Federal Register

Tuesday,
June 29, 2004

Part III

Environmental Protection Agency

40 CFR Parts 92 and 94

Control of Emissions of Air Pollution From New Locomotive Engines and New Marine Compression-Ignition Engines Less than 30 Liters per Cylinder; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 92 and 94

[OAR–2003–0190; FRL–7662–8]

RIN 2060–AM06

Control of Emissions of Air Pollution From New Locomotive Engines and New Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rulemaking.

SUMMARY: EPA is issuing this Advance Notice of Proposed Rulemaking (ANPRM) to invite comment from all interested parties on our plan to propose new emission standards and other related provisions for new compression-ignition marine engines with per cylinder displacement less than 30 liters and locomotive engines. We are considering standards modeled after our 2007/2010 highway and Tier 4 nonroad diesel engine programs, with an emphasis on achieving large reductions in emissions of particulate matter (PM) and air toxics as early as possible through the use of advanced emission control technology starting as early as 2011. This technology, based on high-efficiency catalytic aftertreatment, is enabled by the availability of clean diesel fuel with sulfur content capped at 15 parts per million. This fuel is already being produced in some U.S. markets, and its availability is expected to become widespread in coming years in response to EPA regulations that require it for an increasingly larger portion of the overall diesel fuel pool, starting with highway fuel in 2006. We are well aware that migrating advanced control technologies to locomotives and marine diesel engines would bring with it a unique set of challenges, but we are hopeful that these can be resolved in a collaborative manner as was done in our highway and nonroad diesel rulemakings.

A program like the one under consideration could result in substantial benefits to public health and welfare through significant reductions in emissions of oxides of nitrogen (NO_X) and particulate matter (PM), as well as hydrocarbons (HC) and air toxics. These pollutants contribute to health problems that include premature mortality, aggravation of respiratory and cardiovascular disease, aggravation of existing asthma, acute respiratory symptoms, chronic bronchitis, and decreased lung function. We believe that diesel exhaust is likely to be carcinogenic to humans by inhalation. Locomotive and marine diesel emissions reductions would particularly benefit those who live, work or recreate in and along our nation's coastal areas, rivers, ports, and rail lines. Such reductions would also have beneficial impacts on visibility impairment and regional haze. We received a substantial number of comments from state and local governments following our proposal last year to set new controls for nonroad diesel emissions, pressing the Agency to adopt similar controls for locomotive and marine diesel engines as quickly as possible.

DATES: Send written comments on this advance notice of proposed rulemaking by August 30, 2004. See **ADDRESSES,** below, for more information about written comments. There will also be opportunity for oral and written comment when we publish our Notice of Proposed Rulemaking for this action.

We expect to publish a Notice of Proposed Rulemaking for this rule by mid-2005 and a Final Rule by mid-2006.

ADDRESSES: Submit your comments, identified by Docket ID No. OAR–2003–0190, by one of the following methods:

- Federal Rulemaking Portal: *http://www.regulations.gov.* Follow the on-line instructions for submitting comments.
- Agency Web site: *http://www.epa.gov/edocket.* EDOCKET, EPA's electronic public docket and comment system, is EPA's preferred method for receiving comments. Follow the on-line instructions for submitting comments.
- E-mail: *locomarine@epa.gov.* Specify docket number OAR–2003–0190 in the body of the message.
- Fax: (202) 260–4400.
- Mail: Environmental Protection Agency, Air Docket, Mailcode 6102T, 1200 Pennsylvania Ave., NW, Washington, DC 20460. Please include a total of 2 two copies.
- Hand Delivery: Environmental Protection Agency, Air Docket, Mailcode 6102T, 1200 Pennsylvania Ave., NW., Washington, DC 20460. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. OAR–2003–0190. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.epa.gov/edocket,* including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through EDOCKET, regulations.gov, or e-mail. The EPA EDOCKET and the federal regulations.gov Web sites are ''anonymous access'' systems, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through EDOCKET or regulations.gov, your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit EDOCKET on-line or see the **Federal Register** of May 31, 2002 (67 FR 38102). For additional instructions on submitting comments, go to the **SUPPLEMENTARY INFORMATION** section of this document.

Docket: All documents in the docket are listed in the EDOCKET index at *http://www.epa.gov/edocket.* Although listed in the index, some information is not publicly available, *i.e.,* CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in EDOCKET or in hard copy at the EPA Air Docket, EPA/DC, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Carol Connell, AANC, U.S. EPA, National Vehicle and Fuels Emission Laboratory, 2565 Plymouth Road, Ann Arbor, MI 48105, (734) 214–4349, Fax: (734)214–4816, *connell.carol@epa.gov.*

SUPPLEMENTARY INFORMATION:

I. General Information

A. Does this Action Apply to Me?

Locomotive

Entities potentially regulated by this action are those which manufacture, remanufacture and/or import locomotives and/or locomotive engines; and those which own and operate locomotives. Regulated categories and entities include:

Category	NAICS code [a]	Examples of potentially affected entities
Industry	333618, 336510	Manufacturers, remanufacturers and importers of locomotives and locomotive engines.
Industry	482110, 482111, 482112	Railroad owners and operators.
Industry	488210	Engine repair and maintenance.

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

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your company is regulated by this action, you should carefully examine the applicability criteria in 40 CFR 92.1, 92.801, 92.901 and 92.1001, as well as 40 CFR 85.1601 and 89.1. If you have questions regarding the applicability of this regulation to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Marine

This proposed action would affect companies and persons that manufacture, sell, or import into the United States new marine compression-ignition engines; companies and persons that make vessels that use such engines; and the owners/operators of such vessels. Further requirements apply to companies and persons that rebuild or maintain these engines. Affected categories and entities include:

Category	NAICS code [a]	Examples of potentially affected entities
Industry	333618	Manufacturers of new marine diesel engines.
Industry	33661 and 346611	Ship and boat building; ship building and repairing.
Industry	811310	Engine repair and maintenance.
Industry	483	Water transportation, freight and passenger.
Industry	336612	Boat building (watercraft not built in shipyards and typically of the type suitable or intended for personal use).

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

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your company is regulated by this action, you should carefully examine the applicability criteria in 40 CFR 94.1, as well as the future proposed regulations. Note that in addition to the marine diesel engines currently regulated under 40 CFR 94, this rule also applies to marine diesel engines below 37 kW. If you have questions regarding the applicability of this regulation to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. What Should I Consider As I Prepare My Comments for EPA?

1. *Submitting CBI.* Do not submit this information to EPA through EDOCKET, regulations.gov or e-mail. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD–ROM that you mail to EPA, mark the outside of the disk or CD–ROM as CBI and then identify electronically within the disk or CD–ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

2. *Tips for Preparing Your Comments.* When submitting comments, remember to:

i. Identify the rulemaking by docket number and other identifying information (subject heading, **Federal Register** date and page number).

ii. Follow directions—The agency may ask you to respond to specific questions or organize comments by referencing a Code of Federal Regulations (CFR) part or section number.

iii. Explain why you agree or disagree; suggest alternatives and substitute language for your requested changes.

iv. Describe any assumptions and provide any technical information and/or data that you used.

v. If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for it to be reproduced.

vi. Provide specific examples to illustrate your concerns, and suggest alternatives.

vii. Explain your views as clearly as possible, avoiding the use of profanity or personal threats.

viii. Make sure to submit your comments by the comment period deadline identified.

II. Additional Information About This Rulemaking

Locomotive. The current emission standards for new locomotive engines were adopted by EPA in 1998 (*see* 63 FR 18978, April 16, 1998). This advance notice of proposed rulemaking relies in

part on information that was obtained for that rule, which can be found in Public Docket A–94–31. That docket is incorporated by reference into the docket for this action, OAR–2003–0190.

Marine. The current emission standards for new marine diesel engines were adopted in 1999 and 2003 (*see* 64 FR 73300, December 29, 1999 and 66 FR 9746, February 28, 2003). This advance notice of proposed rulemaking relies in part on information that was obtained for those rules, which can be found in Public Dockets A–97–50 and A–2000–01. Those dockets are incorporated by reference into the docket for this action, OAR–2003–0190.

Other Dockets. This advance notice of proposed rulemaking relies in part on information that was obtained for our recent highway diesel and nonroad diesel rulemakings, which can be found in Public Dockets A–99–06 and A–2001–28 (*see* also OAR 2003–0012).[1] Those dockets are incorporated by reference into the docket for this action, OAR–2003–0190.

Table of Contents

I. Overview

In recent years, EPA has adopted major new programs designed to reduce emissions from diesel engines. When fully phased in, these new programs for highway and nonroad diesel engines will lead to the elimination of over 90% of harmful pollutants from these sources.[2] The public health and welfare benefits of these actions are very significant, projected at over $70 billion and $83 billion for our highway and nonroad diesel programs, respectively, in 2030. In contrast, the corresponding annual cost of these programs will be a small fraction of this amount. We have estimated the annual cost at $4.2 billion and $2 billion, respectively in 2030. These programs are being implemented over the next decade.[3]

Marine diesel engines less than 30 liters per cylinder (marine diesel engines) and locomotives are significant contributors to our national mobile source emissions inventory.[4, 5] Even with recent emission standards for these sectors, the contribution of these engines is expected to grow. Without new controls, we estimate that their respective contributions to mobile source NO_X and fine diesel particulate matter ($PM_{2.5}$) emissions will increase to 27 percent and 45 percent by 2030. Reducing emissions from these two engine categories can lead to significant public health benefits such as reduced premature mortalities and decreased incidences of heart attacks and asthma exacerbations. It will help states and localities attain and maintain PM and ozone national ambient air quality standards (NAAQS).

Locomotive and marine diesel engines are currently subject to emission standards that rely on engine-based technologies to reduce emissions.[6] The opportunity to gain large additional public health benefits, as well as the similarities between these engines and highway and general nonroad engines, lead us to consider additional emission controls based on the same advanced emission control technologies on which our 2007/2010 highway and Tier 4 nonroad diesel engine programs are based. The use of these technologies on locomotive and marine diesel engines will be enabled by the ultra low sulfur diesel (ULSD) requirements established in our recently adopted nonroad diesel rule, which sets a 15 parts per million (ppm) sulfur limit for locomotive and marine diesel fuel beginning in 2012.

In this Advance Notice of Proposed Rulemaking (ANPRM), we describe the emission controls we are considering for locomotive and marine diesel engines. The remainder of this Introduction provides a summary of the controls we are considering and a brief description of the impacts of these emissions on human health and welfare. Sections II and III describe the emission controls we are considering for our locomotive and marine diesel engine programs, respectively. In Section IV, we describe the contribution of these engines to mobile source NO_X and diesel $PM_{2.5}$ inventories and our plans for our future cost analysis. Section V contains our plan to solicit the input from small businesses in these sectors. Finally, sections VI and VII contain information about public participation and statutory and executive order review. We are interested in comments covering all aspects of this ANPRM.

We are planning to issue a Notice of Proposed Rulemaking addressing engine standards for locomotive and marine diesel engines by mid-2005, with a final rule targeted for mid-2006.

A. What New Controls Is EPA Considering?

EPA currently has emission standards for locomotives and marine diesel engines. The standards for new locomotives, adopted in 1998, phase in from 2000 through 2005. That program includes emission limits (that apply upon remanufacturing) for existing locomotives that were originally manufactured after 1973. The standards for marine diesel engines were adopted in 1999 for commercial marine engines

[1] Control of air pollution from new motor vehicles: Heavy-duty engine and vehicle standards and highway diesel fuel sulfur control requirements, 66 FR 5001 (January 18, 2001); Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel, published elsewhere in this issue of the **Federal Register**.

[2] As used in this ANPRM, ''nonroad diesel engines'' refers to the off-highway engines regulated under 40 CFR Part 89 (Tier 1, 2, and 3 standards) and Part 1039 (Tier 4). This generally covers a wide variety of land-based engines, including those used in farm, construction, industrial, and mining applications.

[3] *See* 66 FR 5001 (January 18, 2001), and the Nonroad final rule published elsewhere in this issue of the **Federal Register** for the final rules regarding highway diesel, and nonroad diesel programs, respectively.

[4] As used in this ANPRM, ''marine diesel engine'' refers to compression-ignition marine engines below 30 liters per cylinder displacement unless otherwise indicated.

[5] This rule will address emissions from all marine diesel engines below 30 liters used for commercial, recreational, or auxiliary applications. Marine diesel engines at or above 30 liters per cylinder are not part of this rulemaking. These large engines, which are used for propulsion on ocean-going vessels, are the largest mobile source diesel engines regulated by EPA. They will be addressed in a rule to be finalized by April 27, 2007. *See* 68 FR 9746 (February 28, 2003) for more information about that future rule.

[6] *See* the ''Additional Information about this Rulemaking'' section above for the specific cites.

and in 2002 for recreational marine engines. They phase in from 2004 through 2009, depending on engine size and application. These locomotive and marine diesel engine standards are similar in stringency to our nonroad Tier 2 standards that were set in 1998 and began phasing in starting in 2001. The technologies needed to meet our nonroad diesel Tier 2 standards in turn are derived from highway diesel engine technologies that have been in widespread use since the early 1990's, which achieve emissions reductions through judicious in-cylinder control of ignition timing and fuel injection pressure. The significant lag in leadtime between application of this technology to land-based and marine nonroad engines compared to highway engines is more reflective of the challenges involved in regulating markets just starting to focus on emissions control programs (including development of testing lab capability and production line quality assurance measures, and the like), than of the challenges involved in adapting the technology itself to the differing engine applications.

Emission control technologies for diesel engines have advanced substantially since these rules were issued, especially with regard to high-efficiency catalytic exhaust emission control systems. Our 2007 highway and Tier 4 nonroad diesel engine emission standards are predicated on these new technologies enabling NO_X, HC and PM emission reductions of 90 percent or more. These new standards apply to engines ranging up to several thousand horsepower. PM and HC emissions can be controlled to these levels through the use of catalyzed diesel particulate filters (CDPFs). CDPFs are a well proven technology and have been used in numerous retrofit applications including retrofits of locomotive switcher engines. NO_X emissions can be controlled through the use of NO_X adsorbers or selective catalytic reduction (SCR), both of which are capable of large NO_X reductions. SCR technology has already been implemented on a number of marine engines.[7] To operate reliably and at high efficiencies, these technologies require very low sulfur levels in diesel fuel. We have already put programs in place that will reduce sulfur to 15 ppm for highway and nonroad diesel fuel. Our nonroad diesel fuel program applies the 15 ppm fuel sulfur cap to refiners and importers of locomotive and marine diesel fuel beginning in 2012. However, the widespread availability of 15 ppm sulfur diesel fuel throughout the country even before this date makes it viable to consider locomotive and marine engine programs as early as 2011 that are based at least in some part on the use of this fuel.

In ways relevant to the use of advanced emissions control technologies, marine diesel engines and locomotives are similar to highway and nonroad diesel engines. In fact, many marine diesel engines are derivatives of land-based nonroad engines, and both marine and locomotive engines share important design features with highway and nonroad diesel engines. The nonroad diesel standards cover engines of all sizes, including small engines similar in size to the smallest auxiliary marine engines and large engines on the scale of locomotive and large marine propulsion engines. The new catalyst based emission control technologies, which are expected to be applied for highway and nonroad diesel engines, can be similarly effective at controlling emissions from locomotive and marine engines. Therefore, we believe it is appropriate to consider applying advanced aftertreatment standards to locomotives and marine engines as well. Despite the fundamental similarities involved, we recognize that there are also some differences between the highway/nonroad engines for which the technologies were initially designed and the locomotive/marine engines to which we are considering applying this technology, and this may present some special challenges. We discuss these in this section I.A below. However, we do not believe that these challenges are so significant as to pose a barrier to setting standards based on implementing these technologies in the future. We do recognize that in order to address potential issues, we may need to consider flexibility in how the standards are implemented, and we request comment on the technology issues listed here and on any other technology issues that we should consider in setting new standards.

Potential issues unique to locomotives include available space for the technology and scaling up of aftertreatment systems to large horsepower sizes. When scaled to locomotive-sized engines, the kinds of aftertreatment systems being developed for highway diesel engines would logically be larger, though not necessarily much larger than systems that will be applied to large nonroad diesels. Total locomotive size is constrained by the existing infrastructure. Height and width are constrained by tunnel and bridge clearances, and length is constrained by the curvature of the rails. On the other hand, we believe the use of aftertreatment may make it possible to reduce the need for the additional radiator space that is currently being applied to locomotives to increase aftercooling capacity. We request comment on the significance of any space constraints regarding the use of aftertreatment on locomotives, as well as potential ways of dealing with such constraints.

Exhaust temperature may also be a key factor in the proper design of emission control technologies for locomotive and marine applications. For most catalytic emission control technologies there is a minimum temperature below which the rate of chemical reactions necessary for emissions control falls off. In general, exhaust temperature increases with engine power and can vary dramatically as engine power demands vary. Prolonged low-power operation can hamper the overall effectiveness of catalyst-based aftertreatment devices, unless steps are taken in designing them to compensate. An example of an application with a lot of low-power operation would be a tug boat that primarily idles or operates at low light loads moving around the harbor and only at high loads for a short time when pushing ships. We believe it may be necessary for advanced exhaust emission controls in at least some locomotive and marine applications to use active regeneration mechanisms, such as the post-injection of diesel fuel into the exhaust stream to initiate thermal transients. This would be similar to the design measures we are projecting for robust operation of nonroad diesel engines in our Tier 4 program. We request comment on exhaust temperature profiles for locomotive and marine diesel engines and their impact on aftertreatment design strategies.

One special consideration for marine engines derives from the fact that their exhaust systems are typically designed to operate with surface temperatures below 100°C. This is intended to minimize the risk of fires in response to Coast Guard safety requirements. For most commercial marine engines, the exhaust piping is insulated and the exhaust is routed either through a muffler or under water. Typically, for larger vessels, the exhaust exits above the top of the vessel. However, in many recreational and light-duty commercial applications, the exhaust is water-jacketed and leaves the vessel below the water surface. In some cases, the jacketing-water and exhaust are mixed in the exhaust system before exiting the

[7] *See* EPA docket items OAR–2003–0190–0002, 0003, 0004, and 0005.

vessel. This is especially common in sterndrive applications where the jacket-water mixes with exhaust within feet of the cylinder exhaust port and exits through the lower drive unit.

Exhaust systems that rely on insulation to control surface temperature are likely to prove to be very well matched to the new emission control technologies which can benefit from such a thermal management technique. However, the use of water-jacketing may raise additional issues to be addressed. The first issue is the effect of the water jacketing on the exhaust gas temperature. Where an insulated exhaust helps keep the heat in the exhaust, water-jacketing removes heat thus lowering average exhaust temperatures and potentially reducing catalyst system effectiveness. We believe that there are a number of solutions to this issue including close-coupling of the catalyst system and the use of an insulating gap between the exhaust flow and the water jacket similar to the approach used to insulate the exhaust system. For sterndrive applications or other applications where the exhaust is mixed with the water, we believe it may be necessary to redesign the exhaust system to ensure there is enough room in the dry part of the exhaust system to package the aftertreatment system. We request comment on packaging constraints for marine diesel engine applications that would affect the feasibility of applying exhaust aftertreatment or other emission control strategies. We also request comments describing methods to address potential issues related to system packaging.

We believe that, given adequate development lead time and appropriate structuring of phase-in provisions, locomotive and marine diesel engines could be designed to successfully employ the same high-efficiency exhaust emission control technologies now being developed for highway and nonroad engine use.

B. Why Is EPA Considering New Controls?

Marine diesel engines and locomotives contribute to a number of serious air pollution problems and will continue to do so in the future absent further emission reduction measures. Their emissions lead to adverse health and welfare effects associated with ozone, PM, NO_X, and volatile organic compounds, including toxic compounds. In addition, diesel exhaust is of specific concern because it is likely carcinogenic for humans as well as posing a hazard from noncancer respiratory effects. Ozone, NO_X, and PM also cause significant public welfare harm such as damage to crops, eutrophication, regional haze, and soiling of building materials.[8]

Millions of Americans continue to live in areas with unhealthy air quality that may endanger public health and welfare. Part or all of 474 counties nationwide are in nonattainment for either failing to meet the 8-hour ozone standard or for contributing to poor air quality in a nearby area. There are approximately 159 million people living in these non-attainment areas. In addition, approximately 65 million people live in counties where air quality measurements violate the $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS). These numbers do not include the tens of millions of people living in areas where there is a significant future risk of failing to maintain or achieve the ozone or $PM_{2.5}$ NAAQS. Federal, state, and local governments are working to bring ozone and PM levels into compliance with the NAAQS attainment and maintenance plans and the reductions we are considering in this ANPRM will play a critical part in these actions. In the comments submitted on our recent nonroad diesel rule, several states requested EPA take action to control these emissions. For example, Illinois Lieutenant Governor Pat Quinn commented that ''in Illinois locomotives are quite prevalent especially in the urban area in and around Chicago. It is in urban areas that the risk of cancer and asthma is highest. Incorporating marine vessels and locomotives into the regulations will create an incentive to aggressively advance technology.'' [9] Marianne L. Horinko, Acting Administrator, California Air Resources Board, commented that ''in 2000, locomotives and commercial marine engines were responsible for 15 percent of the PM emissions inventory for diesel mobile sources in California * * * ARB strongly recommends that U.S. EPA proceed as rapidly as possible * * * to establish aftertreatement-based emissions standards for locomotive and marine engines.'' [10] Dr. Pamela M. Berger, Director of Environmental Policy, Office of the Mayor, City of Houston commented that ''given that municipalities and states are not empowered to regulate locomotives and that these vehicles are a growing source of emissions, we would encourage EPA to regulate them.'' [11] Many other commenters encouraged the Agency to adopt further emission controls for these engines as quickly as possible. See section 8.3.3 of the Summary and Analysis of Comments document for the nonroad diesel final rule, available in EPA docket A–2001–28.

Even with the control measures already in place for locomotives and marine diesel engines, the combination of expected future growth and the dramatic emission reductions expected from our recently established highway and nonroad diesel engine control programs will make the relative emission contribution from locomotives and marine diesel engines grow quite large over time. We estimate that they will contribute about 27 percent and 45 percent of national mobile source NO_X and diesel $PM_{2.5}$ emissions, respectively, by 2030. Additionally, the contribution of these engines can be significantly higher in ports, in rail centers, and along coasts and railways. Many of these areas are highly populated and suffer from poor air quality. Because locomotives and marine diesel engines contribute greatly to these air quality problems, further controls in this source category will likely be needed to resolve them. Commenters are encouraged to provide any information they may have that would help us to further assess the contributions of locomotive and marine engines to the nation's air quality problems, especially in regard to future growth in these markets.

We expect that our proposal for new control measures will focus on PM and air toxics reductions as early as feasible, consistent with our 2007/2010 highway and Tier 4 nonroad rules. However, we recognize that these engines are also significant contributors of NO_X emissions and that high-efficiency NO_X controls may well be feasible for these engines in the timeframes under consideration. We request comment, therefore, on all aspects of potential emissions control measures that might be taken to improve air quality.

C. Basis for Action Under the Clean Air Act

Section 213 of the Clean Air Act (the Act) gives us the authority to establish emissions standards for nonroad engines and vehicles. Section 213(a)(3) authorizes the Administrator to set (and from time to time revise) standards for

[8] For a full discussion of the human health and environmental problems that diesel engine emissions contribute to, see Chapter 2 of the Regulatory Impact Analysis for our nonroad diesel rule, available on our Web site: *http://www.epa.gov/otaq*.

[9] Air Docket OAR 2003–0012, Comment OAR–2003–0012–0781.

[10] Air Docket OAR 2003–0012, Comment OAR–2003–0012–0644.

[11] Air Docket OAR 2003–0012, Comment OAR–2003–0012–0630.

NO_X, VOCs, or carbon monoxide emissions from nonroad engines, to reduce ambient levels of ozone and carbon monoxide. That section specifies that the ''standards shall achieve the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the engines or vehicles.'' As part of this determination, the Administrator must give appropriate consideration to cost, lead time, noise, energy, and safety factors associated with the application of such technology. Section 213(a)(4) authorizes the Administrator to establish standards to control emissions of pollutants, such as PM, which ''may reasonably be anticipated to endanger public health and welfare.'' In setting appropriate standards, EPA is instructed to take into account costs, noise, safety, and energy factors. Section 213(a)(5) contains similar provisions that authorize the Administrator to set standards for new locomotive engines.

As part of the development of our Notice of Proposed Rulemaking, we will analyze whether the emission control program under consideration for locomotive and marine diesel engines is technologically feasible and reflects the greatest degree of emission reduction achievable in the model years to which it would apply, giving appropriate consideration to costs and the other factors listed in the statute. We will also perform an analysis of the impacts of locomotive and marine diesel emissions on human health and welfare and the anticipated benefits of the standards.

II. Controlling Locomotive Emissions

A. Background

1. What Is the Nature of the Locomotive Market?

There are currently three manufacturers of locomotive engines for the U.S. market: General Electric (GE), the Electromotive Division of General Motors (EMD), and Caterpillar. Total sales of freshly manufactured locomotives in the U.S. can vary dramatically from year to year. Since 1997 sales have been between 600 and 900 units per year. All freshly manufactured locomotives are essentially built to order for the major Class I railroads. Class II and III railroads typically purchase used locomotives rather than purchasing new.[12]

Locomotives are typically remanufactured to ''as new'' condition every five to seven years throughout their services lives, and they typically remain in service for 30 to 40 years or more before being scrapped. Under our current regulations, these remanufactured engines are considered ''new'' for the purposes of applying emissions standards. As might be expected, there is a thriving market in both aftermarket parts and remanufacturing services. While some railroads remanufacture their own locomotives, other railroads contract to have this work performed for them. The two largest locomotive manufacturers (GE and EMD) both have unit exchange programs where a railroad can trade in a locomotive engine in need of remanufacture for one that has just been remanufactured. There are also a number of independent companies that offer engine remanufacturing services.

2. What Are the Existing Standards for Locomotives?

Three separate sets of emission standards have been adopted, with applicability of the standards dependent on the date a locomotive is freshly manufactured.[13]

- *Tier 0* standards apply to locomotives and locomotive engines that were freshly manufactured from 1973 through 2001; the standards apply any time the engines are manufactured or remanufactured.
- *Tier 1* standards apply to locomotives and locomotive engines that are freshly manufactured from 2002 through 2004. These locomotives and locomotive engines will be required to meet the Tier 1 standards at the time of original manufacture and at each subsequent remanufacture.
- *Tier 2* standards apply to locomotives and locomotive engines that are freshly manufactured in 2005 and later. These locomotives and locomotive engines will be required to meet the applicable Tier 2 standards at the time of original manufacture and at each subsequent remanufacture.

We also have opacity standards for these locomotives and locomotive engines. Electric locomotives, historic steam-powered locomotives, and locomotives freshly manufactured before 1973 are not currently covered by emission regulations.

When fully phased in, these emission standards will reduce NO_X emissions from locomotives by nearly two-thirds, and HC and PM emissions by half. Nevertheless, even with these standards in place, serious concerns about emissions from locomotives remain, as discussed in section I.B.

B. Scope

Because of the potential for locomotives to remain in service for 40 years or more as discussed in section II.A.1, we are considering additional requirements for all 1973 and later locomotives. We are considering an approach similar to our existing program, in which we would set new standards for in-use and new engines, grouped into three categories:

- Locomotives freshly manufactured after the effective date of new Tier 3 standards.
- Locomotives currently subject to the Tier 2 standards.
- Locomotives currently subject to the Tier 0 and Tier 1 standards.

For the first group of engines, those that would be freshly manufactured after the new standards begin to take effect (as early as 2011), we are considering standards that reflect the use of advanced emission controls and aftertreatment devices. These potential standards are discussed in Section II.C. Regarding the second group of engines, we note that manufacturers have already finished the primary design process for their Tier 2 locomotives and are currently testing these designs to ensure that they will be ready for production by 2005, and this will be taken into account in evaluating ideas for further control measures for these engines.

We are also considering new requirements for locomotives freshly manufactured in model years 1973 through 2004, currently subject to Tier 0 or Tier 1 standards. In addition to potential new standards for some or all of these engines upon remanufacture, we are interested in ideas for voluntary provisions and initiatives that could encourage cleaner engines, and in how these might be coordinated with new standards for new and remanufactured engines through emissions trading, fleetwide average standards, or similar approaches. Also, we request comment on the applicability of technologies being developed for Tier 2 locomotives to these earlier engines upon remanufacture.

C. Tier 3 Standards and Effective Dates

1. Tier 3 Standards for New Engines

We are considering emission standards for new locomotives built as

[12] In the United States, freight railroads are subdivided into three classes by the Federal Surface Transportation Board (STB), based on annual revenue. In 1994 a railroad was classified as a Class I railroad if annual revenue was $250 million or greater ($1991), as a Class II railroad with annual revenue of at least $20 million but less than $250 million ($1991), and as a Class III railroad with revenues below $20 million (1991). Surface Transportation Board 1996/1997 Annual Report, accessed at *http://www.stb.dot.gov/stb/docs/ActivityReport1996–1997.pdf* on April 6, 2004.

[13] 63 FR 18977 (April 16, 1998).

early as 2011, based on the application of advanced emission control technologies. These technologies are currently being developed for use in highway and nonroad applications and will begin to see widespread use in these applications starting in 2007. In those programs, we estimated that NO_X and PM emissions could be reduced by 90 percent or more from emission levels in the exhaust leaving the engine through the use of NO_X aftertreatment and PM filter technologies. We would expect that similar levels of NO_X and PM reductions could be achieved by applying these technologies to locomotives as well.

Although for the most part these highway and nonroad engines are smaller than locomotive engines, much of the fundamental diesel engine and emission control technology involved is the same, such as PM filtering matrix designs, catalyst formulations to optimize exhaust stream chemical reactions, and mechanisms for active regeneration of filter and adsorber beds. Furthermore, some nonroad diesel engines subject to our nonroad Tier 4 regulations starting in 2011 are of similar size to locomotive engines, 1000 to 3000 horsepower or more. Although they are not typically made by the same manufacturers, locomotive engines have substantial design and operating similarities to large mobile generator set engines that will allow the locomotive engines to benefit from emission control technology being developed for (and in limited applications already applied to) these generator sets. We note too that the largest generator sets, those over 1200 hp, are subject to the earliest stringent NO_X control requirements of any engines in the Tier 4 program, 0.50 g/bhp-hr in 2011, and to stringent PM standards in that year as well.

Given that other technologies, such as exhaust gas recirculation (EGR) and optimized fuel injection, could also be applied in tandem with exhaust aftertreatment, we expect that similar final emission levels to those achievable from highway and nonroad engines may be feasible. The availability of EGR and other engine-based means of achieving some degree of emissions control also introduces the potential for Tier 3 control in multiple phases, as we do not expect locomotive manufacturers will need to use EGR to meet the Tier 2 standards in 2005. As a result, we request comment on the different forms these future standards could take, including the following:

- Should we adopt the approach taken in the heavy-duty highway and nonroad diesel programs involving a PM control requirement on 100% of the engines concurrent with a NO_X requirement that is phased in over three years, starting as early as 2011?
- Would it be more appropriate for locomotive manufacturers to focus their technology development efforts on a single, final tier of standards with the possibility of getting to aftertreatment-based emission levels sooner than would likely be the case under the two-phase approach?
- Are there phase-in options that we could adopt to encourage the early introduction of aftertreatment technology?
- How should aftertreatment-based particulate matter controls be coordinated with those for NO_X?

2. Idling Emissions Control

Locomotives typically spend significant amounts of time idling. This is especially the case in switchyards, which tend to be located in urban areas. Our current test procedure reflects this reality, with idling operation representing 38 percent of the line-haul duty cycle and almost 60 percent of the switch duty cycle. Although the fact that idling emissions per unit time may be relatively low considering that they occur at low power and fuel consumption levels, the high percentage of total time locomotives spend idling in urban areas, some of which are hot-spot air quality problem areas, may warrant our addressing these emissions, and we request comment on our doing so.

We note that locomotive operators already recognize that there is some public demand to reduce the idling of locomotives. For this reason some railroads are beginning to employ idle shutdown technology on locomotives. This technology simply shuts down a locomotive after a certain length of time at idle conditions. Clearly this technology is feasible and available for use, and we are considering what steps we might take to encourage or require its widespread use. Thus, we request comment on whether we should consider the mandatory use of idle shutdown technology or whether a voluntary program would be more appropriate, both for new and in-use locomotives. In the case of a voluntary program, we request comment on any incentives we might offer to encourage participation in such a program.

D. Testing

In use, locomotive engines are operated at a series of discrete load and speed points, called notches. Our current test procedure involves running a locomotive or locomotive engine through all of its different power notches, as well as its idle settings. Emissions are measured at each of these steady state points, and compliance with the applicable emission standards is determined by weighting the emissions at each point according to the applicable weighting factors to arrive at a composite emissions level. These weighting factors were derived through the analysis of in-use operating data from a number of locomotives, and we believe they accurately represent in-use locomotive operations.

Because of this, we do not expect it will be necessary to adopt comprehensive ''not-to-exceed'' standards provisions for locomotives as we have in our highway and nonroad diesel engine programs. However, the possible inclusion of exhaust aftertreatment technology on future locomotives leads us to request comment on whether the simple approach of weighting the steady state modes according to the duty cycle would still accurately represent in-use operation. Exhaust temperatures tend to be lower at the lower power notches and idle modes, raising questions regarding the effectiveness of aftertreatment technology in those modes of the test procedure versus those modes in actual operation, given that the test procedure requires operating parameters to stabilize in each mode before emissions sampling begins.

The test duty cycle weightings are based on the average amount of time that a locomotive spends in each power notch over a period of time. However, it does not address whether the time spent in lower power notches happens in fewer, longer segments or many shorter ones. If the actual in-use operation in low power notches happens in fewer, longer segments, the test cycle would be more representative of actual in-use operation from an exhaust temperature perspective than if the low power notch operation occurred in a higher number of shorter segments, with operation at higher power notches mixed in. In this latter case, the higher power notch operation may serve to keep exhaust temperatures higher in the low power notches than might be the case if the low power notch operation took place in fewer, longer segments. We request comment on whether this is a concern and, if so, what modifications could be made to the test procedures without impacting its viability or representativeness, or the stringency of the standards.

E. Certification and Compliance

Our current locomotive compliance program contains provisions for engine family certification, production line testing and in-use testing of both freshly

manufactured and remanufactured locomotives. The in-use testing program contains requirements for locomotive manufacturers and remanufacturers, as well as for locomotive operators. We are requesting comment on whether we should consider any changes or additions to our current certification and compliance programs. In addition to possible modifications to our current programs, we are asking for comment on whether an onboard diagnostic (OBD) program would be needed for locomotives, especially for locomotives equipped with advanced exhaust aftertreatment devices.

We currently have OBD requirements in place or under development for a number of mobile source programs, including light-duty highway, heavy-duty highway, and nonroad diesel engines. We request comment on the appropriateness and need for a locomotive diagnostic program in light of our current in-use testing programs, and specifically request comment on what types of parameters would be monitored under such a diagnostic program. We are particularly interested in comments on how our existing OBD programs for other source categories could be adapted for use on locomotives.

III. Controlling Marine Diesel Engine Emissions

A. Background

1. What Is the Nature of the Marine Diesel Engine Market?

Our current marine diesel engine emission control program distinguishes between five kinds of marine diesel engines, defined in terms of displacement per cylinder.[14] These five types are set out in Table III–1. In this rulemaking we will consider new standards for all of these marine diesel engines except Category 3 engines. Category 3 marine diesel engines, which are used for propulsion on ocean-going vessels, will be covered in a separate rule to be issued by April 27, 2007.[15]

All of the marine diesel engines that are included in this rule operate on distillate diesel fuel. Some Category 2 marine diesel engines, however, may operate on a blend of distillate and residual fuel or even on residual fuel (for example, fuels commonly known as DMB, DMC, RMA, and RMB).[16] Operation on these higher sulfur fuels may require engine modifications.

We request comment on the extent to which Category 2 marine diesel engines on vessels in the U.S. fleet use residual fuel or residual fuel blends and how we should take this into account as we design the emission control program for those engines.

TABLE III–1.—MARINE DIESEL ENGINE CATEGORIES

Category	Rated power	Displacement per cylinder	Final rule publication
Small	≤37 kW	any	1998
Commercial C1	>37 kW	< 5 liters	1999
Commercial C2	>37 kW	≥ 5 liters and < 30 liters	1999
Commercial C3	>37 kW	≥ 30 liters	2003
Recreational	>37 kW	< 5 liters	2002

The same engine manufacturers that dominate the land-based nonroad engine market are also active in the marine diesel engine market. These manufacturers often make recreational as well as commercial marine diesel engines. Annual sales are different for each of the categories addressed in this rule but are smaller than for their land-based counterparts. According to analysis performed for our 1999 rule, there are about 5,000 commercial C1 engines produced annually, about 100 commercial C2 engines, and about 10,000 recreational diesel engines. In addition, there are about 6,000 marine diesel engines less than 37 kW produced annually. Like locomotives, certain marine diesel engines can have long service periods, with some of the engines remaining in service for as long as 20 or even 30 years.

2. What Are the Existing Standards for Marine Diesel Engines?

Our 1999 rule for commercial marine diesel engines set two tiers of emission limits for Category 1 and Category 2 marine diesel engines (*see* 40 CFR 94.9). The Tier 1 standards were initially adopted as voluntary standards and are equivalent to the MARPOL Annex VI NO_X limits.[17] These standards were made mandatory for engines above 2.5 liters per cylinder in our 2003 rule, beginning in 2004. The Tier 2 commercial marine diesel engine standards we adopted in 1999 address NO_X, PM, HC, and carbon monoxide emissions, and go into effect from 2004 through 2007, depending on engine size. At the time, we estimated that these standards would yield a 27 percent reduction in NO_X emissions from the MARPOL Annex VI NO_X limits and a 26 percent reduction in PM emissions in 2020.

Recreational marine diesel engines were included in our 2002 recreational vehicle rule (*see* 40 CFR 94.9). These engines are subject to standards that are equivalent to our commercial marine diesel engine standards, but two years later.[18] We estimated that these standards would yield a 21 percent reduction in NO_X emissions and an18 percent reduction in PM emissions in 2020.

Marine diesel engines below 37 kW were included in our 1998 nonroad diesel rule and are subject to the same Tier 1 and Tier 2 standards as their land-based counterparts (*see* 40 CFR 89.112).[19] They were not included in our most recent diesel nonroad rule, however, and are therefore not subject

[14] This approach was used because per-cylinder displacement is an engine characteristic that is not easily changed and is constant for a given engine model or series of engine models. It therefore avoids the problem that can arise when a higher power engine is made by joining together more cylinders: the larger version of the engine could be subject to a different numerical standard than an engine formed from a smaller number of cylinders.

[15] *See* 68 FR 9746 (February 28, 2003) for more information about the future rule for Category 3 marine diesel engines.

[16] The final rule setting limits on the sulfur content of marine diesel fuel does not apply to distillate fuel with a T90 greater than 700°F that is used only in Category 2 or Category 3 marine diesel engines. This would include marine DMB and DMC fuels used in these engines.

[17] The MARPOL Annex VI NO_X limits are the engine standards adopted by the International Maritime Organization in Annex VI to the International Convention on the Prevention of Pollution from Ships, 1973, as Amended by the 1978 Protocol Relating Thereto. These international consensus standards will go into effect when the Annex has been ratified by 15 countries representing no less than 50 percent of the world's merchant shipping tonnage. To date, the Annex has been ratified by 13 countries representing about 54.5 percent. For more information on MARPOL Annex VI, see our 2003 rule.

[18] 67 FR 68242 (November 8, 2002).

[19] 63 FR 56967 (October 23, 1998).

to the subsequent tier of standards that will apply to their land-based counterparts. Instead, additional controls for small marine diesel engines were deferred to this rulemaking.

B. Scope

The emission control program contemplated by today's action is intended to cover all new marine diesel engines up to 30 liters per cylinder, including those used in commercial, recreational, and auxiliary applications.

EPA's existing standards for new marine diesel engines do not apply to engines that were built prior to the effective date of those standards. In our 1998 proposal, we requested comment on whether we should apply the standards to engines when they are remanufactured, using the locomotive approach, given the long useful lives of marine diesel engines. Under the locomotive approach, an engine built in 1973 or later but prior to entry into force of the Tier 1 standards is considered to be ''new'' when each of its power assemblies is replaced or is inspected and qualified. This approach was used to address the long periods of service commonly found for locomotives (30 to 40 years). Certain commercial marine diesel engines also have long periods of service (20 to 30 years) that retard the turnover to the new standards. However, several characteristics of the marine industry make a direct application of this approach to marine diesel engines more difficult. Unlike the railroad industry, there are many companies that operate marine diesel engines, and these companies do not rely on a small number of engine remanufacturers to work on their engines. In fact, many of these operators employ their own mechanics to do all maintenance and remanufacturing work. There is accordingly little uniformity in remanufacturing practices across the industry. In addition, setting emission limits for remanufactured in-use marine diesel engines may be disruptive to a large number of small businesses that own and operate these vessels.

We are interested in exploring this issue, especially with regard to other mechanisms that could be used to achieve additional reductions from in-use engines. In particular, we request comment on how we could design such a program in the context of the remanufacturers' specific market characteristics to provide incentives that encourage retrofits or that accelerate turnover. We request comment on the feasibility and potential costs and benefits of both voluntary and mandatory remanufacturing provisions for in-use marine diesel engines.

C. Tier 3 Standards and Effective Dates

Substantial progress has been made in recent years in controlling diesel exhaust emissions through the use of robust, high-efficiency catalytic devices placed in the exhaust system. [20, 21] Similar to the discussion above regarding technologies for PM, HC, and NO_X control for locomotives, we believe PM filters and NO_X adsorbers can be applied to marine diesel engines for emission reductions of 90% or more. For more specific information on these technologies, the regulatory impact analyses for our 2007 highway diesel program and most recent nonroad rule contains extensive discussions of how these devices work, how effective they are at reducing emissions, and what their limitations are, particularly their dependence on very-low sulfur diesel fuel to function properly.[22, 23]

Although there are important differences between land-based and marine diesel engines, they are fundamentally similar. The majority of marine diesel engine designs are derived from highway and nonroad engine platforms. In addition, engines in some nonroad diesel applications, such as underground mining, have water-cooled exhaust systems similar to those used in many marine applications. Manufacturers of underground mining equipment have pioneered the use of advanced aftertreatment technologies for many years. We request comment on the similarities and differences between land-based and marine diesel engines with respect to emission control. We also request comment on whether marine diesel engines can be designed to successfully employ the same high-efficiency exhaust emission control technologies now being developed for highway and nonroad use. Commenters should consider the anticipated availability of diesel fuel meeting the 15 ppm maximum sulfur requirement and the required amount of development lead time.

We request comment on emission standards for marine diesel engines that would be based on the transfer of exhaust emission control technology from land-based diesel engines. This approach would be consistent with the current marine Tier 2 emission standards which were based on technology transfer from land-based Tier 2 engines. We are considering applying such emission standards to new marine diesel engines built as early as 2011. Similar to the locomotive standards described in Section II above, we request comment on the following:

- Whether we should adopt the approach taken in the heavy-duty highway and nonroad diesel programs involving a PM control requirement on 100% of the engines concurrent with a NO_X requirement that is phased in over three years;
- Whether it would be more appropriate for marine engine manufacturers to focus their technology development efforts on a single, final tier of standards with the possibility of getting to aftertreatment-based emission levels sooner;
- Whether there are phase-in options that we could adopt to encourage the early introduction of aftertreatment technology; and
- How aftertreatment-based particulate matter controls should be coordinated with those for NO_X.

The technologies used to meet the Tier 2 standards are primarily in-cylinder engine controls such as fuel and air management improvements, consistent with the approach taken for heavy-duty highway diesel engines in the 1990's and subsequently for the nonroad diesel engine Tier 2 standards. Due to differences in engine design and application, the marine Tier 2 standards for $HC+NO_X$ are slightly higher than those in the nonroad Tier 2 standards. We request comment of whether these differences in design and application could have an effect on the levels of aftertreatment-based standards.

We recognize that marine diesel engines generally have a much wider band of power ratings for a given per-cylinder displacement, however, we request comment on whether or not we should continue to catagorize the engines based on specific displacement rather than by rated power. The new nonroad Tier 4 standards established key aftertreatment-based emission control standard divisions at 19 kW and 56 kW engine power ratings. We request comment on whether these (or equivalent per-cylinder displacement

[20] ''Highway Diesel Progress Review,'' U.S. EPA, June 2002. EPA420–R–02–016. (*www.epa.gov/air/caaac/dieselreview.pdf*) and ''Highway Diesel Progress Review Report 2,'' U.S. EPA, March 2004, EPA420–R–04–004 (*http://www.epa.gov/otaq/regs/hd2007/420r04004.pdf*).

[21] ''Meeting Technology Challenges For the 2007 Heavy-Duty Highway Diesel Rule'', Final Report of the Clean Diesel Independent Review Subcommittee, Clean Air Act Advisory Committee, October 30, 2002. (*www.epa.gov/air/caaac/diesel/finalcdirpreport103002.pdf).*

[22] ''Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements,'' U.S. Environmental Protection Agency, EPA420–R–00–026, December 2000. This document is available on our Web site at *http://www.epa.gov/otaq/diesel.htm.*

[23] ''Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines,'' U.S. Environmental Protection Agency, EPA 420-R–04–007, May 2004. This document is available on our Web site, *www.epa.gov/otaq.*

categories) would be appropriate for marine engines as well.

D. Testing

1. NTE Zone

The emission standards for marine diesel engines include not-to-exceed requirements in which engines must meet specified emission limits within a zone of engine operation. This NTE zone is supplementary to primary emission standards which are based on the weighted average of emissions measured over a modal duty cycle. The purpose of the NTE requirements is to provide robust control of emissions over a broad range of in-use speed and load combinations (and ambient conditions) that a marine engine may experience in-use.

One issue that has been raised with the use of aftertreatment is its effectiveness at light loads where exhaust temperatures are low. The modal duty cycle for commercial marine engines stresses high load operation, while the duty cycle for recreational marine engines is weighted more towards lighter loads. However, even for commercial marine engines, a large portion of the engine operation for vessels operating in harbors or near ports may be at light load. This operation is important because it is in harbors and ports that the emissions from marine engines may affect the most people. Therefore, an emission control strategy that works well at high loads, but poorly at light loads, may appear effective over the current test procedures without providing significant in-use emission benefits.

We request comment on whether and how the marine diesel engine emissions standards and test procedures should be modified to better consider light load conditions. For instance, we request comment on whether the modal duty cycles should be modified or if the NTE zone would need to be expanded to capture more light load operation. If the NTE zone were adjusted, we request comment on how the emission caps would need to be adjusted to better reflect the capabilities of aftertreatment technology. We also solicit comment on alternative approaches that would help ensure the effectiveness of emission control technology over the wide range of operation and ambient conditions that a marine engine may experience in-use.

2. In-Use Compliance

To sustain the emission benefits over the broadest range of in-use operating conditions, marine diesel engines must meet the applicable emission standards throughout their useful lives. One program that would help achieve this goal is manufacturer-run in-use testing. EPA requests comment on the concepts discussed below.

The Agency plans to promulgate the in-use testing requirements for heavy-duty highway vehicles in the December 2004 time frame and plans to propose a manufacturer-run in-use testing program for nonroad land-based diesel engines by 2005 or earlier. The nonroad diesel engine program is expected to be patterned after the heavy-duty highway program. The Agency expects to pattern the in-use testing requirements for nonroad diesel engines after a program that is being developed for heavy-duty diesel highway vehicles. The highway diesel vehicle program will be funded and conducted by the manufacturers of heavy-duty diesel highway engines with our oversight. We expect it will incorporate a two-year pilot program. The pilot program will allow the Agency and manufacturers to gain the necessary experience with the in-use testing protocols and generation of in-use test data using portable emission measurement devices prior to fully implementing the program.

The goal of an in-use testing program would be to ensure that emissions standards are met throughout the useful life of the engines, under conditions normally experienced in-use. We request comment on implementing an in-use testing program for marine diesel engines. In addition, we request comment on creating a similar pilot program as is anticipated for highway vehicles and nonroad land-based engines. We also request comment on any unique issues related to marine engines that may require modifications to this approach. It should be noted that such an in-use testing program would be in addition to our normal compliance and enforcement provisions.

E. Certification and Compliance

Our current marine compliance program contains provisions for engine family certification, production-line testing and in-use testing. We request comment on whether we should consider any changes or additions to our current certification and compliance programs. In addition to possible modifications to our current programs, we are asking for comment on whether an engine-diagnostic requirement would be beneficial for marine diesel engines. We currently have diagnostic programs in place for some other mobile sources. We request comment on the value of diagnostic requirements for marine diesel engines in light of our current in-use testing programs, and specifically request comment on what types of engine characteristics and components should be monitored under such a program. For example, should we consider actual onboard emissions measurement, which would require new hardware, or should we simply require that the existing sensors be utilized to better monitor for potential problems related to emission controls?

IV. Potential Environmental Impacts and Costs

A. Estimated Inventory Contribution

Locomotives and marine diesel engines contribute to the formation of ground level ozone and fine particles. Based on our current inventory analysis, we estimate that these engines contributed 12 percent and 10 percent of mobile source NO_X and diesel $PM_{2.5}$ emissions in 1996. We estimate that their contribution will increase to 27 and 45 percent of mobile source NO_X and diesel $PM_{2.5}$ emission by 2030, after phase-in of our existing locomotive and marine diesel engine emission control programs. Our current estimates for NO_X and diesel $PM_{2.5}$ inventories are set out in Tables IV.A–1 and IV.A–2. The inventory projections include the newly adopted nonroad diesel engine standards and sulfur reductions for marine and locomotive diesel fuel. Also, diesel $PM_{2.5}$ and SO_2 emissions for locomotives and marine diesel engines were adjusted downward to account for the recent fuel sulfur limits on diesel marine and locomotive fuel. While we do not provide estimates for other pollutants in this ANPRM, it should be noted that these engines also contribute to national HC, carbon monoxide, and air toxics inventories. We will estimate those inventories as part of the development of our NPRM.

Our current inventories for marine diesel engines are based on inventory work done in connection with our 1999 and 2003 marine diesel engine rules. The inventory for Category 1 marine diesel engines, which includes recreational, commercial, and auxiliary applications, is estimated using a methodology based on engine population, hours of use, average engine loads, and in-use emission factors. The inventory for Category 2 marine diesel engines is based on a combination of two approaches, one using ship registry data, engine rated power, operation, fuel consumption, and fuel specific emission factors, and the other using a cargo movement approach. Our inventory estimates assume that all these emissions occur within the U.S. airshed. Finally, the emissions for marine diesel

engines less than 37 kW are estimated using the draft NONROAD2004 model.

As part of the development of our NPRM, we will be re-evaluating our marine diesel inventory with respect to Category 1 and Category 2 marine diesel engines and locomotives. We will also be investigating the localized effects of these emissions in and around ports and rail yards. We will be posting a note on our locomotive and marine Web sites that describes our plans and solicits input on several aspects of our inventory research.

TABLE IV.A–1.—ANNUAL NO_X BASELINE EMISSION LEVELS FOR MOBILE AND OTHER SOURCE CATEGORIES [a]

Category	1996			2030		
	NO_X short tons	Percent of mobile source	Percent of total	NO_X short tons	Percent of mobile source	Percent of total
Marine Diesel except C3 [b]	673,309	5.2	2.8	655,052	15.6	4.5
Locomotives	934,070	7.2	3.8	481,077	11.5	3.3
Subtotal of Affected Categories	1,607,379	12.4	6.6	1,136,128	27.1	7.8
Land-based Nonroad Diesel	1,564,904	12.1	6.4	458,649	11.0	3.2
Recreational Marine SI	33,304	0.2	0.1	67,893	1.6	0.5
Nonroad SI ≤25 hp	63,120	0.5	0.3	114,447	2.7	0.8
Nonroad SI >25 hp	273,082	2.1	1.1	43,527	1.0	0.3
Recreational SI	4,297	0.0	0.0	19,389	0.5	0.1
Commercial Marine Diesel C3	184,275	1.4	0.8	514,881	12.3	3.5
Commercial Marine Other [c]	5,979	0.0	0.0	4,020	0.1	0.0
Aircraft	165,018	1.3	0.7	258,102	6.2	1.8
Total Nonroad	3,901,357	30	16	2,617,036	62.5	18
Total Highway	9,060,923	70	37	1,566,902	37.5	11
Total Mobile Sources	12,962,279	100	53	4,183,938	100	29
Stationary Point and Area Sources [d]	11,449,752	.....	47	10,320,361	.....	71
Total Man-Made Sources	24,412,031	.....	.....	14,504,300	.....	.....
Mobile Source Percent of Total	.....	53	.....	.....	29	.....

Notes:

[a] These are 48-state inventories. They do not include Alaska and Hawaii.

[b] Marine diesel includes commercial C1, commercial C2, recreational up to 30 liters per cylinder displacement; it also includes marine diesel engines <37 kW that were included in the Tier 1 and Tier 2 standards for land-based nonroad engines.

[c] Steam and coal-powered marine vessels.

[d] Does not include the effects of the Proposed Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule). 69 FR 4566, January 30, 2004. *See http://www.epa.gov/interstateairquality/rule.html.*

TABLE IV.A–2.—ANNUAL DIESEL $PM_{2.5}$ BASELINE EMISSION LEVELS FOR MOBILE AND OTHER SOURCE CATEGORIES [a] [b]

Category	1996			2030		
	Short tons	Percent of mobile source	Percent of total	Short tons	Percent of mobile source	Percent of total
Diesel Marine [c]	18,705	4.7	4.6	17,526	27.0	25.4
Locomotives	22,266	5.6	5.5	11,599	17.9	16.8
Subtotal of Affected Categories [d]	40,971	10.3	10.1	29,125	44.9	42.2
Land-Based Nonroad Diesel	186,507	47.2	45.8	21,698	33.5	31.4
Total Nonroad Diesel	227,478	58	56	50,823	78	74
Total Highway Diesel	167,384	42	41	13,948	22	20
Total Mobile Source Diesel	394,862	100	97	64,771	100	94
Stationary Point and Area Source Diesel [e]	12,199	.....	3	4,231	.....	6
Total Man-Made Diesel Sources	407,061	.....	.....	69,002	.....	.....
Mobile Source Percent of Total	[f] 97	.....	.....	[f] 94	.....	.....

Notes:

[a] These are 48-state inventories. They do not include Alaska and Hawaii.

[b] Excludes natural and miscellaneous sources.

[c] Marine diesel includes commercial C1, commercial C2, recreational up to 30 liters per cylinder displacement; it also includes marine diesel engines <37 kW that were included in the Tier 1 and Tier 2 standards for land-based nonroad engines. It does not include commercial C3 vessels using residual fuel.

[d] When total $PM_{2.5}$ is considered, marine diesel engines and locomotives contributed 7.2% of mobile source $PM_{2.5}$ in 1996. The contribution of these sources expected to be 10.4% of mobile source $PM_{2.5}$ in 2030.

[e] This category includes point sources burning either diesel, distillate oil (diesel), or diesel/kerosene fuel.

[f] Percent.

B. Potential Costs

The emission-control technologies we are considering for marine diesel engines and locomotives are already under development or in commercial use for highway and nonroad diesel engines. To estimate the costs of this prospective emission control program, we expect to start with the cost estimates we have established in previous rulemakings for highway and nonroad diesel engines. We will modify those estimates as needed to take into account the unique aspects of locomotive and marine applications. These include different usage characteristics, engine lifetimes and rebuild schedules, and sales volumes. Additional adjustment will be made to account for the physical and operating characteristics of locomotive engines and marine diesel engines, such as size, packaging, maintenance, duty cycle, and idling patterns. We encourage commenters to review the extensive information covering all aspects of engine costs contained in the highway and nonroad diesel engine program regulatory impact analyses, and to provide comments on cost-related issues that differentiate locomotives and marine engines from highway and land-based nonroad diesel engines. In addition, we are interested in cost information associated with potential retrofitting concepts, and in information about any unique costs associated with equipment redesign for the marine market.

V. Small Business Concerns/Regulatory Flexibility

Pursuant to the Regulatory Flexibility Act (RFA, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 5 U.S.C. 601 *et seq.*), we will perform an assessment of the impacts of the emission control program we are considering on small entities and will convene a Small Business Advocacy Review (SBAR) panel if the assessment indicates this is appropriate.

We are also planning outreach efforts independent of the SBAR panel to obtain advice and recommendations from representatives of the small entities that would likely be directly affected by a proposed rule. We anticipate beginning this outreach effort in Summer 2004. We may contact some stakeholders prior to that time to gain as much information as possible about these entities to assist us in creating useful provisions for small businesses to utilize.

We intend to offer similar regulatory flexibility provisions for small entities that were offered in previous locomotive, marine, and other nonroad rules to help decrease the burden on small entities while still meeting the environmental goals of the Agency. We also invite recommendations on additions and/or modifications of prior flexibility provisions for this rule.

The following is a list of the entities that we believe will be regulated by this rule, and their corresponding size standards, as set out by the Small Business Administration (SBA):

Category/industry	Size standards (number of employees)	NAICS [a] code
Engine manufacturers (including engine marinizers, rebuilders, and remanufacturers)	1,000	[b] 333618
Locomotive manufacturers and rebuilders	1,000	[c] 336510
Ship builders and repairers	1,000	336611
Boat builders	500	336612

[a] NAICS is the North American Industry Classification System.
[b] Diesel engine manufacturers, specifically locomotive engines, are classified in the NAICS system as ''Other Equipment Manufacturing''.
[c] Locomotive manufacturers and rebuilders are classified in the NAICS system as ''Railroad Rolling Stock Manufacturers''.

VI. Public Participation

We are committed to a full and open regulatory process with input from a wide range of interested parties and request comment on all aspects of this Advance Notice of proposal. Opportunities for input include a public comment period on this ANPRM. This section describes how you can participate in this process.

A. How Do I Submit Comments?

With today's action, we open a comment period for this advance notice. We will accept comments until by August 30, 2004. We encourage comment on all issues raised here, and on any other issues you consider relevant. The most useful comments are those supported by appropriate and detailed rationales, data, and analyses. All comments, with the exception of proprietary information, should be directed to the docket (*see* **ADDRESSES**).

If you wish to submit proprietary information for consideration, you should clearly separate such information from other comments by (1) labeling proprietary information ''Confidential Business Information'' and (2) sending proprietary information directly to the contact person listed (*see* **FOR FURTHER INFORMATION CONTACT**) and not to the public docket. This will help ensure that proprietary information is not inadvertently placed in the docket. If you want us to use a submission of confidential information as part of the basis for a proposal, then a nonconfidential version of the document that summarizes the key data or information should be sent to the docket. We will disclose information covered by a claim of confidentiality only to the extent allowed and in accordance with the procedures set forth in 40 CFR part 2. If you don't identify information as confidential when we receive it, we may make it available to the public without notifying you.

B. Will There Be a Public Hearing?

We will not hold a public hearing for the issues raised in this Advance Notice of proposal. However, we will hold a hearing for the issues raised in our future Notice of Proposed Rulemaking, and will provide information about that hearing when we publish the NPRM.

VII. Statutory and Executive Order Reviews

A. Administrative Designation and Regulatory Analysis (Executive Order 12866)

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to review by the Office of Management and Budget (OMB) and the requirements of this Executive Order. The Executive Order defines a ''significant regulatory action'' as any regulatory action that is likely to result in a rule that may:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or

State, Local, or Tribal governments or communities;

- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

This Advance Notice was submitted to OMB for review. Any written comments from OMB and any EPA response to OMB comments are in the public docket for this Notice.

B. Regulatory Flexibility Act

Section 605 of the Regulatory Flexibility Act (RFA), 5 U.S.C. 601 *et seq.* requires the Administrator to assess the economic impact of proposed rules on small entities. The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996, Public Law 104–121, amended the RFA to strengthen its analytical and procedural requirements and to ensure that small entities are adequately considered during rule development. The Agency accordingly requests comment on the potential impacts on a small business of the program described in this notice. These comments will help the Agency meet its obligations under SBREFA and will suggest how EPA can minimize the impacts of this rule for small companies that may be adversely affected.

Depending on the number of small entities identified prior to the proposal and the level of any contemplated regulatory action, we may convene a Small Business Advocacy Review Panel under section 609(b) of the Regulatory Flexibility Act as amended by SBREFA. The purpose of the Panel (or multiple Panels, as necessary) would be to collect the advice and recommendations of representatives of small entities that could be affected by the eventual rule. If we determine that a panel is not warranted, we would intend to work on a less formal basis with those small entities identified.

We request information on small entities potentially affected by this rulemaking. Information on company size, number of employees, annual revenues and product lines would be especially useful. Confidential business information may be submitted as described in Section VI.

C. Paperwork Reduction Act

We will prepare information collection requirements as part of our proposed rule and submit them for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

D. Intergovernmental Relations

1. 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 of why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

As part of the development of our Notice of Proposed Rulemaking, we will examine the impacts of our proposal with respect to expected expenditures by state, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.

2. 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.'' ''Policies that have tribal implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on one or more Indian tribes, on the relationship between the Federal government and the Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes.''

As part of the development of our Notice of Proposed Rulemaking, we will examine the impacts of our proposal with respect to tribal implications.

E. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law 104–113, section 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

As part of the development of our Notice of Proposed Rulemaking, we will examine the availability and use of voluntary consensus standards.

F. Protection of Children (Executive Order 13045)

Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 F.R. 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.

As part of the development of our Notice of Proposed Rulemaking, we will

examine the impacts of our proposal with respect to whether it concerns an environmental health or safety risk that we have reason to believe may have a disproportionate effect on children.

G. Federalism (Executive Order 13132)

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

Under Section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the proposed regulation. EPA also may not issue a regulation that has federalism implications and that preempts State law, unless the Agency consults with State and local officials early in the process of developing the proposed regulation.

Section 4 of the Executive Order contains additional requirements for rules that preempt State or local law, even if those rules do not have federalism implications (*i.e.*, the rules will not have substantial direct effects on the States, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government). Those requirements include providing all affected State and local officials notice and an opportunity for appropriate participation in the development of the regulation. If the preemption is not based on express or implied statutory authority, EPA also must consult, to the extent practicable, with appropriate State and local officials regarding the conflict between State law and Federally protected interests within the agency's area of regulatory responsibility.

As part of the development of our Notice of Proposed Rulemaking, we will examine the impacts of our proposal with respect to 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.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed rule from State and local officials.

H. Energy Effects (Executive Order 13211)

We anticipate that our proposal will not be a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution or use of energy. The proposed standards will have for their aim the reduction of emission from certain nonroad engines, and have no effect on fuel formulation, distribution, or use.

I. Plain Language

This document follows established EPA practices regarding the use of plain language in government writing. To read the text of the regulations, it is also important to understand the organization of the Code of Federal Regulations (CFR). The CFR uses the following organizational names and conventions.

Title 40—Protection of the Environment
Chapter I—Environmental Protection Agency
Subchapter C—Air Programs. This contains parts 50 to 99, where the Office of Air and Radiation has usually placed emission standards for motor vehicle and nonroad engines.
Subchapter U—Air Programs Supplement. This contains parts 1000 to 1299, where we intend to place regulations for air programs in future rulemakings.
Part 1045—Control of Emissions from Marine Spark-ignition Engines and Vessels.
Part 1068—General Compliance Provisions for Engine Programs. Provisions of this part apply to everyone.

Each part in the CFR has several subparts, sections, and paragraphs. The following illustration shows how these fit together.

Part 1045
Subpart A
Section 1045.1
(a)
(b)
(1)
(2)
(I)
(ii)
(A)
(B)

A cross reference to § 1045.1(b) in this illustration would refer to the parent paragraph (b) and all its subordinate paragraphs. A reference to ''§ 1045.1(b) introductory text'' would refer only to the single, parent paragraph (b).

List of Subjects

40 CFR Part 92

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

40 CFR Part 94

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

Dated: May 11, 2004.

Michael O. Leavitt,

Administrator.

[FR Doc. 04–11294 Filed 6–28–04; 8:45 am]

BILLING CODE 6560–50–P