

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

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

We have concluded that the standards in this final rule (which are equivalent to the internationally negotiated NO<sub>x</sub>

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

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

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

We are including a regulatory provision in 40 CFR 94.8 that establishes a schedule for a future rulemaking to promulgate additional emission standards for Category 3 marine engines that we determine are appropriate under section 213(a)(3). This rulemaking will reassess the emission standards in light of the developments in and experience with applying emission-reduction technology to Category 3 marine engines. The standards in this final rule will remain in effect until we modify them in a future rulemaking. We are committing to take final action on appropriate standards for marine diesel engines by April 27, 2007, and to issue a proposal no later than approximately one year before. This future rulemaking will allow us to exercise the discretionary authority under Clean Air Act section

213(a)(3), which directs EPA to “from time to time revise” regulations under that provision. EPA considers this time as necessary and appropriate to properly take into consideration additional information expected to become available about emerging technologies, as well as any developments in the international negotiations for more stringent emission limits.

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

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

## 2. Category 1 and Category 2 Marine Diesel Engines

We proposed to adopt a first tier of standards equivalent to the internationally negotiated NO<sub>x</sub> limits for marine diesel engines with per-cylinder displacement of 2.5 to 30 liters. We are adopting these standards in this action. By adopting these standards as Tier 1 standards, we are making them mandatory and enforceable for new engines on U.S. vessels. The Tier 1 standards will begin to apply in 2004 and will continue to apply through 2006. Beginning in 2007, the Tier 2