would generally not apply to vessels that rely on multiple engines providing electric-drive propulsion, since these engines can be shut down as needed to maintain the desired engine loading. We will consider several options in our future rulemaking to address this concern. We could re-weight the modes of the duty cycle to emphasize low-power operation. This has several disadvantages. For example, we have no information to provide a basis for applying different weighting factors. Also, changing the duty cycle would depart from the historic norm for marine engine testing. This would make it more difficult to make use of past emission data, which is all based on the established modal weighting. An alternative approach would be to cap emission rates at the two low-power modes. We could set the cap at the same level as the emission standard, or allow for a small variation above the emission standard. For mechanically controlled engines, such an approach could dictate the overall design of the engine. On the other hand, it is likely that Tier 2 engines will have electronic controls, which would enable the manufacturer to target emission controls specifically for low-power operation without affecting the effectiveness of emission controls at higher power.

3. What Are EPA's Concerns About the Fuel Used for Emission Testing?

Appropriate test procedures need to represent in-use operating conditions as much as possible, including specification of test fuels consistent with the fuels that compliant engines will use over their lifetimes. For the standards we are adopting in this rule, we are allowing engine testing using distillate fuel, even though vessels with Category 3 marine engines primarily use the significantly less expensive residual fuel. This allowance is consistent with the specifications of the NTC. We proposed to base the standards on testing using residual fuel, but are not finalizing this requirement at this time due to concerns about the lead time needed by manufacturers to develop the necessary testing capabilities for residual fuels. Most manufacturers have test facilities designed to test engines using distillate fuel because it is easier to work with than residual fuel. Nevertheless, we believe that long-term standards should be based on actual in-use fuels. Thus, we will reconsider the issue of test fuel in a future rulemaking.

In our proposal, we also included a correction factor to account for the emission-related effects of fuel quality, specifically fuel-bound nitrogen. We are not finalizing the correction here. This correction would have been needed for residual fuel testing because of the high levels of nitrogen contained in those fuels. For all testing with Category 3 engines, we proposed to require measuring fuel-bound nitrogen and correcting measured values to what would occur with a nitrogen concentration of 0.4 weight percent. This corrected value would be used to determine whether the engine meets emission standards or not. This correction methodology would have applied equally to testing with distillate or residual fuels. While we are not adopting any correction for fuel effects in this rule, we will reconsider the need for such corrections in a future rulemaking.

4. What Are EPA's Concerns About Production Variability?

To ensure compliance of production engines, we proposed a simple testing program that is modeled loosely on our production line testing (PLT) requirements for other marine engines. The general object of any PLT program is to enable manufacturers and EPA to determine, with reasonable certainty, whether certification designs have been translated into production engines that meet applicable standards. We proposed that each engine a manufacturer produces be tested. We are not including new production testing requirements in this final rule because of concerns about the amount of lead time needed to start such program. However, we will revisit the need to include this type of post-certification testing in our future rulemaking.

VI. Projected Impacts

Our analysis of the projected impacts of new emission standards typically consists of estimating the costs, emission benefits, and cost per ton of pollutant reduced.

We expect the costs of compliance to be negligible. We do not anticipate any engineering or design costs associated with the near-term standards because manufacturers should already be certifying engines to the Annex VI standards to comply with the internationally negotiated program and new Category 3 marine diesel engines installed on ships since January 1, 2000 are widely understood to already comply with the standards set forth in both Annex VI and this rule. While there will be certification and compliance costs, these costs will be negligible, because manufacturers will be able to use the same test data for both programs. As detailed in the information collection request associated with this final rule (OMB #2060–0460), total annual reporting and recordkeeping costs for all affected entities is estimated to be $144,000.[36] Consequently, this program does not impose significant additional costs.

The emission reductions will reflect only reductions from engines that are currently in noncompliance with the Annex VI NO_X limits. For these reasons, the projected impacts of this rule are expected to be negligible (see Table VI–1). Accordingly, we have not calculated values to quantify the cost-effectiveness of the final rule.

TABLE VI–1.—CATEGORY 3 MARINE VESSEL NO_X NATIONAL EMISSION INVENTORIES

	1996	2010	2020	2030
No control baseline (thousand short tons)	190	303	439	659
EPA/MARPOL Annex VI:				
(Thousand short tons)	190	274	367	531
Percent reduction (relative to no control)	....	9.6	16.2	19.5

VII. The Blue Cruise Program

As described in Section VIII of the proposal, we are interested in developing a voluntary program to encourage ship owners and operators to reduce their air and waste emissions to minimize adverse environmental impacts. Under the envisioned program, a participant ship owner would be awarded a certain designation based on the combination of air and waste emission-control programs adopted. These technologies and systems could be different for new or existing vessels, but would be in addition to any equipment or systems they are already required to have. Qualifying ship owners could use the EPA designation on advertising materials (including the ship itself) to educate consumers and encourage them to choose their vessels.

We will continue the development of the Blue Cruise program separate from the emission-control programs for marine diesel engines. We intend to interact extensively with interested parties through public workshops and a proposal that we intend to publish in mid-2003. After consideration of the public comments we receive on that proposal, we will publish a final program.

VIII. Public Participation

A wide variety of interested parties participated in the rulemaking process that culminates with this final rule. This process provided opportunity for public comment following the proposal that we published May 29, 2002 (67 FR 37548). We considered these comments in developing the final rule.

We have prepared a detailed Summary and Analysis of Comments document, which describes the comments we received on the proposal and our response to each of these comments. The Summary and Analysis of Comments is available in the docket for this rule and on the Office of Transportation and Air Quality Internet home page at *http://www.epa.gov/otaq/marine.htm.*

[36] Note that manufacturers have already incurred most of these estimated compliance costs for meeting Annex VI standards. New costs related to the final rule will be much smaller.

IX. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

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 one 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.

EPA has determined that this rule is a ''significant regulatory action'' under the terms of Executive Order 12866 because it raises novel legal or policy issues due to the international nature of the use of Category 3 marine diesel engines and is therefore subject to OMB review. The Agency believes this regulation will result in none of the economic effects set forth in Section 1 of the Order. A Final Regulatory Support Document has been prepared and is available in the docket for this rulemaking and at the Internet address listed under **ADDRESSES** above. Written comments from OMB and responses from EPA to OMB are in the public docket for this rulemaking.

B. Paperwork Reduction Act

The Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*, requires agencies to submit for OMB review and approval any federal requirements and activities that result in the collection of information from ten or more persons. Information-collection requirements may include reporting, labeling, and recordkeeping requirements. Federal agencies may not impose penalties on persons who fail to comply with collections of information that do not display a currently valid OMB control number.

The information collection requirements in this final rule have been approved by OMB under the Paperwork Reduction Act. The OMB control number for this information collection is 2060–0460, which we sent to OMB under the EPA ICR number 1897.04. The information being collected will be used by EPA to ensure that new marine vessels and fuel systems comply with emission standards through certification requirements and various subsequent compliance provisions.

In addition, this notice announces OMB's approval of the information collection requirements for commercial marine diesel engine for which we adopted emission standards on December 29, 1999 (64 FR 73300) and for recreational marine diesel engines for which we adopted emission standards on November 8, 2002 (67 FR 68242). The estimated annual public reporting and recordkeeping burden for collecting information from these engines is shown in Table IX.B–1.

TABLE IX.B–1.—BURDEN COLLECTING INFORMATION FOR MARINE DIESEL EMISSION-CONTROL PROGRAMS

Engine type	Respondents	Hours per respondent	Hours for all respondents	Capital costs for all respondents	Operating and maintenance costs for all respondents	Total costs for all respondents
Category 3	6	302	1,812	$0	$67,104	$144,022
Commercial—Category 1 and 2	232	93	21,520	0	40,000	2,494,272
Recreational	12	606	7,273	0	870,238	1,178,061

The Information Collection Requests (ICR) were subject to public notice and comment prior to OMB approval and, as a result, EPA finds that there is ''good cause'' under section 553(b) of the Administrative Procedures Act (5 U.S.C. 553(b)) to include these information-collection requirements in 40 CFR part 9 without additional notice and comment. EPA received various comments on the rulemaking provisions covered by the ICRs, but no comments on the paperwork burden or other information in the ICRs. All comments that were submitted to EPA are considered in the relevant Summary and Analysis of Comments, which can be found in the docket. A copy of any of the submitted ICR documents may be obtained from Susan Auby, Collection Strategies Division, U.S. Environmental Protection Agency (2822–T), 1200 Pennsylvania Ave., NW., Washington, DC 20460 or by e-mail at *auby.susan@epamail.epa.gov.*

C. Regulatory Flexibility Act

EPA has determined that it is not necessary to prepare a regulatory flexibility analysis in connection with this final rule. EPA has also determined that this rule will not have a significant economic impact on a substantial number of small entities. For purposes of assessing the impacts of this rulemaking, ''small entity'' is defined as any one of the following: (1) A small business that meets the definition for businesses based on size standards adopted by the Small Business Administration; (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; or (3) a small organization that is any not-for-profit enterprise that is independently owned and operated and is not dominant in its field. The following Table X.B–1 provides an overview of the primary SBA small business categories that may be affected by this regulation.

TABLE X.B–1.—PRIMARY SBA SMALL BUSINESS CATEGORIES POTENTIALLY AFFECTED BY THIS REGULATION

Industry	NAICS [a]	Defined by SBA as a small business if: [b]
Internal Combustion Engines	333618	< 1000 employees
Ship Building	336611	< 1000 employees

TABLE X.B–1.—PRIMARY SBA SMALL BUSINESS CATEGORIES POTENTIALLY AFFECTED BY THIS REGULATION—Continued

Industry	NAICS [a]	Defined by SBA as a small business if: [b]
Water transportation, freight and passenger	483	< 500 employees

[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.

After considering the economic impacts of this rule on small entities, EPA has concluded that this action will not have a significant economic impact on a substantial number of small entities. This final rule will not impose any requirements on small entities. Our review of the list of manufacturers of Category 3 marine diesel engines indicates that there are no U.S. manufacturers of these engines that qualify as small businesses. We are unaware of any foreign manufacturers of such engines with a U.S.-based facility that qualify as a small business. In addition, this rule will not impose significant economic impacts on engine manufacturers. Engine manufacturers are already achieving the Tier 1 standards and our program will impose only negligible compliance costs. Our review of the U.S. shipyards that build ships that use Category 3 marine diesel engines indicates that there are no U.S. manufacturers of these ships that qualify as small businesses.

Ship operators must take minimal steps to comply with this final rule. This includes an obligation to do emission-related maintenance specified by the engine manufacturer. These costs are not expected to be greater than the costs of maintaining unregulated engines except to the extent that ship operators do not currently maintain engines as specified by the engine manufacturer. Maintenance costs are expected to be minimal, given the overall costs of maintaining all of the vessel's systems and structures. In addition, operators must record certain information related to operating and servicing their engines. For example, maintaining the ''record book of engine parameters'' and detailing the ship's location when servicing engines is generally already required under MARPOL Annex VI or is readily available as a matter of routine recordkeeping. Finally, we require owners of marine vessels with Category 3 engines to send minimal annual notification to EPA to state whether engine maintenance and adjustments have caused engines to be noncompliant.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 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 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.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments in the aggregate, or the private sector in any one year. According to our cost estimates, we estimate the aggregate costs (annualized over 20 years) of this rule to be negligible. This final rule is therefore not subject to the requirements of sections 202 and 205 of the UMRA.

E. Executive Order 13132: Federalism

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.''

This 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. This rule creates no mandates on State, local, or tribal governments. The rule imposes no enforceable duties on these entities, because they do not manufacture any engines that are subject to this rule. This rule will be implemented at the Federal level and impose compliance obligations only on private industry. Executive Order 13132 therefore does not apply to this rule.

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.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 6, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.''

This rule does not have tribal implications as specified in Executive Order 13175. This rule will be implemented at the Federal level and impose compliance costs only on engine manufacturers and shipbuilders. Tribal governments will be affected only to the extent they purchase and use vessels having regulated engines. Executive Order 13175 therefore does not apply to this rule.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

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 rule is not subject to Executive Order 13045 because it is not economically significant under the terms of Executive Order 12866.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

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 aim to reduce emissions from certain nonroad engines and have no effect on fuel formulation, distribution, or use.

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Pub. L. 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 rule involves technical standards for testing emissions from marine diesel engines. EPA is adopting test procedures contained in the MARPOL NO_X Technical Code, with the certain modifications as described in this document. The MARPOL NO_X Technical Code includes the International Standards Organization (ISO) duty cycle for marine diesel engines (E2, E3, D2, C1) and the American Society for Testing and Materials (ASTM) fuel standards.[37] These procedures are currently used by virtually all Category 3 engine manufacturers to demonstrate compliance with the Annex VI NO_X limits and to obtain Statements of Voluntary Compliance to those standards.

J. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States before the rule is published in the **Federal Register**. This rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

List of Subjects

40 CFR Part 9

Reporting and recordkeeping requirements.

40 CFR Part 94

Environmental protection, Administrative practice and procedure, Air pollution control, Confidential business information, Imports, Incorporation by reference, Penalties, Reporting and recordkeeping requirements, Vessels, Warranties.

Dated: January 31, 2003.

Christine Todd Whitman,

Administrator.

For the reasons set out in the preamble, title 40, chapter I of the Code of Federal Regulations is amended as set forth below.

PART 9—[AMENDED]

1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318, 1321, 1326, 1330, 1342, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

2. Section 9.1 is amended in the table by adding the center heading and the entries under that center heading in numerical order to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * *	
Control of Emissions From New and In-Use Marine Compression-Ignition Engines	
94.7–94.12	2060–0460.
94.101–94.109	2060–0460
94.203–94.222	2060–0460
94.303–94.310	2060–0460
94.403–94.408	2060–0460
94.508–94.509	2060–0460
94.804	2060–0460
94.904–94.911	2060–0460
* * * * *	

PART 94—CONTROL OF AIR POLLUTION FROM MARINE COMPRESSION-IGNITION ENGINES

1. The authority 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]

2. Section 94.1 is amended by revising paragraph (b) to read as follows:

§ 94.1 Applicability.

* * * * *

[37] The Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines in the Annex VI of MARPOL 73/78 Regulations for the Prevention of Air Pollution from Ships and NO_X Technical Code, International Maritime Organization. *See* footnote 1 regarding how to obtain copies of these documents.

(b) Notwithstanding the provision of paragraph (c) of this section, the requirements and prohibitions of this part do not apply with respect to the engines identified in paragraphs (a)(1) and (2) of this section where such engines are:

(1) Marine engines with rated power below 37 kW; or

(2) Marine engines on foreign vessels.

* * * * *

3. Section 94.2 is amended by adding, in alphabetical order, definitions to paragraph (b) for ''Annex VI Technical Code'', ''Brake-specific fuel consumption'', ''Hydrocarbon standard'', ''Maximum test speed'', ''Residual fuel'', ''Round'', ''Tier 1'', ''Vessel operator'', and ''Vessel owner'', and revising the definitions for ''Designated Officer'', ''Diesel fuel'', and ''New vessel'' 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:

Annex VI Technical Code means the ''Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines,'' adopted by the International Maritime Organization (incorporated by reference in § 94.5).

* * * * *

Brake-specific fuel consumption means the mass of fuel consumed by an engine during a test segment divided by the brake-power output of the engine during that same test segment.

* * * * *

Designated Officer means the Manager of the Engine Programs Group (6405–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., Washington, DC 20460.

* * * * *

Diesel fuel means any fuel suitable for use in diesel engines which is commonly or commercially known or sold as diesel fuel or marine distillate fuel.

* * * * *

Hydrocarbon standard means an emission standard for total hydrocarbons, nonmethane hydrocarbons, or total hydrocarbon equivalent; or a combined emission standard for NO_X and total hydrocarbons, nonmethane hydrocarbons, or total hydrocarbon equivalent.

* * * * *

Maximum test speed means the engine speed defined by § 94.107 to be the maximum engine speed to use during testing.

* * * * *

New vessel means:

(1)(i) A vessel, the equitable or legal title to which has never been transferred to an ultimate purchaser; or

(ii) For vessels with no Category 3 engines, a vessel that has been modified such that the value of the modifications exceeds 50 percent of the value of the modified vessel. The value of the modification is the difference in the assessed value of the vessel before the modification and the assessed value of the vessel after the modification. Use the following equation to determine if the fractional value of the modification exceeds 50 percent:

Percent of value = *[(Value after modification) − (Value before modification)]* × 100% (Value after modification)

(iii) For vessels with Category 3 engines, a vessel that has undergone a modification, which:

(A) Substantially alters the dimensions or carrying capacity of the vessel; or

(2) Changes the type of vessel; or

(3) Substantially prolongs the vessel's life.

(2) Where the equitable or legal title to a vessel is not transferred to an ultimate purchaser prior to its being placed into service, the vessel ceases to be new when it is placed into service.

* * * * *

Residual fuel means a petroleum product containing the heavier compounds that remain after the distillate fuel oils (*e.g.*, diesel fuel and marine distillate fuel) and lighter hydrocarbons are distilled away in refinery operations.

Round means to round numbers according to ASTM E29–02 (incorporated by reference in § 94.5), unless otherwise specified.

* * * * *

Tier 1 means relating to an engine subject to the Tier 1 emission standards listed in § 94.8.

* * * * *

Vessel operator means any individual that physically operates or maintains a vessel, or exercises managerial control over the operation of the vessel.

Vessel owner means the individual or company that holds legal title to a vessel.

* * * * *

4. Section 94.5 is revised to read as follows:

§ 94.5 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 the U.S. EPA, Air and Radiation Docket and Information Center, 1301 Constitution Ave., NW., Room B102, EPA West Building, Washington, DC 20460 or the Office of the Federal Register, 800 N. Capitol St., NW., 7th Floor, Suite 700, Washington, DC.

(a) *ASTM material.* Table 1 of § 94.5 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. Anyone may purchase copies of these materials from the American Society for Testing and Materials, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428. Table 1 follows:

TABLE 1 OF § 94.5.—ASTM MATERIALS

Document No. and name	Part 94 reference
ASTM D 86–01, Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure	94.108
ASTM D 93–02, Standard Test Methods for Flash-Point by Pensky-Martens Closed Cup Tester	94.108
ASTM D 129–00, Standard Test Method for Sulfur in Petroleum Products (General Bomb Method)	94.108
ASTM D 287–92 (Reapproved 2000), Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method).	94.108
ASTM D 445–01, Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity).	94.108
ASTM D 613–01, Standard Test Method for Cetane Number of Diesel Fuel Oil	94.108
ASTM D 1319–02a, Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption.	94.108

TABLE 1 OF § 94.5.—ASTM MATERIALS—Continued

Document No. and name	Part 94 reference
ASTM D 2622–98, Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry.	94.108
ASTM D 5186–99, Standard Test Method for Determination of the Aromatic Content and Polynuclear Aromatic Content of Diesel Fuels and Aviation Turbine Fuels by Supercritical Fluid Chromatography.	94.108
ASTM E 29–02, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.	94.2

(b) *ISO material.* Table 2 of § 94.5 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. Anyone may purchase copies of these materials from the International Organization for Standardization, Case Postale 56, CH–1211 Geneva 20, Switzerland.

Table 2 follows:

TABLE 2 OF § 94.5.—ISO MATERIALS

Document No. and name	40 CFR part 94 reference
ISO 8178–1, Reciprocating internal combustion engines—Exhaust emission measurement—Part 1: Test-bed measurement of gaseous and particulate exhaust emissions, 1996.	94.109

(c) *IMO material.* Table 3 of § 94.5 lists material from the International Maritime Organization 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. Anyone may purchase copies of these materials from the International Maritime Organization, 4 Albert Embankment, London SE1 7SR, United Kingdom.

Table 3 follows:

TABLE 3 OF § 94.5.—IMO MATERIALS

Document No. and name	40 CFR part 94 reference
Resolution 2—Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines, 1997.	94.2, 94.11, 94.108, 94.109, 94.204, 94.211, 94.1004.

5. Section 94.7 is amended by revising paragraph (d) to read as follows:

§ 94.7 General standards and requirements.

* * * * *

(d) Manufacturers shall ensure that all engines subject to the emission standards of this part are equipped with a connection in the engine exhaust system that is located downstream of the engine and before any point at which the exhaust contacts water (or any other cooling/scrubbing medium) for the temporary attachment of gaseous and/or particulate emission sampling equipment. Use good engineering judgment to locate the connection. This connection shall be internally threaded with standard pipe threads of a size not larger than one-half inch, and shall be closed by a pipe-plug when not in use. Equivalent connections are allowed. Engine manufacturers may comply with this requirement by providing vessel manufacturers with clear instructions explaining how to meet this requirement, and noting in the instructions that failure to comply may subject the vessel manufacturer to federal penalties. Vessel manufacturers are required to comply with the engine manufacturer's instructions.

* * * * *

6. Section 94.8 is amended by revising paragraphs (a), (c), (d), (e), (f), and (g) to read as follows:

§ 94.8 Exhaust emission standards.

(a) The Tier 1 standards of paragraph (a)(1) of this section apply until replaced by the standards of paragraph (a)(2) of this section.

(1) *Tier 1 standards.* NO_X emissions from model year 2004 and later engines with displacement of 2.5 or more liters per cylinder may not exceed the following values:

(i) 17.0 g/kW-hr when maximum test speed is less than 130 rpm.

(ii) $45.0 \times N^{-0.20}$ when maximum test speed is at least 130 but less than 2000 rpm, where N is the maximum test speed of the engine in revolutions per minute.

(**Note:** Round speed-dependent standards to the nearest 0.1 g/kW-hr.)

(iii) 9.8 g/kW-hr when maximum test speed is 2000 rpm or more.

(2) *Tier 2 standards.* (i) Exhaust emissions from marine compression-ignition engines shall not exceed the applicable Tier 2 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 [1]	$THC+NO_X$ g/kW-hr	CO g/kW-hr	PM g/kW-hr
disp. < 0.9 and power ≥ 37 kW	Category 1	2005	7.5	5.0	0.40
0.9 ≤ disp. < 1.2, all power levels	Category 1	2004	7.2	5.0	0.30
1.2 ≤ disp. < 2.5, all power levels	Category 1	2004	7.2	5.0	0.20
2.5 ≤ disp. < 5.0, all power levels	Category 1	2007	7.2	5.0	0.20

TABLE A–1.—PRIMARY TIER 2 EXHAUST EMISSION STANDARDS (G/KW-HR)—Continued

Engine size liters/cylinder, rated power	Category	Model year [1]	$THC+NO_X$ g/kW-hr	CO g/kW-hr	PM g/kW-hr
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	2007	9.8	5.0	0.50
25.0 ≤ disp. < 30.0, all power levels	Category 2	2007	11.0	5.0	0.50
disp. ≥ 30.0, all power levels	Category 3	2007	See paragraph (a)(2)(ii) of this section.		

[1] The model years listed indicate the model years for which the specified standards start.

(ii) EPA has not finalized Tier 2 standards for Category 3 engines. EPA will promulgate final Tier 2 standards for Category 3 engines on or before April 27, 2007.

* * * * *

(c) In lieu of the $THC+NO_X$ standards, and PM standards specified in paragraph (a) of this section, manufacturers may elect to include engine families in the averaging, banking, and trading program, the provisions of which are specified in subpart D of this part. The manufacturer shall then set a family emission limit (FEL) which will serve as the standard for that engine family. The ABT provisions of subpart D of this part do not apply for Category 3 engines.

(d)(1) Naturally aspirated engines subject to the standards of this section shall not discharge crankcase emissions into the ambient atmosphere.

(2) For engines using turbochargers, pumps, blowers, or superchargers for air induction, if the engine discharges crankcase emissions into the ambient atmosphere in use, these crankcase emissions shall be included in all exhaust emission measurements. This requirement applies only for engines subject to hydrocarbon standards (*e.g.*, THC standards, NMHC standards, or $THC+NO_X$ standards).

(3) The crankcase requirements of this paragraph (d) do not apply for Tier 1 engines.

(e)(1) For Category 1 and Category 2 engines, exhaust emissions from propulsion engines subject to the standards (or FELs) in paragraph (a), (c), or (f) of this section shall not exceed:

(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; or

(ii) 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.

(2) [Reserved]

(f) The following define the requirements for low-emitting Blue Sky Series engines:

(1) *Voluntary standards.* (i) Category 1 and Category 2 engines may be designated ‘‘Blue Sky Series’’ engines by meeting the voluntary standards listed in Table A–2, which apply to all certification and in-use testing:

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

(ii) Category 3 engines may be designated ‘‘Blue Sky Series’’ engines by meeting these voluntary standards that would apply to all certification and in-use testing:

(A) A NO_X standard of $9.0 \times N^{-0.20}$ where N = the maximum test speed of the engine in revolutions per minute (or 4.8 g/kW–hr for engines with maximum test speeds less than 130 rpm). (**Note:** Round speed-dependent standards to the nearest 0.1 g/kW–hr.)

(B) An HC standard of 0.4 g/kW–hr.

(C) A CO standard of 3.0 g/kW–hr.

(2) *Additional standards.* Blue Sky Series engines are subject to all provisions that would otherwise apply under this part.

(3) *Test procedures.* Manufacturers may use an alternate procedure to demonstrate the desired level of emission control if approved in advance by the Administrator.

(g) Standards for alternative fuels. The standards described in this section apply to compression-ignition engines, irrespective of fuel, with the following two exceptions for Category 1 and Category 2 engines:

(1) Engines fueled with natural gas shall comply with $NMHC+NO_X$ standards that are numerically equivalent to the $THC+NO_X$ described in paragraph (a) of this section; and

(2) Engines fueled with alcohol fuel shall comply with $THCE+NO_X$ standards that are numerically equivalent to the $THC+NO_X$ described in paragraph (a) of this section.

7. Section 94.9 is amended by revising paragraphs (a)(1), (b)(1) and (b)(2) to read as follows:

§ 94.9 Compliance with emission standards.

(a) * * *

(1) The minimum useful life is 10 years or 10,000 hours of operation for Category 1, 10 years or 20,000 hours of operation for Category 2, and 3 years or

10,000 hours of operation for Category 3.

* * * * *

(b) * * *

(1) Compliance with the applicable emission standards by an engine family shall be demonstrated by the certifying manufacturer before a certificate of conformity may be issued under § 94.208. Manufacturers shall demonstrate compliance using emission data, measured using the procedures specified in Subpart B of this part, from a low hour engine. A development engine that is equivalent in design to the marine engines being certified may be used for Category 2 or Category 3 certification.

(2) The emission values to compare with the standards shall be the emission values of a low hour engine, or a development engine, adjusted by the deterioration factors developed in accordance with the provisions of § 94.219. Before comparing any emission value with the standard, round it to the same number of significant figures contained in the applicable standard.

* * * * *

8. Section 94.10 is amended by revising paragraph (a) to read as follows:

§ 94.10 Warranty period.

(a)(1) Warranties imposed by § 94.1107 for Category 1 or Category 2 engines shall apply for a period of operating hours equal to at least 50 percent of the useful life in operating hours or a period of years equal to at least 50 percent of the useful life in years, whichever comes first.

(2) Warranties imposed by § 94.1107 for Category 3 engines shall apply for a period of operating hours equal to at least the full useful life in operating hours or a period of years equal to at least the full useful life in years, whichever comes first.

* * * * *

9. Section 94.11 is amended by adding paragraph (g) to read as follows:

§ 94.11 Requirements for rebuilding certified engines.

* * * * *

(g) For Category 3 engines, the owner and operator shall also comply with the recordkeeping requirements in the Annex VI Technical Code (incorporated by reference at § 94.5) regarding the Engine Book of Record Parameters.

10. Section 94.12 is amended by revising the introductory text and adding 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 supercede the other provisions of this part. The provisions of this section do not apply for Category 3 engines.

* * * * *

(f) Manufacturers may submit test data collected using the Annex VI test procedures to show compliance with Tier 1 standards for model years before 2007. Note: Starting in 2007, EPA may approve a manufacturer's request to continue using alternate procedures under § 94.102(c), as long as the manufacturer satisfies EPA that the differences in testing will not affect NO_X emission rates.

Subpart B—[Amended]

11. Section 94.106 is amended by revising the section heading and introductory text to read as follows:

§ 94.106 Supplemental test procedures for Category 1 and Category 2 marine engines.

This section describes the test procedures for supplemental testing conducted to determine compliance with the exhaust emission requirements of § 94.8(e)(1). In general, the supplemental test procedures are the same as those otherwise specified by this subpart, except that they cover any speeds, loads, ambient conditions, and operating parameters that may be experienced in use. The test procedures specified by other sections in this subpart also apply to these tests, except as specified in this section.

* * * * *

12. Section 94.107 is amended by revising paragraph (a) and adding paragraph (f) to read as follows:

§ 94.107 Determination of maximum test speed.

(a) *Overview.* This section specifies how to determine maximum test speed from a lug curve. This maximum test speed is used in §§ 94.105, 94.106, and § 94.109 (including the tolerances for engine speed specified in § 94.105).

* * * * *

(f) For Category 3 engines, manufacturers may choose to set the maximum test speed at the maximum in-use engine speed instead of the speed specified in § 94.107(d).

13. Section 94.108 is amended by revising paragraphs (a)(1), (b), and (d)(1) and adding paragraph (e) to read as follows:

§ 94.108 Test fuels.

(a) *Distillate diesel test fuel.* (1) The diesel fuels for testing Category 1 and Category 2 marine engines designed to operate on distillate diesel fuel shall be clean and bright, with pour and cloud points adequate for operability. The diesel fuel may contain nonmetallic additives as follows: cetane improver, metal deactivator, antioxidant, dehazer, antirust, pour depressant, dye, dispersant, and biocide. The diesel fuel shall also meet the specifications (as determined using methods incorporated by reference at § 94.5) in Table B–5 of this section, or substantially equivalent specifications approved by the Administrator, as follows:

TABLE B–5.—FEDERAL TEST FUEL SPECIFICATIONS

Item	Procedure [1]	Value
Cetane	ASTM D 613–01	40–48
Distillation Range:		
Initial boiling point, °C	ASTM D 86–01	171–204
10% point, °C	ASTM D 86–01	204–238
50% point, °C	ASTM D 86–01	243–282
90% point, °C	ASTM D 86–01	293–332
End point, °C	ASTM D 86–01	321–366
Flashpoint, °C	ASTM D 93–02	54 minimum
Gravity, API	ASTM D 287–92	32–37
Hydrocarbon composition:		
Aromatics, volume percent	ASTM D 1319–02a or D 5186–99	10 minimum
Olefins and Saturates (paraffins and napththenes)	ASTM D 1319–02a	Remainder
Total Sulfur, weight percent	ASTM D 129–00 or D 2622–98	0.03—0.80

TABLE B–5.—FEDERAL TEST FUEL SPECIFICATIONS—Continued

Item	Procedure [1]	Value
Viscosity at 38 °C, centistokes	ASTM D 445–01	2.0–3.2

[1] All ASTM standards are incorporated by reference in § 94.5.

* * * * *

(b) *Other fuel types.* For Category 1 and Category 2 engines that are designed to be capable of using a type of fuel (or mixed fuel) instead of or in addition to distillate diesel fuel (*e.g.*, natural gas, methanol, or nondistillate diesel), and that are expected to use that type of fuel (or mixed fuel) in service:

(1) A commercially available fuel of that type shall be used for exhaust emission testing. The manufacturer shall propose for the Administrator's approval a set of test fuel specifications that take into account the engine design and the properties of commercially available fuels. The Administrator may require testing on each fuel if it is designed to operate on more than one fuel. These test fuel specifications shall be reported in the application for certification.

(2) [Reserved]

* * * * *

(d) *Correction for sulfur.* (1) Particulate emission measurements from Category 1 or Category 2 engines without exhaust aftertreatment obtained using a diesel fuel containing more than 0.40 weight percent sulfur may be adjusted to a sulfur content of 0.40 weight percent.

* * * * *

(e) *Test fuel for Category 3 engines.* For testing Tier 1 engines, use test fuels meeting the specifications listed in the Annex VI Technical Code (incorporated by reference in § 94.5).

14. A new § 94.109 is added to read as follows:

§ 94.109 Test procedures for Category 3 marine engines.

(a) Gaseous emissions shall be measured using the test cycles and procedures specified by Section 5 of the Annex VI Technical Code (incorporated by reference in § 94.5), except as otherwise specified in this paragraph (a).

(1) The inlet air and exhaust restrictions shall be set at the average in-use levels.

(2) Measurements are valid only for sampling periods in which the temperature of the charge air entering the engine is within 3°C of the temperature that would occur in-use under ambient conditions (temperature, pressure, and humidity) identical to the test conditions. You may measure emissions within larger discrepancies, but you may not use those measurements to demonstrate compliance.

(3) Engine coolant and engine oil temperatures shall be equivalent to the temperatures that would occur in-use under ambient conditions identical to the test conditions.

(4) Exhaust flow rates shall be calculated using measured fuel flow rates.

(5) Standards used for calibration shall be traceable to NIST standards. (Other national standards may be used if they have been shown to be equivalent to NIST standards.)

(6) Certification tests may be performed at any representative pressure and humidity levels. Certification tests may be performed at any ambient air temperature from 13°C to 30°C and any charge air cooling water temperature from 17°C to 27°C. These limits apply instead of the limits specified in section 5.2.1 of the Annex VI Technical Code. Correct emissions for test conditions using the corrections specified in section 5.12.3 of the Annex VI Technical Code.

(7) Test cycles shall be denormalized based on the maximum test speed described in § 94.107.

(b) Analyzers meeting the specifications of either 40 CFR part 86, subpart N, or ISO 8178–1 (incorporated by reference in § 94.5) shall be used to measure THC and CO.

(c) The Administrator may specify changes to the provisions of paragraph (a) of this section that are necessary to comply with the general provisions of § 94.102.

Subpart C—[Amended]

15. Section 94.203 is amended by revising paragraph (d)(14) to read as follows:

§ 94.203 Application for certification.

* * * * *

(d) * * *

(14) (i) For Category 1 and Category 2 engines, a statement that the 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.

(ii) [Reserved]

* * * * *

16. Section 94.204 is amended by adding paragraph (f) to read as follows:

§ 94.204 Designation of engine families.

* * * * *

(f) Category 3 engines shall be grouped into engine families based on the criteria specified in Section 4.3 of the Annex VI Technical Code (incorporated by reference in § 94.5), except as allowed in paragraphs (d) and (e) of this section.

17. Section 94.205 is amended by revising paragraph (b) and adding paragraphs (e) and (f) to read as follows:

§ 94.205 Prohibited controls, adjustable parameters.

* * * * *

(b)(1) Category 1 marine engines equipped with adjustable parameters must comply with all requirements of this subpart for any adjustment in the physically adjustable range.

(2) Category 2 and Category 3 marine engines equipped with adjustable parameters must comply with all requirements of this subpart for any adjustment in the approved adjustable range.

* * * * *

(e) Tier 1 Category 3 marine engines shall be adjusted according to the manufacturer's specifications for testing.

(f) For Category 3 marine engines, manufacturers must specify in the maintenance instructions how to adjust the engines to achieve emission performance equivalent to the performance demonstrated under the certification test conditions. This must address all necessary adjustments, including those required to address differences in fuel quality or ambient temperatures. For example, equivalent emissions performance can be measured relative to optimal engine performance that could be achieved in the absence of emission standards (*i.e.*, the calibration that result in the lowest fuel consumption and/or maximum firing pressure). In this example, adjustments that achieved the same percent reduction in NO_X emissions from the optimal calibration would be considered to be equivalent. Alternatively, if the engine uses injection timing retard and EGR to reduce emissions, then retarding timing the same number of degrees (relative to optimal engine performance) and using the same rate of EGR at the different conditions would be considered to be equivalent.

18. Section 94.209 is amended by adding introductory text to the section to read as follows:

§ 94.209 Special provisions for post-manufacture marinizers.

The provisions of this section apply for Category 1 and Category 2 engines, but not for Category 3 engines.

* * * * *

19. Section 94.211 is amended by adding paragraphs (a)(3), (e)(2)(iii), (k) and (l) and revising paragraphs (h) introductory text, and (j)(2) introductory text to read as follows:

§ 94.211 Emission-related maintenance instructions for purchasers.

(a) * * *

(3) For Category 3 engines, the manufacturer must provide in boldface type on the first page of the written maintenance instructions notice that § 94.1004 requires that the emissions-related maintenance be performed as specified in the instructions (or equivalent).

* * * * *

(e) * * *

(2) * * *

(iii) The maintenance intervals listed in paragraphs (e)(3) and (e)(4) of this section do not apply for Category 3.

* * * * *

(h) For Category 1 and Category 2 engines, equipment, instruments, or tools may not be used to identify malfunctioning, maladjusted, or defective engine components unless the same or equivalent equipment, instruments, or tools will be available to dealerships and other service outlets and are:

* * * * *

(j) * * *

(2) All critical emission-related scheduled maintenance must have a reasonable likelihood of being performed in use. For Category 1 and Category 2 engines, the manufacturer must show the reasonable likelihood of such maintenance being performed in-use. Critical emission-related scheduled maintenance items which satisfy one of the conditions defined in paragraphs (j)(2)(i) through (j)(2)(vi) of this section will be accepted as having a reasonable likelihood of being performed in use.

(k) For engines with rated power greater than 130 kW, the manufacturer must provide the ultimate purchaser with a Technical File meeting the specifications of section 2.4 of the AnnexVI Technical Code (incorporated by reference in § 94.5). The maintenance instructions required by this part to be provided by manufacturer may be included in this Technical File. The manufacturer must provide a copy of this Technical File to EPA upon request.

(l) Owners and operators of Category 3 engines shall transfer the maintenance instructions to subsequent owners and operators of the engine upon sale or transfer of the engine or vessel.

20. Section 94.214 is revised to read as follows:

§ 94.214 Production engines.

Any manufacturer obtaining certification under this part shall supply to the Administrator, upon his/her request, a reasonable number of production engines, as specified by the Administrator. The engines shall be representative of the engines, emission control systems, and fuel systems offered and typical of production engines available for sale or use under the certificate. These engines shall be supplied for testing at such time and place and for such reasonable periods as the Administrator may require. This requirement does not apply for Category 3 engines. Manufacturers of Category 3 engines, however, must allow EPA access to test engines and development engines to the extent necessary to determine that the engine family is in full compliance with the applicable requirements of this part.

21. Section 94.217 is amended by adding paragraph (f) to read as follows:

§ 94.217 Emission data engine selection.

* * * * *

(f) A single cylinder test engine may be used for certification of Tier 1 Category 3 engine families. If you use test data from a single cylinder test engine for certification, explain in your application how you have determined that such data show that the multiple cylinder production engines will comply with the applicable emission standards.

22. Section 94.218 is amended by revising paragraphs (c) and (d)(1) to read as follows:

§ 94.218 Deterioration factor determination.

* * * * *

(c) *Rounding.* (1) In the case of a multiplicative exhaust emission deterioration factor, round the factor to three places to the right of the decimal point.

(2) In the case of an additive exhaust emission deterioration factor, round the factor shall to at least two places to the right of the decimal point.

(d)(1) Except as allowed by paragraph (d)(2) of this section, the manufacturer shall determine the deterioration factors for Category 1 and Category 2 engines based on service accumulation and related testing, according to the manufacturer's procedures, and the provisions of §§ 94.219 and 94.220. The manufacturer shall determine the form and extent of this service accumulation, consistent with good engineering practice, and shall describe this process in the application for certification.

* * * * *

23. Section 94.219 is amended by revising paragraph (a) to read as follows:

§ 94.219 Durability data engine selection.

(a) For Category 1 and Category 2 engines, the manufacturer shall select for durability testing, from each engine family, the engine configuration which is expected to generate the highest level of exhaust emission deterioration on engines in use, considering all exhaust emission constituents and the range of installation options available to vessel builders. The manufacturer shall use good engineering judgment in making this selection.

* * * * *

Subpart D—[Amended]

24. Section 94.305 is amended by revising paragraph (a) to read as follows:

§ 94.305 Credit generation and use calculation.

(a) For each participating engine family, calculate $THC+NO_X$ and PM emission credits (positive or negative) according to the equation in paragraph (b) of this section and round emissions to the nearest one-hundredth of a megagram (Mg). Use consistent units throughout the calculation.

* * * * *

Subpart E—[Amended]

24. Section 94.403 is amended by revising paragraph (a) to read as follows:

§ 94.403 Emission defect information report.

(a) A manufacturer must file a defect information report whenever it determines, in accordance with procedures it established to identify either safety-related or performance defects (or based on other information), that a specific emission-related defect exists in 25 or more Category 1 marine engines, or 10 or more Category 2 marine engines, or 2 or more Category 3 engines or cylinders. No report must be filed under this paragraph for any emission-related defect corrected prior to the sale of the affected engines to an ultimate purchaser. (Note: These limits apply to the occurrence of the same defect, and are not constrained by engine family or model year.)

* * * * *

Subpart F—[Amended]

25. Section 94.503 is amended by revising paragraphs (a) and (b) to read as follows:

§ 94.503 General requirements.

(a) For Tier 2 and later Category 1 and Category 2 engines, manufacturers shall test production line engines in accordance with sampling procedures specified in § 94.505 and the test procedures specified in § 94.506. The production-line testing requirements of this part do not apply for other engines.

(b) Upon request, the Administrator may also allow manufacturers to conduct alternate production line testing programs for Category 1 and Category 2 engines, provided the Administrator determines that the alternate production line testing program provides equivalent assurance that the engines that are being produced conform to the provisions of this part. As part of this allowance or for other reasons, the Administrator may waive some or all of the requirements of this subpart.

* * * * *

26. Section 94.505 is amended by revising paragraph (a) introductory text to read as follows:

§ 94.505 Sample selection for testing.

(a) At the start of each model year, the manufacturer will begin to select engines from each Category 1 and Category 2 engine family for production line testing. Each engine will be selected from the end of the production line. Testing shall be performed throughout the entire model year to the extent possible. Engines selected shall cover the broadest range of production possible.

* * * * *

27. Section 94.507 is amended by revising paragraph (a) to read as follows:

§ 94.507 Sequence of testing.

(a) If one or more Category 1 or Category 2 engines fail a production line test, then the manufacturer must test two additional engines for each engine that fails.

* * * * *

28. Section 94.508 is amended by revising paragraphs (a), (b), (c), (d), and (e) introductory text to read as follows:

§ 94.508 Calculation and reporting of test results.

* * * * *

(a) Manufacturers shall calculate initial test results using the applicable test procedure specified in § 94.506(a). These results must also include the Green Engine Factor, if applicable. Round these results to the number of decimal places contained in the applicable emission standard expressed to one additional significant figure.

(b) To calculate test results, sum the initial test results derived in paragraph (a) of this section for each test engine, divide by the number of tests conducted on the engine, and round to the same number of decimal places contained in the applicable standard expressed to one additional decimal place. (For example, if the applicable standard is 7.8, then round the test results to two places to the right of the decimal.)

(c) To calculate the final test results for each test engine, apply the appropriate deterioration factors, derived in the certification process for the engine family, to the test results described in paragraph (b) of this section; round to the same number of decimal places contained in the applicable standard expressed to one additional decimal place. (For example, if the applicable standard is 7.8, then round the test results to two places to the right of the decimal.)

(d) (1) If, subsequent to an initial failure of a Category 1 or Category 2 production line test, the average of the test results for the failed engine and the two additional engines tested, is greater than any applicable emission standard or FEL, the engine family is deemed to be in non-compliance with applicable emission standards, and the manufacturer must notify the Administrator within 2 working days of such noncompliance.

(2) [Reserved]

(e) Within 30 calendar days of the end of each quarter in which production line testing occurs, each manufacturer must submit to the Administrator a report which includes the following information:

* * * * *

29. Section 94.510 is amended by revising paragraph (b) to read as follows:

§ 94.510 Compliance with criteria for production line testing.

* * * * *

(b) A Category 1 or Category 2 engine family is deemed to be in noncompliance, for purposes of this subpart, if at any time throughout the model year, the average of an initial failed engine and the two additional engines tested, is greater than any applicable emission standard or FEL.

Subpart I—[Amended]

30. Section 94.801 is amended by revising paragraph (b) to read as follows:

§ 94.801 Applicability.

* * * * *

(b) Regulations prescribing further procedures for the importation of engines into the Customs territory of the United States are set forth in U.S. Customs Service regulations (19 CFR chapter I).

Subpart J—[Amended]

§ 94.904 [Amended]

31. Section 94.904 is amended by removing paragraph (b)(7).

32. Section 94.906 is amended by revising the section heading and removing paragraph (d) to read as follows:

§ 94.906 Manufacturer-owned exemption, display exemption, and competition exemption.

* * * * *

33. Section 94.907 is amended by revising paragraph (d), introductory text, to read as follows:

§ 94.907 Engine dressing exemption.

* * * * *

(d) New Category 1 and Category 2 marine engines that meet all the following criteria are exempt under this section:

* * * * *

34. Subpart K, consisting of §§ 94.1001, 94.1002, 94.1003, and 94.1004, is added to read as follows:

Subpart K—Requirements Applicable to Vessel Manufacturers, Owners, and Operators

Sec.
94.1001 Applicability.
94.1002 Definitions.
94.1003 Production testing, in-use testing, and inspections.
94.1004 Maintenance, repair adjustment, and recordkeeping.

Subpart K—Requirements Applicable to Vessel Manufacturers, Owners, and Operators

§ 94.1001 Applicability.

The requirements of this subpart are applicable to manufacturers, owners, and operators of marine vessels that contain Category 3 engines subject to the provisions of subpart A of this part, except as otherwise specified.

§ 94.1002 Definitions.

The definitions of subpart A of this part apply to this subpart.

§ 94.1003 Production testing, in-use testing, and inspections.

(a) [Reserved]

(b) [Reserved]

(c) Manufacturers, owners and operators must allow emission tests and inspections to be conducted and must provide reasonable assistance to perform such tests or inspections.

§ 94.1004 Maintenance, repair, adjustment, and recordkeeping.

(a) Unless otherwise approved by the Administrator, all owners and operators of Category 3 engines subject to the provisions of this part shall ensure that all emission-related maintenance is performed, as specified in the maintenance instructions provided by the certifying manufacturer in compliance with § 94.211.

(b) Unless otherwise approved by the Administrator, all maintenance, repair, adjustment, and alteration of engines subject to the provisions of this part performed by any owner, operator or other maintenance provider that is not covered by paragraph (a) of this section shall be performed, using good engineering judgment, in such a manner that the engine continues (after the maintenance, repair, adjustment or alteration) to meet the emission standards it was certified as meeting prior to the need for service. Adjustments are limited to the range specified by the engine manufacturer in the approved application for certification.

(c) An engine may not be adjusted or altered contrary to the requirements of § 94.11 or § 94.1004(b), except as allowed by § 94.1103(b)(2). If such an adjustment or alteration occurs, the engine must be returned to a configuration allowed by this part within two hours of operation. Each two-hour period during which there is noncompliance is a separate violation. The following provisions apply to adjustments or alterations made under § 94.1103(b)(2):

(1) In the case of an engine that is adjusted or altered under § 94.1103(b)(2)(i), there is no violation under this paragraph (c) for engine operation before completion of the repair or replacement procedure. The provisions of paragraph (c) introductory text apply to all operation following completion of the repair or replacement procedure.

(2) In the case of an engine that is adjusted or altered under § 94.1103(b)(2)(ii), there is no violation under this paragraph (c) if the engine operates for less than two hours following the conclusion of the emergency that prompted the adjustment or alteration before the emission-control system is restored to proper functioning. The provisions of paragraph (c) introductory text apply to all operation that occurs after this two-hour period.

(d) The owner and operator of the engine shall maintain on board the vessel records of all maintenance, repair, and adjustment that could reasonably affect the emission performance of any Category 3 engine subject to the provision of this part. Owners and operators shall also maintain, on board the vessel, records regarding certification, parameter adjustment, and fuels used. For engines that are automatically adjusted electronically, all adjustments must be logged automatically. Owners and operators shall make these records available to EPA upon request. These records must include the following:

(1) [Reserved]

(2) The Technical File, Record Book of Engine Parameters, and bunker delivery notes that are required by the Annex VI Technical Code (incorporated by reference in § 94.5).

(3) Specific descriptions of engine maintenance, repair, adjustment, and alteration (including rebuilding). The descriptions must include at least the date, time, and nature of the maintenance, repair, adjustment, or alteration and the position of the vessel when the maintenance, repair, adjustment, or alteration was made.

(4) Emission-related maintenance instructions provided by the manufacturer.

(e) For each marine vessel containing a Category 3 engine, the owner shall annually review the vessel's records and submit to EPA a signed statement certifying compliance during the preceding year with the requirements of this part that are applicable to owners and operators of such vessels. Alternately, if review of the vessel's records indicates that there has been one or more violations of the requirements of this part, the owner shall submit to EPA a signed statement specifying the noncompliance, including the nature of the noncompliance, the time of the noncompliance, and any efforts made to remedy the noncompliance. The statement of compliance (or noncompliance) required by this paragraph shall be signed by the executive with responsibility for marine activities of the owner. If the vessel is operated by a different business entity than the vessel owner, the reporting requirements of this paragraph (e) apply to both the owner and the operator. Compliance with these review and certification requirements by either the vessel owner or the vessel operator with respect to a compliance statement will be considered compliance with these requirements by both of these parties for that compliance statement. The executive(s) may authorize a captain or other primary operator to conduct this review and submit the certification, provided that the certification statement is accompanied by written authorization for that individual to submit such statements. The Administrator may waive the requirements of this paragraph when equivalent assurance of compliance is otherwise available.

Subpart L—[Amended]

35. Section 94.1103 is amended by adding paragraphs (a)(2)(v), (a)(2)(vi), and (a)(7) and by revising paragraph (a)(3)(i) to read as follows:

§ 94.1103 Prohibited acts.

(a) * * *

(2) * * *

(v) For an owner or operator of a vessel using a Category 3 engine to refuse to allow the in-use testing described in § 94.1003 to be performed.

(vi) For a manufacturer, owner or operator of a Category 3 engine to fail to provide maintenance instructions as required by § 94.211.

(3)(i) For a person to remove or render inoperative a device or element of design installed on or in a engine in compliance with regulations under this part, or to set any adjustable parameter to a setting outside of the range specified by the manufacturer, as approved in the application for certification by the Administrator (except as allowed by §§ 94.1003 and 94.1004).

* * * * *

(7)(i) For an owner or operator of a vessel using a Category 3 engine to fail or refuse to ensure that an engine is properly adjusted as set forth in § 94.1004.

(ii) For an owner or operator of a vessel using a Category 3 to fail to maintain or repair an engine as set forth in § 94.1004.

(iii) For an owner or operator of a vessel using a Category 3 engine to operate an engine in violation of the requirements of § 94.1004(c).

(iv) For an owner or operator of a vessel using a Category 3 engine to fail to comply with any applicable provision in this part for recordkeeping, reporting, or submission of information to EPA, including the annual certification requirements of § 94.1004.

* * * * *

36. Section 94.1106 is amended by adding introductory text, revising paragraphs (a) and (c)(1), and adding paragraph (d) to read as follows:

§ 94.1106 Penalties.

This section specifies actions that are prohibited and the maximum civil penalties that we can assess for each violation. The maximum penalty values listed in paragraphs (a) and (c) of this section are shown for calendar year 2002. As described in paragraph (d) of this section, maximum penalty limits for later years are set forth in 40 CFR part 19.

(a) *Violations.* A violation of the requirements of this subpart is a violation of the applicable provisions of the Act, including sections 213(d) and 203, and is subject to the penalty provisions thereunder.

(1) A person who violates § 94.1103(a)(1), (a)(4), (a)(5), (a)(6), or (a)(7)(iv) or a manufacturer or dealer who violates § 94.1103(a)(3) (i) or (iii) or § 94.1103(a)(7) is subject to a civil penalty of not more than $31,500 for each violation.

(2) A person other than a manufacturer or dealer who violates § 94.1103(a)(3) (i) or (iii) or § 94.1103(a)(7) (i), (ii), or (iii) or any person who violates § 94.1103(a)(3)(ii) is subject to a civil penalty of not more than $3,150 for each violation.

(3) A violation with respect to § 94.1103(a)(1), (a)(3)(i), (a)(3)(iii), (a)(4), or (a)(5), (a)(7) constitutes a separate offense with respect to each engine.

(4) A violation with respect to § 94.1103(a)(3)(ii) constitutes a separate offense with respect to each part or component. Each day of a violation with respect to § 94.1103(a)(5) or (a)(7)(iv) constitutes a separate offense.

(5) Each two hour period of a violation with respect to § 94.1103(a)(7)(iii) constitutes a separate offense. A violation of § 94.1103(a)(7)(iii) lasting less than two hours constitutes a single offense.

* * * * *

(c) *Administrative assessment of certain penalties.* (1) Administrative penalty authority. Subject to 42 U.S.C. 7524(c), in lieu of commencing a civil action under paragraph (b) of this section, the Administrator may assess any civil penalty prescribed in paragraph (a) of this section, except that the maximum amount of penalty sought against each violator in a penalty assessment proceeding shall not exceed $250,000, unless the Administrator and the Attorney General jointly determine that a matter involving a larger penalty amount is appropriate for administrative penalty assessment. Any such determination by the Administrator and the Attorney General is not subject to judicial review. Assessment of a civil penalty shall be by an order made on the record after opportunity for a hearing held in accordance with the procedures found at part 22 of this chapter. The Administrator may compromise, or remit, with or without conditions, any administrative penalty which may be imposed under this section.

* * * * *

(d) The maximum penalty values listed in paragraphs (a) and (c) of this section are shown for calendar year 2002. Maximum penalty limits for later years may be adjusted based on the Consumer Price Index. The specific regulatory provisions for changing the maximum penalties, published in 40 CFR part 19, reference the applicable U.S. Code citation on which the prohibited action is based.

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