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Air

EPA Summary and Analysis of Comments

Control of Air Pollution; Emission Standards for New Gasoline Spark-Ignition Marine Engines

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Introduction

This document summarizes and analyses the comments received on the Notice of Proposed Rulemaking (NPRM) for *Emission Standards for New Gasoline Spark-Ignition and Diesel Compression-Ignition Marine Engines* and the Supplemental Notice of Proposed Rulemaking (SNPRM) for *Emission Standards for New Gasoline Spark-Ignition and Diesel Compression-Ignition Marine Engines; Exemptions for New Nonroad Compression-Ignition Engines at or Above 37 Kilowatts and New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts* pertaining to gasoline spark-ignition marine engines. EPA's proposal, summary of comments received, and analysis of comments received is presented. Readers are referred to the Air Docket #A-92-28 for access to all comments received on the NPRM and SNPRM.

This document does not address comments received pertaining to diesel compression-ignition engines, even though both the NPRM and SNPRM contained proposals applicable to such engines. EPA expects to take further action on diesel compression-ignition marine engines by December , 1996. At that time, a Summary and Analysis of Comments document will address the comments received pertaining to diesel compression-ignition marine engines.

1. Scope

1(i) Determination of Significance

Proposal: In the proposal EPA stated that gasoline spark-ignition marine engines make up nearly 30 percent of the nonroad engine summertime VOC emissions which contribute an average of ten percent of summer VOCs in the 19 ozone nonattainment areas included in the 1991 Nonroad Engine and Vehicle Emission Study. Given these facts, EPA determined that it is required to regulate new gasoline spark-ignition marine engines under Section 213(a) of the Clean Air Act.

Comments: One commenter offered three critiques of EPA's determination that it is required to regulate new gasoline spark-ignition marine engines. First, the commenter argued that EPA had failed to establish what constitutes "significant" under Section 213. Second, the commenter alleged various flaws in EPA's determination that new and existing nonroad engines and vehicles significantly contribute to VOC emissions in more than one nonattainment area. Third, the commenter suggested EPA must find that marine engines exceed the significance threshold. No comments were recieved refuting that nonroad gasoline SI marine engines contribute to nearly 30 percent of all nonroad engine summertime VOC emissions which contribute an average of ten percent of summer VOC emissions in the ozone nonattainment areas included in the 1991 Nonroad Engine and Vehicle Emission Study.

Analysis: In a final rule published June 17, 1994 (59 FR 31306), EPA determined that emissions of VOCs, NOx, and CO from nonroad engines and vehicles are significant contributors to ozone or CO concentrations in more than one ozone or CO NAAQS nonattainment area. Comments, if any, on this issue were appropriately received and addressed at the time of that rulemaking. Similarly, comments, if any, on the establishment of what constitutes significant contribution under 213(a)(2) were appropriately received and address at the time of that rulemaking. The commenter's statements regarding these two issues run to the prior rulemaking and not the

ongoing rulemaking regarding the control of emissions from spark-ignition marine engines. Comments on these two issues are beyond the scope of this ongoing rulemaking.

Further, the comment that a significance determination should be made for gasoline marine engines misinterprets the clear language of section 213(a). Paragraphs one and two of section 213(a) make it clear that EPA's determination of significance should be based on whether emissions from all new and existing nonroad engines are significant contributors to ozone or CO concentrations. By contrast, if the Administrator makes an affirmative decision regarding significance under section 213(a)(2), then section 213(a)(3) requires the Administrator to promulgate regulations for those classes or categories of new nonroad engines and vehicles "which in the Administrator's judgment cause, or contribute to, such air pollution." The reference to significant contribution relates to the initial determination on emissions from all nonroad engines and vehicles, but there is no such reference to significance in the subsequent language regarding regulation of classes or categories of new nonroad engines and vehicles. The reference to "such air pollution" relates to ambient concentrations of ozone or CO. Thus, the Agency believes that Congress did not intend a showing of significant contribution to be required for regulation of the class or category of new gasoline spark-ignition marine engines. Further, no one has challenged EPA's factual analysis and conclusions regarding these engines' contribution to ozone in ozone nonattainment areas. Accordingly, EPA is finalizing its proposed determination that emissions from new gasoline spark-ignition marine engines cause or contribute to ozone concentrations in more than one ozone nonattainment area.

1(ii) Alternative Fuels

Proposal: EPA proposed that the emission standards only apply to gasoline spark-ignition marine engines and not to spark-ignition marine engines that use any other fuels. EPA did not include test procedures or emission standards for alternative fueled-marine engines in its proposal. In the NPRM, the Agency stated that developing

test procedures or standards for alternative fuels would be time consuming and could not be completed by the court-ordered deadline for publication. Comments were requested by EPA on the need for regulations pertaining to alternative fuels and the potential for increased market share for alternative-fueled marine engines.

Comments: . Numerous comments were received on this issue from the manufacturers of a soy-based and bio-diesel fuels on the benefits of using these alternative fuels in compression-ignition diesel engines. These commenters urged the agency to give full consideration to the environmental benefits offered by such alternative fuels for CI engines. One additional comment on the use of alternative fuels was offered from a manufacturer of a propane alternative fuel system encouraging the Agency to include provisions for alternative fuels in this regulation. This commenter suggests that environmental benefits can be achieved from their propane fuel system, without adversely affecting the performance of marine engines. One comment was also received suggesting that incorporating alternative fuels into this regulation was unnecessary, but offered no supporting rationale.

Analysis: The scope of the final rule for spark-ignition engines will include only gasoline marine engines as proposed. EPA's analysis did not show that alternative fuels were being used in the spark-ignited (SI) marine industry by any major manufacturer. Also, there does not appear to be any efforts by marine SI gasoline engine manufacturers to design alternative fueled SI engines as the technological exhaust emission solution. Further, EPA is concerned that the establishment of emission standards and certification requirements for alternative fuels would likely discourage, rather than encourage, potential clean burning alternative fueled OB/PWC engines from entering the marketplace. EPA does not think it appropriate to set exhaust emission standards for these engines that require the use of alternative fuels. For these reasons, EPA has decided not to establish test procedures or standards for alternative fueled spark-ignited marine engines at this time. However, EPA appreciates the interest of commenters supporting the use of alternative fuels in marine engines and supports the establishment of demonstration projects for alternatively fueled marine engines.

1(iii) National Security and Exemption

Proposal: The proposal includes exemptions for marine enginesused for national security. It also proposed to revise the regulations for new small SI engine (40 CFR Part 90) and new large CI engines (40 CFR Part 89) to include such exemptions. The proposal applies the same type of national security exemptions used for existing on-highway programs to the applicable nonroad engines.

Comments: One commenter emphasized support for exemptions on basis of national security and military training purposes. No comments were received opposing the national security exemption proposal.

Analysis: Based on the lack of adverse comment, the final regulation for gasoline marine engines will be unchanged from the proposal with regards to national security exemptions. Also, EPA is finalizing the proposed revisions to 40 CFR parts 89, and 90, and the same provisions will apply to part 91.

1(iv) Exemption of imported engines Greater than 20 yrs old

Proposal: EPA did not propose an exemption for imported engines greater than 20 years old. EPA requested comment on the need for an exemption for imported engines greater than 20 yrs old.

Comments: Comments received on this issue supported exemptions for imported engines greater than 20 years old, suggesting that these engines have little or no impact on emissions and the lack of exemption would hinder trading and collection of "classic" engines.

Analysis: EPA thinks that the commenters misunderstood the issue of not exempting imported engines greater than 20 years old from importation restrictions. EPA proposed to allow collectors to apply for an exemption for "classic" engines for demonstration purposes and is finalizing provisions as proposed that allow for this concern. Therefore, EPA understands that a separate exemption for imported engines greater than 20 years old is not needed to address commenters concern and EPA is not including such an exemption in its final rule.

2. Averaging Sets

2(i) Averaging sets - one set v. two sets for SD/I and OB/PWC

Proposal: For the purpose of determining compliance with the average HC emissions standards, EPA proposed to construct two separate averaging sets for gasoline marine engines. Set 1 would include outboard/personal watercraft engines and Set 2 would include sterndrive and inboard engines. EPA proposed that two averaging sets with separate standards curves for each set was the most appropriate option for regulating HC emissions from gasoline spark-ignition marine engines. The Agency requested comment on the need to combine the averaging sets.

Comments: The Agency received no adverse comments on the proposal to maintain separate averaging sets for SD/I and OB/PWC engines. One engine manufacturer submitted comments opposing the option of combined averaging sets.

Analysis: The final regulation will remain as proposed due to the absence of adverse comments on the proposed option and an adverse comment received on the alternative option: SD/I and OB/PWC engines will be considered separately at this time with respect to potential emission standards and averaging sets. See Section 2, Emission Standards, for further discussion of the standards being finalized for the separate SD/I and OB/PWC categories.

2(ii) Averaging sets within the OB/PWC category

Proposal: EPA proposed in the NPRM a combined averaging set for outboards and personal watercraft, even though there are differences in product lines between manufacturers with some producing both types or only one type. EPA further articulated the reasons for its proposal in the SNPRM in light of comments received on the NRPM. Also, EPA sought comment on requiring separate averaging sets for a short while or during the phase-in period or a portion of it.

Comments: Comments received from several marine engine manufacturers and a marine industry group on both the NPRM and the SNPRM indicate support for a combined averaging set for OB/PWC, but not until the year 2001.

Analysis: The Agency has considered the comments received and the final

regulation has separate averaging sets for OB and PWC engines for model years 1999 and 2000, and a one-year deferral of the emission standard for PWC engines. The regulation requires OB engines to meet the proposed standards beginning in MY 1998, and for MY 1998 thru 2000, OB engines will be in a separate averaging set. For PWC engines, the one year deferral requires PWC engines to certify to the standards beginning in MY 1999, and for MY 1999 and 2000, PWC engines will be in a separate averaging set. Beginning in MY 2001, PWC and OB engines will be combined into a single averaging set and manufacturers will be required to meet the corporate average standards across their entire product line, including both OB and PWC engines. Section 9(iii) contains a summary and analysis of comments specifically addressing the issue of the unique nature of the PWC market place and the necessity for a one-year deferral and separate averaging sets for OB and PWC engines in MY 1999 and 2000.

3. Emission Standards

3(i) HC + NOx Standard for OB+/PWC Engines

3(i)(a) Level of the Standards

Proposal: In the NPRM, EPA proposed separate standards for HC and for NOx emissions from marine engines. The proposed HC standard was based on a curve of HC (in g/kW-hr) vs. engine rated power, which was developed by EPA as a best fit to engine manufacturers baseline data for OB and PWC engines. Manufacturers would use the curve to determine the standard which each FEL is compared with to determine emission credits (positive or negative) for each family. Each year the manufacturers' total credits must sum to zero or a positive credit balance. During each successive year of the proposed nine year phase-in period of the program, the emission curve becomes more stringent; in the final year, the curve represents a 75% reduction in HC emissions from the unregulated case.

In the proposal, EPA requested comment on the form of the HC standard (i.e., a curve based on engine rated power). EPA presented an analysis in the proposal of the technologies and associated cost of various emission control strategies. EPA's analysis and discussion included the use of marginal cost effectiveness, considerations of price elasticity, spreading of capital control costs over time, the related NOx standard, and the adherence to the statutory criteria. Based on this analysis, EPA believed the proposed 75% HC reduction was appropriate for this category of engines

In the proposal, EPA considered the application of several emission reduction technologies to the marine industry, including the application of automotive style "3-way" catalytic converters to four-stroke outboard and personal watercraft engines. Automotive style "3-way" catalytic convertors reduce HC, CO and NOx. The Agency commented that the technological difficulties of applying automotive style "3-way" catalytic converters to marine engines, while not insurmountable, would be costly. When considering the level of the standard on a marginal cost effectiveness basis, the application of such catalytic converters to four-stroke marine engines was found to be relatively expensive for the emission benefit derived from the technology.

Several other technologies were considered for reduction of HC emissions from

current two-stroke outboard and personal watercraft engines. These include conversion to four-stroke, direct-injection two-stroke, recalibration of current two-strokes, as well as the use of "2-way" catalytic converters which reduce HC and CO. In determining the benefits from these technologies, EPA compared emissions rates (on a brake specific work basis) from current two-stroke outboard and personal watercraft engines without these emission control technologies to estimates and test data from engines with these emission control technologies.

In the NPRM, EPA proposed an average NOx emission standard of 6.0g/kW-hr to begin in the first year of the program (1998). This level resulted from the HC reduction analysis. EPA's philosophy was to identify the average necessary NOx increase that resulted from the 75% HC reduction and to set the average NOx emission standard at that level. That level was 6.0g/kW-hr. EPA requested comment on the need for a phase-in period for the NOx standard. EPA proposed to not allow NOx banking during the phase-in period (MY 1998-2006) but requested comment on the issue of NOx banking. The Agency discussed the technical basis for the proposed 6.0 standard, the inherent relationship between HC and NOx for this class of engines, and the resulting increase in NOx emissions as a result of the proposed HC standard.

In light of comments received on the NPRM, EPA re-proposed in the SNPRM a combined HC+NOx average standard which would retain the phased-in HC reduction proposed in the NPRM and a 6.0 g/kW-hr NOx level after the phase-in.

Comments: Diverse comments were received on this issue. Several environmental organizations commented that the EPA should finalize much lower emission standards than were proposed. These comments recommended that the HC standard for SI marine engines should be set at four-stroke levels which would effectively remove two-stroke engines from the OB/PWC+ market. One commenter believed this would be equivalent to approximately a 90% reduction in HC from the baseline. One environmental organization commented that HC levels should be reduced by approximately 98% to achieve the same reductions as required of light duty vehicles. This commenter stated that § 213(a)(3) requires that emission standards for nonroad engines be of equivalent stringency to standards for on-

highway vehicles. Commenters also stated they believed that many of the NOx control strategies used in on-highway applications, such as EGR and aftertreatment, can be applied to marine engines. Comments were received from several environmental organizations suggesting automotive style 3-way catalyst technology is feasible for several marine applications including OB/PWC. One group representing several states recommended a NOx standard of 3 g/kW-hr (and lower) for spark-ignition marine engines. They suggested the NOx level of 3 g/kW-hr would be half as stringent as the Tier 1 light-duty vehicle (LDV) on-highway standard. An environmental organization supported a NOx standard of 1.8g/kW-hr. Several environmental organizations questioned the use of marginal cost-effectiveness as a basis for setting the emission standard while other commenters supported this approach.

Generally, state and local environmental agencies supported the level of the standards and emphasized the need for emission reductions from this source. Some commenters thought lower standards may be attained, yet comments supported the levels finalized as a balanced approach.

In general, marine OB/PWC engine manufacturers supported the proposed HC standard. Manufacturers supported the proposed HC curve and the averaging approach of the standard. However, OB/PWC engine manufacturers were opposed to the proposed 6.0 g/kW-hr average NOx level. In general, manufacturers believed EPA had failed to adequately consider the relationship between NOx and HC and the effect the proposed HC standard would have on NOx emissions. Manufacturers commented that the technologies which would be used to meet the proposed 75% HC reduction would result in average NOx levels above the 6.0 g/kW-hr the Agency proposed. Several alternative proposals were received from engine manufacturers. Several manufacturers supported an average NOx level of 14g/kW-hr and one manufacturer supported a level of 10g/kW-hr. Several manufacturers urged EPA to consider a combined HC+NOx standard as a solution to the inherent HC-NOx tradeoff, they stated that the HC+NOx averaging format would allow them the flexibility to meet both the proposed HC and NOx standards.

Comments were received from marine engine manufacturers as well as marine

industry organizations on the various emission control technology issues discussed in the NPRM. One commenter stated that to control NOx, modifying air/fuel ratio and exhaust gas recirculation (EGR) will slightly decrease power, increase fuel consumption which will result in an increase in both HC and CO. Additional comments focused on discussion on the use of catalysts. Some commenters suggest that catalysts on some marine engines would be exposed to water and other conditions unique to marine usage that leads to high catalyst temperatures, catalyst degradation, and other hazards.

Analysis: EPA is finalizing an HC+NOx average emission standard, which when completely phased-in (model year 2006), will result in at least an overall 75 percent reduction in HC emissions from OB/PWC from baseline levels[1]. The HC emission reduction will come from the use of cleaner technologies, such as 2-stroke direct injection, 4-stroke, catalyst, or other technologies, for OB/PWC. Refer to the next section (3(i)(b)) for a discussion of the specific issue of an HC+NOx emission standard form. Refer to the preamble section ("Level of the OB/PWC HC+NOx Emission Standard") for a discussion of the HC+NOx emission standard. The analysis presented here addresses comments received which are not discussed in the preamble.

Comments received did not present sufficient cause to deviate from the proposed emission standard levels or justification for the 75% reduction as the basis for the HC+NOx average emission standard for OB/PWC. EPA received comment suggesting an HC reduction of 90% was appropriate from this class of engines. As discussed above, the Agency believes a 90% is possible, however, the Agency believes the cost-ineffectiveness at the 90% reduction level is not justified. The Agency received comment supporting an HC reduction of 98% because this would be equivalent to the reduction for on-highway light-duty vehicles. The Agency disagrees with this analysis. Section 213 of the Clean Air Act does not require that EPA finalize

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[1]In the SNPRM the Agency stated that the combined HC+NOx emission standard would achieve the same overall level of control as the separate standards proposed in the NPRM. Though no comments were received on this issue, the Agency believes the combination of HC and NOx into a single standard for the final rule maintains the same level of stringency as the separate standards proposed in the NPRM. See section IV.A.1. and IV.A.2. of the SNPRM for additional information.

nonroad emission standards of equivalent stringency to LDV standards. Rather, the CAA states that when setting standards for new nonroad engines or vehicles, "the Administrator shall first consider standards equivalent in stringency to standards for comparable motor vehicles or engines (if any) regulated under section 202, taking into account the technological feasibility, costs, safety, noise, and energy factors associated with achieving, as appropriate, standards of such stringency and lead time.", 42 USC 7547(a)(3). The technology assessment analysis performed by the Agency indicated a 98% reduction was not technologically feasible for this category of nonroad engines at this time considering the available range of technologies. Section 1.2, Emission Control Technology, of the Regulatory Impact Analysis for this final rule contains additional information on the range of HC reduction technology the Agency considered for this rule.

The Agency received comment supporting a NOx emission standard set at 3 g/kW-hr, which would be half as stringent as the NOx Tier 1 standard for light-duty vehicles. The Agency also received comment supporting a NOx standard of 1.8 g/kW-hr. The Agency also received comments suggesting a NOx standard of 14 g/kW-hr would be appropriate, and a suggestion that a 10 g/kW-hr NOx standard was appropriate. The Agency believes the NOx portion of the combined HC+NOx standard represents an average NOx level of 6.0g/kW-hr at the end of the phase-in. The Agency considered the range of technologies most likely to be utilized in order to achieve cost-effective reductions in HC from this category of engines. Without the use of either NOx reduction catalysts or exhaust gas recirculation (EGR), most HC technologies considered by the Agency result in a NOx increase (e.g., conversion to 4-stroke or direct injection 2-stroke). The Agency received comment stating that the use of EGR or the adjustment of engine air-fuel ratio to achieve a reduction in NOx will result in a decrease in engine power, increased fuel consumption, and higher emissions of both CO and HC. The Agency agree's that the adjustment of air-fuel ratio to decrease NOx may increase HC and CO emissions, however, the adjustment of air-fuel ratio to decrease NOx does not automatically lead to decreased power and increased fuel consumption. The Agency believes an unqualified statement such as

this is not defendable. The use of EGR can reduce engine power, but the selective use of EGR at certain operating conditions, other than the wide-open throttle, peak power condition, would not effect the maximum power rating of the engine. The Agency received comments from some engine manufacturers suggesting the application of catalyst to marine engines present unique circumstances that lead to catalyst deterioration. The Agency agrees that catalyst used in the marine environment would see operating conditions substantially different than on-highway applications. The reader is referred to RIA section 1.2.2.3 "Catalyst Technology" for a more detailed discussion of catalysts. The Agency believes the use of NOx reduction catalysts and EGR may someday be feasible and cost effective for this category of engines, but the Agency's analysis did not show that cost effective HC+NOx emission reductions would be achieved through the use of such technologies at this time. The HC reduction technologies which do not result in NOx increases (e.g.. use of oxidation catalysts on current technology 2-stroke engines) do not result in large HC reductions. The analysis performed by the Agency considered the impact the range of HC reduction technologies would have on NOx emission levels. At the level of HC emission control being finalized in this rule (75% HC reduction), average NOx emissions were estimated to be 6.0g/kW-hr, not 1.8, 3, 10 or 14. With respect to the level of the NOx standard, EPA is finalizing interpollutant averaging via the HC+NOx average emission standard structure. Because of the inherent flexibilities of allowing interpollutant averaging, EPA agrees with comment that manufacturers will be able to meet both the 75% reduction in HC and the 6.0 g/kW-hr NOx level contemplated in the NPRM. Therefore, the HC+NOx standard is being finalized in a way that is expected to result in average NOx levels of 6.0g/kW-hr NOx from OB/PWC engines.

3(i)(b) Interpollutant Averaging

Proposal: Based on comments received on the NPRM, EPA re-proposed in the SNPRM that an HC+NOx average emission standard more appropriately recognizes the inherent spark-ignited engine technology trade-off between reductions in HC and necessary increases in NOx. The proposed form of the combined HC+NOx standard would retain the 75% HC reduction from the NPRM and would achieve an average NOx level at 6.0g/kW-hr after the phase-in period. As discussed in section (a) above,

EPA originally proposed separate HC and NOx standards for spark-ignition marine engines. HC reductions are the primary focus of this rule because of the very high HC emissions from charge crankcase scavenged two-stroke spark-ignition marine engine technology which is currently used in most OB/PWC engines. In both the NPRM and SNPRM, the proposed standards sought to "achieve the greatest degree of emission reduction achievable through the application of technology ..., giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers," and to noise, energy, and safety factors[2].

The Agency proposed the combined HC+NOx emission standard would be based on a 1 to 1 weighting of the two pollutants and requested comments on the appropriateness of this weighting scheme for the marine rulemaking. Finally, EPA requested comment on the relative valuation of HC versus NOx in terms of air quality as it relates to the proposed combined HC+NOx standard.

Comments: EPA received comments from marine engine manufacturers requesting that the HC and NOx standards be combined into a single HC+NOx standard. They commented that the proposed NOx standard was too stringent and would retard the introduction of the cleanest HC control technologies. Manufacturers were concerned that a low HC engine that generated positive emission credits according to the proposed HC average standard could generate negative NOx credits. Therefore, the negative NOx credits would have to be covered by positive NOx credits from other engines with less or no HC control. Manufacturers commented that an HC+NOx standard would allow them the flexibility to calibrate their new technology engines while still achieving overall targets. Engine manufacturers strongly supported the proposed HC+NOx standard. Marine engine manufacturers supported the proposed 1 to 1 relative weighting of the two pollutants.

A state air quality agency commented in support of the SNPRM proposal to combine HC and NOx through interpollutant averaging. The commenter supported the proposed 1 to 1 relative weighting of the two pollutants. The commenter also

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[2] § 213(a)(3) of the Clean Air Act

stated that it would be important for state air agencies to have separate reporting of the HC and NOx levels from marine engines.

An environmental organization was opposed to interpollutant averaging between HC and NOx. In response to the NPRM, they commented that a combined HC+NOx standard would make the actual air quality impacts of the rule difficult to discern, could result in greatly increased NOx emissions, and could hamper enforcement, but no further rationale was offered by the commenter.

Analysis: As proposed in the SNPRM, EPA is finalizing an HC+NOx average emission standard which retains the 75% reduction in HC emissions and the 6.0 g/kW-hr NOx level in 2006 and later years proposed in the NPRM. This standard will take the form of an HC+NOx averaging curve that becomes more stringent each year for a nine year phase-in period. This averaging curve is a combination of HC emissions being reduced from a baseline curve to a final curve which is 25% of the baseline curve and a phase up of NOx from 2.0 to 6.0 g/kW-hr incrementally over nine years. Manufacturers will be required to report HC and NOx emission levels separately. EPA thinks this approach will be enforceable, give appropriate incentives to manufacturers for low NOx levels, and give the Agency the ability to monitor both the HC and NOx levels of these engines in the future.

Generally, the most effective HC control technologies that manufacturers consider applicable for reducing engine-out emissions have a detrimental effect on NOx emissions. The control strategies most likely to be used to meet the large HC reductions in this rule, (e.g. conversion to four-stroke and direct injection two-stroke) increase the combustion efficiency of the engine so that fuel is used more economically. However, increased combustion efficiency will also increase cylinder temperatures, resulting in a more favorable environment for NOx formation. In addition, the dominant engine technology currently used in the OB/PWC market, charge scavenged two-stroke engines, utilizes internal EGR which results in low NOx emissions at the cost of extremely high HC emissions (see section 1.2.3.1 "Control Technology Pollutant Levels - Outboard and Personal Watercraft Engines" of the RIA for additional discussion of NOx levels from existing technologies). The new control strategies do not have internal EGR. Because HC emissions from current two-stroke

marine engines are several orders of magnitude higher than NOx emissions, large reductions in HC emissions can be obtained with a relatively small NOx increase. This HC and NOx tradeoff can be controlled through other means, but some NOx increase is inevitable with large HC reductions. The proposed NOx level was based on a calculation of the average NOx expected from OB/PWC spark-ignition marine engines with the proposed HC standard in place. As discussed in the Regulatory Impact Analysis, the Agency has estimated the increase in NOx to be small from an already small contributor. The Agency believes the average NOx emission level at the completion of the phase-in period will be 6.0g/kW-hr. The Agency does not believe that average NOx levels will be higher than 6.0g/kW-hr because of the combination of HC and NOx into a single standard. As discussed in the RIA, average NOx emissions from OB/PWC engines will increase as a result of the final rule, however, the analysis the Agency has performed did not show that average NOx emission levels will be higher than 6.0g/kW-hr at the completion of the phase-in period. Refer to the RIA for additional information on the technologies the Agency expects to be used to meet the finalized standard.

EPA does not believe that the HC+NOx standard format will cause any loss of air quality benefits. This flexibility actually promotes the introduction of cleaner HC technologies into the marketplace earlier than if the standards were separate because NOx control becomes less of a design problem for the manufacturers. Gasoline marine engines make a much smaller contribution to NOx inventories than to HC inventories. EPA also does not believe that the combined standard will impede modeling efforts, or make actual air quality impacts of the rule difficult to discern. Manufacturers will be reporting both HC and NOx individually in their certification applications which can be used to improve State Implementation Plan analyses. The Agency received comment suggesting that a combined standard would hamper enforcement of the regulation. EPA does not understand why the commentor believes the combined standard will interfere with enforcement and no detail was provided by the commenter. The Agency has finalized a strong enforcement program which will not be adversely effected by the combination of HC and NOx levels into a combined

standard. The combination of HC and NOx into a single standard has no relevance on the enforceability of the finalized regulation. Manufacturers must certify an FEL which will be a combined HC+NOx numerical value. This numerical value has the same enforceability as would a program with separate HC and NOx standards.

The equal weighting of HC and NOx in a 1 to 1 ratio is finalized as was proposed in the SNPRM. The reactions between HC and NOx to form ozone are not currently understood well enough to put meaningful weightings on HC and NOx, if such weightings are appropriate at all. Although the reduction of both pollutants generally results in a reduction of ozone formation, the relative importance of each pollutant can not be calculated for this action as a whole. The main reason for this is that each air basin in which gasoline marine engines are used will react differently to the same reductions in pollution. Ozone formation in each area will be affected not only by marine engines, but by other emissions sources (natural and man made), weather, and wind patterns. Therefore, EPA has decided at this time to finalize a weighting of 1 to 1 for HC and NOx for this rulemaking[3]. If new information or policy becomes available in the future regarding the relative importance of HC and NOx and its relationship to the gasoline OB/PWC emission inventory, the Agency may revisit this issue at that time.

3(i)(c) Implementation Schedule

Proposal: EPA proposed the standards for OB/PWC engines should begin in model year (MY) 1998, and be phased-in over a 9 year period so that the final (~75% HC reduction) HC+NOx level would be achieved by MY 2006. EPA also proposed the standards for gasoline SD/I engines would begin in MY 1998, however, because of EPAs decision to not finalize gasoline SD/I engine emission standards, comments received on the implementation schedule for SD/I engines will not be summarized. In the SNPRM, EPA proposed no change to the implementation schedule for OB/PWC engines. However, in the SNPRM, EPA requested comment on the need for flexibility

[3]EPA has finalized a similar 1 to 1 ratio HC + NOx standard for small spark-ignited nonroad engines under 19kW (40 CFR Part 90) and other rules.

for the 1998 MY compliance due to circumstances outside the control of the manufacturer, including the need for a multi-year averaging period. EPA also requested comment on any other alternatives.

Comments: Several comments were received regarding the implementation schedule for OB/PWC engines. One marine industry organization in their SNPRM comments supported the proposed implementation schedule for HC+NOx standards for OB engines, but requested a one year deferral to MY 1999 for PWC engines and a multi-year averaging for the initial years of implementation for both OB and PWC. This same marine industry organization commented that EPA should allow both OB and PWC manufacturers to certify prior to the implementation year in order to take advantage of early credit banking . One PWC engine manufacturer commented that PWC implementation should be delayed by one-year to MY 1999, along with a deficit carry-over for MY 1999 and 2000 for PWC engines. A second PWC engine manufacturer supported a one-year delay in the implementation schedule for PWC manufacturers. An OB manufacturer who identified themselves as a small volume manufacturer requested the implementation date for small volume manufactures be delayed two years to MY 2000, but the completion of the phase-in period would remain at MY 2006.

One state air quality organization offered an alternative implementation schedule which began in MY 1999 but was fully phased in by MY 2003.

An environmental organization commented that EPAs implementation schedule started too late and was too lengthy. This commenter urged EPA to begin the certification process in FY 1996 or 1997, and they believed a four-year phase in period should be sufficient for conversion of OB/PWC to four-stroke or direct-injection technology.

Analysis: EPA has closely considered the comments received regarding implementation schedule. This final rule will retain the proposed implementation schedule for OB engines, a nine year phase-in period beginning in MY 1998, but the PWC engine implementation will be delayed one year to MY 1999 with an eight year phase-in period. The comments received by state air quality agencies and

environmental organizations reflect EPAs position in the sense that real emission reductions should be achieved as quickly as possible. EPA has spent considerable time analyzing the OB/PWC industry and believes the final implementation schedule is as aggressive a schedule that the industry can achieve without imposing undesirable economic hardship. The final regulation will require significant retooling efforts by the OB/PWC industry which will require time in addition to significant capital investment. The Agency believes the one-year deferral for PWC manufacturers is necessary considering the unique position of many of the PWC manufacturers (see Section 9(ii) and 9(iii)). Additionally, see sections 4(vii)(a) and 4(vii)(b) for discussions on multi-year averaging and early banking and trading.

3(ii) No Emission Standards for SD/I Engines

Proposal: In the NPRM, EPA proposed to set emission standards for HC, NOx, and CO for gasoline SD/I engines. The Agency proposed an average HC standard of 8.0 g/kW-hr, an average NOx standard of 6.5 g/kW-hr, and a CO cap standard of 400 g/kW-hr. Upon analysis of the NPRM comments, EPA proposed in the SNPRM to set a HC+NOx emission cap standard equal to 2/3 of the final year HC+NOx average emission standard for the OB/PWC category, i.e., the SD/I HC+NOx standard would equal 2/3 the model year 2006 level for OB/PWC engines. In the SNPRM, EPA also requested comment on the alternative of finalizing no HC or NOx emission standard for SD/I engines. EPA requested comment in the SNPRM on whether SD/I standards at the level proposed would offer a useful backstop against emissions backsliding by SD/I.

Comments: Comments were received from environmental organizations opposing EPAs NPRM proposal for SD/I HC and NOx standards. In general, environmental organizations believed EPAs proposed standards were to lenient for this category of engines. One environmental organization believed EPA should set a standard equal to a 98% reduction from all marine engines. This commenter believed Clean Air Act Section 213(a) required EPA to set a standard of equal stringency to on-highway engines, which they believed corresponded to a 98% reduction.

A second environmental organization also believed EPAs proposal was to

lenient. The commenter believed the CAA requires EPA to set a standard of equivalent stringency to the existing standards for on-highway vehicles. This commenter believed EPA should set a HC standard equivalent to the standard for on-highway light-duty trucks, which they estimated to be 0.78 g HC/kW-hr. The commenter believed a NOx standard for SD/I engines should be based on the levels achievable with the use of three-way catalytic convertors.

No response was received on the SNPRM regarding EPA's proposed emission standard for SD/I engines or the alternative of no emission standard.

State organizations were generally supportive of the approaches proposed for SD/I engines and generally deferred to EPA's judgement as to the appropriate emission standards. One state group thought that lower standards based upon the application of on-highway technology were feasible, however. One state commented that EPA should issue guidance to states that provides information on the relative emissions from the class or category of SI engines.

Manufacturers were generally supportive of the SNPRM proposals if the proposed certification flexibilities for SD/I engines were finalized. Otherwise, they supported no SD/I emission standards.

Analysis: The final regulation contains no HC or NOx standards for SD/I engines. The final regulation also contains no CO standard for SD/I engines, please see Section 3(v), "No CO or PM Standard", for a discussion of no CO standard for gasoline marine engines. A sterndrive or inboard (SD/I) engine is an engine which utilizes a four-stroke, automotive style engine block which has been modified (i.e., marinized) to facilitate the marine application. SD/I engines are much cleaner than the OB/PWC model year 2006 emission standard (see EPA Air Docket A-92-28, docket submission IV-H-01 for a discussion of EPAs analysis of SD/I emission levels in comparison to the OB/PWC model year 2006 standards). In fact, SD/I engines have lower emissions than the alternative technology which will likely be applied to the potentially substitutable outboard engines: direct-injection two-stroke technology.

Section 213 of the CAA offers the Agency the flexibility to not impose emissions standards for SD/I engines, given the unique circumstances presented by SD/I's.

Section 213(a)(3) directs EPA to establish emission standards for "classes or categories" of new nonroad engines which achieve the "greatest degree of emission reduction achievable through the application of technology ..., giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers" and other factors 42 U.S.C. 7545(a)(3). EPA is treating all marine spark-ignition engines as one "class or category" of new nonroad engines for which EPA is establishing emission standards. SD/Is constitute a subclass or subcategory of the marine propulsion SI class or category while OB/PWC constitute the other subclass or subcategory. Given this approach, EPA has determined that together the HC+NOx emission standard for OB/PWC and no SD/I HC or NOx standard are appropriate under Section 213(a)(3). Additional discussion of this issue appears in the preamble.

Comments received from several organizations suggested EPA should set a stringent emission standard for SD/I engines based on the application of on-highway technology, i.e., the use of electronic fuel injection with closed loop fuel feedback controls, three-way catalytic convertors, oxygen sensors, and EGR. EPA considered the application of these technologies to SD/I engines[4] and included estimated costs and benefits in it's analysis (see the Regulatory Impact Analysis for this final regulation for a detailed discussion of the marginal cost effectiveness analysis performed for this rule). One result of the analysis which was very clear was the small added emission benefit at very large cost which would occur from the application of on-highway technology to marine SD/I engines.

Per the suggestion of one commenter, EPA plans to issue guidance to states that provides information of the relative emissions from the class or category of SI engines. See discussion of guidance in the preamble.

3(iii) Evaporative Emission Standards

[4] Section 213(a)(3) directs EPA to consider standards equivalent in stringency to standards for comparable motor vehicles or engines (if any). See discussion of § 213(a)(3) in Section (3)(i)(a) of this document.

Proposal: EPA did not propose evaporative emission standards for gasoline marine engines, but did request comment on this issue. EPA also requested comment on the merits of requiring a closed fuel system for these engines.

Comments: One environmental group supported the control of evaporative emissions from marine engines through the sealing of fuel systems. The commenter suggested that sealed fuel systems with air makeup valves are satisfactory and present no insurmountable technological or cost obstacles, no additional information was provided by the commenter. One engine manufacturer suggested EPA undertake a separate rulemaking on the issue of evaporative emission controls for marine engines if control was determined to be necessary. An third commenter was strongly opposed to any evaporative emission requirements which would compromise boating safety or existing U.S. Coast Guard safety standards, including any EPA requirement for a sealed fuel tank. A fourth commenter supported the inclusion of evaporative emission standards either now or in the near future for gasoline marine engines.

Analysis: The final regulation does not contain any requirements for evaporative emission reductions or sealed fuel systems. Because EPA has little or no information available on the cost, benefits, or safety implications of controlling evaporative emissions from marine engines, and no new information was obtained during the comment period, EPA lacks sufficient information on which to base evaporative emission control requirements. EPA retains the authority under §213 of the CAA to propose evaporative emission controls in the future, and any such undertaking would take into consideration existing U.S. Coast Guard requirements.

3(iv) Crankcase Emissions

Proposal: EPA proposed to require closed crankcase systems for all gasoline marine engines. EPA requested comment in the supplement notice on the option of no emission standards for sterndrive/inboard engines which would include no closed crankcase requirements for these engines.

Comments: One commenter supported the proposal for closed crankcase systems. No adverse comments were received on the proposal.

Analysis: EPA will finalize closed crankcase requirements for the OB/PWC category of gasoline marine engines. For SD/I engines, EPA has finalized no emission standards for this category of gasoline marine engines, which includes no standards or requirements for closed crankcases. However, EPA retains the authority to revisit this matter in the future. In addition, EPA encourages any manufacturer of gasoline SD/I engines to voluntarily incorporate closed crankcase systems.

3(v) No CO or PM Standard

Proposal: EPA proposed in the NPRM to cap CO emissions at 400g/kW-hr and requested comment on the appropriateness of such a cap, given that nonattainment episodes for CO occur in the winter, while most boating activity in the U.S. occurs during the summer months. The Agency discussed in the proposal concerns regarding CO exposure to boat users. In the SNPRM, EPA noted that it was considering whether to include a CO standard in the final rule.

The proposed regulation contained no particulate matter (PM) emission standards for gasoline marine engines, but comment was requested on the issue.

Comments: Diverse comments on the proposed CO standard were received in response to the NPRM. Several environmental organizations recommended the Agency set a stringent CO standard. One environmental organization suggested the cap be at 20 g/kW-hr or less to coincide with the stringency of the CO cap set for light-duty vehicles. An environmental organization commented that personal exposure to exhaust emissions from marine engines must be taken into account when considering marine standards. Specifically this commenter mentioned exposure to carbon monoxide, benzene, and fine particles. In addition, this commenter submitted an article regarding CO exposure for the Agencies review, which is now contained in the Docket (i.e. Journal of American Medical Associations[5]). The article discusses CO exposure among recreational boaters from a study performed in the Seattle, Washington area. One environmental organization also suggested that CO from

[5] Silvers, S., Hampson, N., "Carbon Monoxide Poisoning Among Recreational Boaters," JAMA, November 22/29, 1995--Vol 274, No. 20.

marine engines poses a risk to marine life.

One state air quality organization believed the proposed CO standard was to lenient, and that lower standards were achievable through the application of on-highway technology, however, no suggested CO level or specific technology for the reduction of CO was suggested.

A boat manufacturing company questioned EPA's reference in the NPRM to boat design and its impact on CO. This commenter does not believe such language is appropriate and requested EPA clarify the meaning of the reference to boat design and CO health effects.

A few engine manufacturers expressed support for the 400 g/kW-hr cap, but only beginning in the year 2000 to allow proper focus on cleaner HC technologies and to avoid putting resources into existing technology engines to comply with the standard. Several engine manufacturers supported no standard for CO from OB/PWC engines, suggesting that because CO nonattainment is primarily a wintertime problem minimal environmental benefits would be gained relative to the costs associated with meeting such a standard.

One marine industry group commented in response to the NPRM that they supported the proposed CO standard, but were concerned that efforts to meet the proposed CO standard would divert needed resources away from meeting the HC emission benefits, for this reason they proposed the CO standard become effective in the year 2000. In comments submitted on the SNPRM, this same marine industry group reversed their NPRM comments and supported the position that no CO standards should be finalized for OB/PWC engines. Their rationale was that CO nonattainment is a cold-weather phenomenon, and boats are generally used in warm weather; therefore, reducing CO emissions from boats would not help bring an area into CO attainment. The commenter stated there is a lack of evidence that recreational marine engines significantly contributes to CO nonattainment, and they are not aware of any other basis for which a CO standard should be imposed, therefore no CO standard should be finalized. They stated that if the Agency choose to finalize a CO cap, the cap should be no lower than 400g/kW-hr and must not apply

to existing technology engines.

Comments were received both supporting and opposing the lack of a PM standard for gasoline marine engines. One marine industry commenter supported the proposal, concurring that PM emissions from these engines are very small relative to other sources, and that the potential benefits do not warrant the increased cost of control.

Two environmental organizations believed EPA must set a PM standard for gasoline two-stroke marine engines. Both commenters stated that PM from current technology two-stroke engines was a significant health hazard and they urged EPA to set a stringent standard for these engines. One of these commenters suggested EPA set a PM standard of 0.75 g/kW-hr or less for OB/PWC engines. This commenter wrote that EPAs own reports state that 70,000 deaths per year are associated with PM. The commenter concluded because 2-stroke engines emit 10 times more PM than 4-stroke engines a PM standard was essential.

Analysis: EPA is not finalizing a CO standard or a PM standard for gasoline marine engines.

As discussed in the NPRM, most of the NAAQS nonattainment episodes for CO occur in the winter, while most boating activity in the US occurs during the summer months, when CO air quality standards are rarely in nonattainment . EPA has not determined CO emissions from gasoline marine engines contribute to CO concentrations in more than one CO nonattainment area. Under Section 213(a)(3) of the Clean Air Act (CAA), EPA has the authority to set emission standards for CO from gasoline SI engines should such contribution occur, whether or not that contribution is significant, see Section 1(i).

Section 213(a)(4) of the CAA gives EPA additional discretionary authority to regulate any emissions not referred to in section 213(a)(2) of the CAA from new nonroad engines or vehicles collectively that the Agency determines significantly contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. If such a determination is made, EPA may regulate such emissions fro those classes or categories of new nonroad engines that cause or contribute to such pollution. EPA considered whether a CO standard was justified for OB/PWC engines

under CAA Section 213(a)(4). At this time EPA does not have enough information regarding CO personal exposure from gasoline marine propulsion engines to determine whether a CO standard is appropriate for this subcategory or subclass of engines or what an appropriate CO level would be with respect to 213(a)(4) criteria.

Information presented during the comment period did not address CO exposure resulting from the emissions from OB/PWC engines, however, some information was presented on SD/I engines. A JAMA article ("Carbon Monoxide Poisoning Among Recreational Boaters," JAMA, November 22/29, 1995--Vol 274, No. 20.) was submitted to the docket suggesting that boat design, in addition to engine CO exhaust emissions, influences CO exposure from boating activity. However, this article is an insufficient basis for making a determination. This article indicates that boat design is a factor in CO exposure yet does not offer further analysis of boat desing and its impact on exhaust emisison levels or indicate any suggested remedies. The Agency has no additional information on CO exposure from gasoline marine SI engines. The Agency will continue to monitor the issue of recreational boating CO exposure and contributions to CO nonattainment and retains the authority to act accordingly on new information as it becomes available. The Agency believes this regulation will decrease the total emissions of CO from the gasoline marine engine category as a whole, however, the emissions from individual engines may stay near their current emission levels or may decrease. The Agency's analysis indicates the application of direct-injection two-stroke technology will result in a significant decrease in CO emissions as compared to existing technology two-stroke engines. The application of 4-stroke technology has the potential to result in decreased CO emissions, but decreased CO emissions is not guaranteed. The Agency believes it is extremely unlikely that CO emissions from OB/PWC engines would increase as a result of the conversion of existing technology two-stroke engines to the new technology direct-injection two-stroke and 4-stroke technology.

Control of particulate matter is a concern for EPA, however, EPA does not believe setting gasoline marine engine exhaust emission standards for PM would be appropriate at this time. Despite not finalizing PM standards, the Agency believes the

technologies used to meet the HC+NOx standard in this regulation will result in a large reduction in PM from this source category. Information available on off-highway four-stroke engines indicates PM from 4-stroke gasoline engines is significantly lower than traditional charge crank-case scavenged (i.e. existing technology) two-stroke engines (see Society of Automotive Engineers Paper 910560). Information on the PM characteristics of the new technology direct-injection two-stroke engines was not available, but the elimination of scavenging losses expected with this technology would likely lead to large reductions in PM compared to existing technology two-stroke engines. Given the expected reduction in PM for OB/PWC as a result of the finalized HC+NOx standard, the Agency declines to exercise its discretionary authority under §213(a)(4) to impose a PM standard for this category of engines at this time.

In summary, the Agency has made no determination regarding the appropriateness of CO or PM emission standards for gasoline SI marine engines under either §213(a)(3) or §213(a)(4).[6]

(vi) Water Quality Issues

Proposal: The proposal contained EPA's position on water quality impacts from marine exhaust emissions. EPA acknowledged in the proposal that marine engine emissions impact water quality, but the Agency presented reasons why the proposal did not contain provisions specifically addressing the water quality impacts of marine emissions.:

Comments: Several environmental organizations commented on the effects of marine engines and vessels in general on water quality and marine life. The commenters cited several existing as well as on going scientific studies regarding the effects of marine engine exhaust on aquatic life. In addition to hydrocarbon effects on marine life, one commenter also suggested that CO from marine engines pose a risk to marine life. One environmental organization commented they appreciated the

[6] Regulation of benzene due to personal exposure hazards would also be authorized under §213(a)(4), but the Agency has made no determination on the appropriateness of benzene emission standards for gasoline SI marine engines.

strong possibility that reductions in air hydrocarbon emissions would result in reductions in water hydrocarbons, but the commenter questioned the similarities in the speciation of the reduction in water bound hydrocarbons. In general, the commenters supported any efforts to reduce marine emissions into the water and encouraged EPA to solicit or undertake research into water bound hydrocarbons from engine exhaust.

Comment was received by an academic research center which questioned the impacts of the proposed regulation on water quality. This commenter believed the proposed regulations would make improvements in air emissions from marine engines, but they believed the Agency should further investigate the impacts of the proposal on water quality before finalizing the regulation.

Analysis: The Agency appreciates the concerns raised by several commenters regarding the potential impacts of marine emissions on water quality. Many of the comments received relied on the same data reports EPA examined during the development of the NPRM, though some new studies were brought to EPA's attention through the comment process. In particular, an article written by several Swedish scientist at Stockholm University's Laboratory for Aquatic Ecotoxicology titled, "Effects of Exhaust from Two-Stroke Outboard Engines on Fish" submitted by an environmental organization presented well written study of the potential impacts of OB emissions. However, many of the assumptions which went into the Swedish study may not be appropriate for estimations of water quality impacts in the United States. Assumptions made in that study regarding average engine size, water depth, water temperature, and level of exposure do not appear to be appropriate for many areas of the United States. While Section 213 of the Clean Air Act does not preclude the Agency from considering and addressing water quality impacts, the primary focus of this rulemaking is the effects of gasoline spark-ignited engines on air quality. The Agency believes this regulation will decrease the water quality impact from marine engine emissions through the reductions in exhaust emissions required by this regulation for the reasons set forth in the proposal; however, the sparse data currently available makes it clear that more information is needed to understand the impact frommarine gasoline SI engine exhaust emissions on water quality. The Agency

continues to be interested in any new information which becomes available.

4. Pre-Production Compliance--Certification Program Issues

4(i) Model Year Definition

Proposal: EPA proposed to use the same definition for model year as exists for on-highway heavy-duty vehicles and engines, but requested comments on the appropriateness of this definition. EPA also requested comments on the relationship between the proposed model year definition and inventory issues, particularly left-over inventory of engines at the end of the model year.

Comments: Comments were received from engine manufacturers supporting the proposal because it provides manufacturers with flexibility.

Analysis: Based on the absence of negative comment, EPA will finalize the model year definition as proposed.

4(ii) Engine Family Definition

Proposal: EPA proposed in the NPRM to use the engine family definition criteria currently applied to on-highway engines and requested comment on the issue. The Agency proposed an engine family definition in the NPRM that allowed the manufacturers flexibility to further segregate engine families beyond the proposed criteria, but did not allow manufacturers the flexibility to consolidate engine families. In response to comments, the SNPRM proposed additional language which would allow engine manufacturers to consolidate engine models further, based on proof of similar in-use emission performance.

Comments: One engine manufacturer commented the proposed definition in the NPRM is too restrictive as marine engine applications vary widely, and more flexibility is needed to allow additional aggregation of families. Another commenter generally agreed with the NPRM proposal on engine family definition, but also supports the idea of encouraging aggregation. One environmental organization believed EPA did not have the authority to allow manufacturers to subdivide engines into engine families. Specifically, the commenter stated that the Clean Air Act does not provide for the subdivision of vehicles or engines into families. The commenter did not identify which section of the Clean Air Act that was being referred to and no

other supporting information was offered. Comments were received from an industry organization in support of the proposed amendments to the engine family definition contained in the supplemental notice.

Analysis: The Agency will retain the engine family definition criteria as proposed in the NPRM with the modifications proposed in the SNPRM. It is essential that manufacturers appropriately apply the concept of engine families in order to determine an FEL which appropriately characterizes the engine family. If a manufacturer can supply information indicating the in-use emission performance of engine models are similar, the manufacturer should be allowed more flexibility in aggregating models into engine families. Similarly, if a manufacturer can supply information indicating the in-use emission performance of engine models are dissimilar, the manufacturer should be allowed more flexibility in disaggregating models into engine families. Section 206 of the CAA offers EPA the authority to allow manufacturers to group and subdivide engine models into engine families.

4(iii) Existing Technology--Definition and Administrative Flexibilities

Proposal: In response to comments received on the NPRM, the Agency proposed in the SNPRM to provide old technology OB/PWC engines with certain compliance flexibilities and exemptions in order to mitigate compliance costs of engines that would eventually be phased out of production. EPA agreed with NPRM commenters that allowing flexibility in administrative programs for old technology engines would free up resources for manufacturers to produce and market cleaner technology. The Agency proposed to define " old technology" OB/PWC engine families to be those that were in production for the 1997 *and* previous model years and that did not utilize newer technologies (e.g., four stroke technology, direct injection technology, or catalyst technology). The Agency proposed the definition in this way because of concern that manufacturers would take advantage of the flexibilities offered by first bringing an old technology engine family into production in 1997, just before the regulations take effect. OB/PWC engine families qualifying as old technology would be allowed reduced data submission requirements for certification, exemption from certain Part 91 subparts, and exemption from compliance with the

CO standard (if one were finalized). These flexibilities would be allowed through the sixth year of the phase-in period (i.e., MY 2003). EPA also proposed to waive production line and in-use testing requirements for any existing technology OB/PWC engine family through MY 2003. In MY 2004 and 2005, any manufacturer of an old technology OB/PWC engine family may request an exemption from the requirements to perform production line testing and from participation in the in-use testing program for those years upon showing the engine family will be phased out of production by the end of MY 2005.

Comments: While commenters generally agreed with the flexibilities proposed for these engines, they opposed the proposed definition as it prevents older technology engines newly introduced in MY 1997 from taking advantage of the flexibilities offered. Commenters argued that production delays beyond their control could cause these engines, originally planned for introduction in earlier years, to not be introduced until the 1997 model year. Furthermore, they stated that the compliance flexibilities enjoyed by these older technology engine families would not encourage manufacturers to introduce new dirty engines into the market in the last year before implementation of this rule since they would have to cover them with emission credits to achieve compliance over the averaging period. In addition to comments received regarding the definition, comment was also received requesting EPA to extend old technology waivers to all requirements such as warranties, tamper resistance, adjustment limitations, labeling, design change reporting, and defect reporting.

Analysis: After a review of the comments, EPA has decided to allow engines newly introduced in the 1997 model year which do not utilize "newer" technology to be considered "existing technology" and afforded the flexibilities offered to these engines. In other words, "existing technology" OB/PWC engines families are considered to be those engines in production for the 1997 *or* previous model years that do not utilize newer technologies.[7] EPA believes that the need for offsetting

[7]The term is changed to "existing" rather than "old" technology to reflect the change in the definition.

credits for these engine families in future years will deter manufacturers from introducing dirty technology in MY 1997 solely for the purpose of taking advantage of the compliance flexibilities available to these older technology engine families.

With regard to the flexibilities proposed for these engines, existing technology OB/PWC engines will be exempted from §91.112 and Subparts D, E, F, G, I (non-recall portions only), J and M. These regulations include the adjustable parameters requirements, production line testing program, the in-use testing program, the defect warranty requirements, and defect reporting requirements. The Agency is not exempting existing technology OB/PWC engines from recall or from the Selective Enforcement Audit program. Readers are referred to section 6(iv) for an explanation of the need to apply this subpart. The flexibilites offered in this final rule are the same as proposed except that EPA is also offering exemption from the adjustable parameter requirement and some of the labeling requirements. The additional tamper resistance flexibilities suggested by one commenter are not appropriate. Section 203(a)(3)(A) of the Clean Air Act specifies that tampering with a certified engine is a prohibited act. Therefore, the anti-tampering provisions of the final regulation will apply to both new and existing technology engines certified to this regulation. See section 6(ix). However, in response to later comments from NMMA seeking an exemption from §91.112 for existing technology engines, EPA is exempting existing technology engines from the adjustable parameters requirements (§91.112) through model year 2003 to avoid the potential burden of compliance on technology that would be phased out of production given EPA's expectation that the exemption will have no impact on the targeted emission reduction. §91.112 requires that engines comply with all emission requirements across any adjustable parameter. A parameter is not adjustable if sealed, but investment would be needed to modify existing technology to limit the adjustable range.

Regarding the other suggested waivers (from adjusment limitations, labeling, design change reporting, and defect reporting requirements) the commenter offered no rationale for granting these waivers to existing technology engines. EPA sees no reason to treat existing technology engines differently from other OB/PWC engines in these areas except that, in response to later comments from NMMA that the labeling

requirements are excessive for existing technology, EPA has decided that some flexibility is appropriate. Although EPA is requiring engine labeling of existing technology, EPA allows less information on the engine label for existing technology than for new technology because some emission control information is not applicable to existing technology engines and other information is not critical to maintain the representativeness of the FEL. Given these factors, it is appropriate to minimize labelling requirements and their related costs on engines that will be phased out of production.

As proposed, the flexibilities for existing technology engines would be allowed through the sixth year of the phase-in period (i.e., MY 2003). In MY 2004 and 2005, any manufacturer of an existing technology OB/PWC engine family may request an extension of these administrative flexibilities for those years upon showing the engine family will be phased out of production by the end of MY 2005. For all other existing technology OB/PWC engines, these flexibilities and exemptions will end in MY 2003.

The flexibilities and their effective dates are summarized in Table 2, shown below.

Table 2

Effective Dates for OB/PWC Existing Technology Flexibilities

	Model Year									
Flexibility*	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06
Allowable Submission of Surrogate Data										
Waivers from Certain Part 91 Subparts										
Discretionary Waiver from Certain Part 91 Subparts										

*Manufacturers of PWC engines may take advantage of these flexibilities in 1997 or 1998 for their existing technology engines if participating in early banking in the 1997 or 1998 model year

4(iv) Existing Technology--Certification Flexibility

Proposal: As one of the flexibilities offered to manufacturers of existing technology OB/PWC engines, EPA proposed to accept, at its discretion, summary information for a limited time on these engine families in lieu of the full Application for Certification. The Agency would explain its policy on accepting summary information via guidance to be generated and distributed to manufacturers subsequent to the publication of the final rule. EPA requested comment on the appropriateness of this provision, and on the appropriate mechanism for defining the summary certification procedures.

Comment: Manufacturers supported this proposed flexibility, however, comment was received stating that the flexibilities did not go far enough, in that a significant amount of certification testing would still be required for these engines. Concern was also expressed over an inadequate number of facilities being available for engine testing.

One commenter offered an approach that would allow the Agency to receive the necessary emissions data, while reducing the cost burden for testing of these engines. The commenter suggested EPA adopt a program allowing manufacturers to use the HC+NOx baseline curve data in setting their FEL during the initial averaging period of the program (the first three years), and, by the end of MY 2000, the manufacturer would supply the Agency with data for all three years that would reflect actual (simplified) certification data or actual emission data previously submitted on "comparable" engines. Commenters also supplied EPA with deterioration data on existing technology engines which they believe supported the establishment of an assigned additive deterioration factor (DF) of 0 or a multiplicative DF of 1 for these engines. See section *19. Deterioration Factors/Durability Demonstration*, for a more detailed discussion regarding DFs for existing technology engines.

Analysis: In consideration of the comment received, EPA has decided to include in the final rule a certification program for existing technology engines similar to that suggested by the commenter. This provision will allow manufacturers to estimate an FEL for engine families for which real emission test data is not available.

For example, manufacturers may use baseline curve data when selecting their FELs for existing technology engines for MY 1998, MY 1999, and MY2000 certification (i.e., during the initial three-year averaging period for OB engines and during the two-year PWC initial averaging period). The manufacturers compliance demonstration in MY 2000 would "true up" the data for MYs 1998, 1999, and 2000 so that by the end of MY 2000 certification data reflects an FEL chosen based on actual emission test data, rather than an estimate based on the baseline curve. The Agency will not specify in the regulation the type of information that would be considered acceptable for the true up certification data, rather, the acceptance of information will be done according to guidance policy issued after the rule is final and on a case by case basis.

In the development of the baseline curve, many manufacturers submitted emission factors based on real emission test data. For these engine families the Agency will review the data used for the baseline curve and will determine if it is acceptable for setting the FEL. If the test data was based on a similar test as the certification test cycle and test procedure it is likely the Agency would find that data acceptable. Additionally, the test engine selected must be representative of the engine family, although it does not necessarily need to be worst case as EPA is more interested in an adequate FEL for the engine family rather than requiring further testing on existing technology engine families. The test data used for the baseline curve mostly meet these conditions. For manufacturers who use the "true up" option, the most prudent route for a manufacturer to take is to provide actual certification test data as described in Subparts D and E of the final rule. The Agency would consider other types of data submission on a case-by-case basis and would evaluate the alternative data based on the expected similarity of the data to actual certification test data.

By allowing manufacturers the flexibility to "true-up" their emissions data for these engines, this provision will help to alleviate concerns expressed by manufacturers over inadequate testing facilities, reduce short term manufacturer testing burden, alleviate logistical problems with providing test data on an entire product line, and still provide the Agency with accurate FELs for credit accounting purposes.

The Agency received no comment on the appropriate mechanism to be used for defining the summary certification procedures for existing technology OB/PWC engines. The Agency will issue certification guidance after publication of the final rule describing the process manufacturers will use for certification of existing technology OB/PWC engines.

4(v) Test Engine Selection

Proposal: To certify their product lines, manufacturers must test one engine from each engine family. Because the engine families are usually made up of several engine configurations, an appropriate engine configuration must be chosen to represent the entire family. It has been EPAs long standing position with respect to FEL determination that manufacturers choose the worst case emitter as the certification engine. EPA proposed that manufacturers of OB/PWC engines must choose the worst case HC emitter within an engine family to represent the FEL. EPA proposed to accept the engine configuration with the highest brake specific fuel consumption (BSFC) as the certification test engine for a given engine family. This selection criteria was intended to represent the engine configuration with the highest HC emissions. EPA requested comment on allowing a manufacturer to use sound technical justification to choose the configuration expected to exhibit the highest HC emissions.

Comment: EPA received some support from commenters on the proposed engine selection criteria as well as suggestions for other selection criteria options. However, one commenter stated that brake-specific fuel consumption is not an appropriate criterion for identifying the worst-case HC+NOx emitter. This commenter suggests that test engine selection should be based on emissions of the combined pollutants, in light of the fact that an HC+NOx standard was proposed by the Agency, and that manufacturers should be permitted to select the worst-case HC+NOx emitter based on best engineering practice. Comment supported allowing the manufacturers to select the engine configurations expected to exhibit the highest BSFC. Commenters also recommended that the worst case configuration be based on combined HC and NOx emissions.

EPA also received comment requesting provisions be provided for low volume engine families to address concerns that, under the proposed test engine selection criterion, an engine configuration in a family with a relatively small sales volume may be used to set that family's FEL. Their concern is that the FEL may be much higher for that small volume configuration than for the average of the family as a whole. In which case, this worst case emitter would not reasonably represent the engine family with which it would normally be grouped. One suggestion from marine engine manufacturers was to use the configuration having more than 60 percent of the sales within the engine family. Another suggestion was to allow manufacturers the flexibility of separating small sales volume (less than 10 percent) engine configurations with significantly higher emissions (e.g., high performance configurations) from their families and combine them into a single family. The FEL would be based on the worst case emitter in this aggregated low volume engine family.

Analysis: Historically, EPA has taken the conservative approach and required highest BSFC engine configuration as the determinant for the worst-case emitter for HC. This was proposed because the primary target pollutant for this regulation is HC. , But the worst case emitter for HC is not necessarily the worst case emitter for NOx. The problem with using the highest BSFC to identify the worst case HC emitter is the same configuration would not necessarily represent the worst case emitter for NOx and the manufacturer would still be responsible for meeting the NOx FEL represented by the worst case NOx emitter under the combined HC+NOx standard. However, when considering both HC and NOx combined, it is not as difficult to determine the worst case emitter for HC+NOx. . Therefore, EPA has modified the final regulation and is permitting manufacturers to use sound technical justification determined by good engineering judgement in choosing the worst case HC+NOx engine configuration from each engine family for certification testing.

The concept of an engine family is based on the principle of similar emission characteristics. If a manufacturer has designated models within an engine family which have substantially different emission performance, regardless if the models are small or large volume, the engine family could be divided into two separate engine

families, as provided in the final regulations and proposed in the SNPRM. To the extent that the worst case HC+NOx emitter deviates substantially from the sales-weighted average emission level of the engine family, the targeted emission reductions required by the emission standards will under represent the real emission reductions achieved. EPA is not philosophically opposed necessarily to the concept of identifying the FEL as the sales-weighted average emission level of the engine family. In fact, due to the unique average emission standard structure and the way the emission standards were derived (based on baseline and control technology emission test data representing the average emission level for the engine family), the use of the sales-weighted FEL is conceptually attractive. However, EPA recognizes that there is much less testing required with identifying the FEL via the worst case emitter philosophy (i.e., one test) versus testing each configuration in an engine family to determine the sales-weighted FEL.

Contrary to the attractive sales-weighted average FEL solution, EPA does not consider the use of the highest sales volume engine configuration to be a viable solution, even if that configuration represented a majority of sales in the engine family. The recommendation of identifying the FEL by the configuration representing at least 60% of engine family sales would mean that potentially 40% of the engine family sales are unrepresented by an FEL in the corporate average. To the extent that the FEL identified by the engine configuration representing at least 60% of engine family sales deviates significantly from the sales-weighted average emission rate for the entire engine family, the corporate average is unacceptably inaccurate. For example, suppose the configuration representing at least 60% of engine family sales happened to be the lowest emitting configuration and the sales-weighted average emission rate for the family was significantly higher. It could be higher because a different configuration with a relatively higher emission rate represented 40% of engine family sales. In this instance, the FEL would be under represented. While it may be acceptable to EPA for the sales-weighted average represent the FEL instead of the worst case emitter, it is unacceptable for the FEL to under represent the sales-weighed FEL.

In light of the EPA concern with identifying the FEL by the highest sales volume

configuration, as stated above, and the concern over testing burden associated with accurately identifying the sales-weighted FEL for the engine family, EPA is finalizing the identification of the FEL by requiring the manufacturers to identify the worst case HC+NOx emitter through sound technical justification based on good engineering judgement or to utilize the highest BSFC configuration as the configuration that determines the FEL.

However, EPA thinks that the alternative recommendation by a commenter to allow a manufacturer to lump worst case emitter configurations representing less than 10% sales into a "catch all" engine family, while retaining the worst case emitter requirement for all engine families to be an interesting alternative. EPA has discretion in the regulatory language regarding test engine selection and will develop guidance on this issue. EPA will investigate this alternative recommendation, or other appropriate alternatives, for the unique nature of the marine engine technology.

4(vi) Certification Protocol--Simplified Certification

Proposal: The certification program contained in the proposal was based on the programs for other EPA nonroad regulations. This program relies on manufacturers submitting information to the Agency on a pre-production engine for each engine family on which the FEL for the engine family will be based. EPA also proposed simplified certification requirements for certain types of gasoline marine SI engines (i.e. old technology and SD/I engines) which allowed EPA to accept summary information in lieu of a full Application for certification at its discretion.

Comments: Several engine manufacturers requested EPA simplify certification data submissions to the minimal amount required in order to eliminate unnecessary reporting burdens. One manufacturer commented that the current certification program for on-road LDVs is unnecessary for this class of engines. They suggested a more appropriate certification process for these non-road engines would be for manufacturers to identify intended product offerings and projected sales estimates, provide EPA with data showing emission compliance and compliance with other EPA requirements (e.g., warranty coverage), and retain relevant certification testing information available at EPAs request. The commenter believes this minimum data

submission in certification application, reporting of running changes only if they have an effect on emissions, and one-page carry-over certification applications to be more appropriate for this industry and class of engines.

Analysis: The Agency shares manufacturers concerns regarding unnecessary reporting burdens during the certification process. EPA will finalize the simplified certification data submission requirements that it has recently promulgated for other nonroad regulations (61 FR 20738 & 61 FR 20779). These requirements will be used as a model for the marine engine certification process. EPA intends to follow the intent of the manufactures comments and not place unnecessary reporting burdens on engine manufacturers. As an example, EPA intends, through guidance, to establish protocol for an interactive, on-line computer based data submittal program for many portions of this rule, including certification, assembly line testing, and defect reporting. Though this system will not be available for the first year of early banking (MY1997), EPA will establish this simplified data submittal system in the near future. EPA thinks the finalization of simplified certification data submission requirements for all gasoline marine SI engines subject to this rule is an appropriate extension of the proposed provisions for SD/I engines and specific types of OB/PWC engines. Additionally, it is in keeping with the general policy direction the Agency is taking for other nonroad regulations. Further, simplified certification data submission requirements is in keeping with the direction from the Paperwork Reduction Act. Under the simplified certification process, manufacturers would be required to submit far less information in their Application then is currently required, however, manufacturers would be required to maintain all the information specified in the certification portions of the regulation at their facilities in the event the Agency requests to see additional information.

4(vii) Certification Averaging, Banking, and Trading (ABT) Provisions

5(vii)(a) Early Banking

Proposal: EPA did not propose to allow early banking of certification emission credits, that is, banking of credits prior to the effective dates of the program. Early banking would require early certification of a manufacturers entire product line, which

the Agency believed manufacturers would be unlikely to do. The Agency did not believe that an early banking provision was needed for the purpose of creating an incentive for manufacturers to bring about new product offerings earlier than expected. EPA believed the nine year phase-in standard structure already provided this incentive since there is a greater credit generation potential in the early years of the phase-in.

Comments: Commenters opposed the proposed restriction against early banking, arguing that the potential for banking credits prior to the implementation date would encourage manufacturers to introduce cleaner technology into the market sooner. One commenter suggested the Agency adopt an early banking provision for OB/PWC engines which would provide credit to those manufacturers introducing clean technology into the market earlier than required, while allowing a portion of the credits to be dedicated to the environment. They suggested any manufacturer achieving an 8.3 percent reduction of their entire product line in MY 1997 or MY 1998 would be eligible to generate and bank credits for anything beyond 4.15 percent. The commenter offered no rationale for this suggested early banking scheme.

Analysis: The Agency now believes the approach suggested by the commenter to be a reasonable one which would provide both an air quality benefit and an additional incentive to manufacturers to introduce clean technology earlier than required.

The Agency believes in this case early banking pulls ahead emission reductions because of the concerns expressed in comment with achieving the emission standards, especially for personal watercraft. EPA had believed that manufacturers would be unlikely or unable to certify their entire product line early to take advantage of an early banking program. Manufacturers however, informed EPA of their desire to do just that. In order to accommodate their comments on this issue, the Agency is adopting for the final rule an early banking program allowing manufacturers to generate credits for bringing their entire product line to meet the emission reductions required in the first year of the program. However, only reductions over 4.15% will be awarded to the manufacturer. EPA thinks it important that a portion of the credits are not bankable for this flexibility because they may be used to partially achieve the

reduction potentially foregone due to the need to delay the PWC implementation date to model year 1999. Comment supported this approach.

Specifically, both OB and PWC manufacturers will be allowed to bank emission credits as early as MY 1997. PWC manufacturers will also be allowed early banking for MY 1998. Manufacturers choosing to participate in the certification ABT program early will be

subject to all provisions (e.g., all applicable subparts of the regulations) applicable at the effective date of the program.

In MY 1997, OB manufacturers must achieve an 8.3 percent reduction on a corporate average basis to be eligible to generate banked credits. Manufacturers would then receive credits generated in excess of half the 1998 MY reduction (i.e. in excess of a 4.15% reduction) required under the standard phase-in structure. Based on data submitted by engine manufacturers of their projected engine technology offerings and projected engine sales for MY 1997, the Agency estimates a four percent emissions reduction for the year as a result of the early banking program. Although manufacturers would receive roughly half of reductions as banked credits, the Agency expects to achieve a four percent reduction in emissions inventories for MY 1997 that would not have been realized in the absence of an early banking program. PWC manufacturers must show they can achieve a 4.15 percent reduction in MY 1997, and would be required to achieve the full 8.3 percent reduction in MY 1998 in order to be eligible for early banking. Similar to OB manufacturers, PWC manufacturers eligible to early bank would receive credits generated in excess of half (i.e. in excess of 4.15%) the proposed 1998 MY reduction.

The Agency believes most PWC manufacturers will not use early banking. As explained in the preamble to the final rule, the Agency is delaying the effective date of the rule for PWC by one year. The Agency has received comments from most PWC manufacturers requesting a one-year deferral of the rule to MY 1999 because of the they could not meet the proposed 1998 model year reduction target. Given these comments, EPA expects these manufacturers will not have the ability to pull ahead technologies on a time scale quick enough to allow them to early bank. The Agency received comment stating that it would be advantageous to encourage manufacturers to make concentrated efforts to pull ahead cleaner technology in anticipation of the rule. In addition, many states had already incorporated the emission reductions expected to be received from PWC in 1998 into their state implementation plans. The Agency believes the early banking provisions will help to alleviate both of these concerns because it is good to have clean technology in the market as soon as possible and EPA may be able to still give some credit, although small, to states in 1998 for

PWC emission reductions.

4(vii)(b) Certification ABT Multiyear Averaging

Proposal: For compliance with the emission standards, EPA proposed to require each manufacturer to maintain a positive or zero balance in their emission credit account with EPA at the end of each model year. The positive balance could be used by the manufacturer to ease the transition to tighter standards in future years. However, manufacturers would not be allowed to carry a negative balance over to the next model year. If the manufacturer did not achieve an emission account balance greater than or equal to zero, then certificates awarded for noncomplying engine families could be rendered *void ab initio*.

However, in the SNPRM EPA acknowledged the difficulties manufacturers could face in meeting the 1998 model year, due to the limited lead time between the finalization of the marine regulation and the beginning of the 1998 model year, and to unforseen circumstances beyond the manufacturers control. EPA requested comment in the SNPRM on the need for multi-year averaging in during the initial years of the program. Specifically, EPA requested comment on the need for a two-year averaging period, alternative lengths for the averaging period, what specific circumstances would be outside the control of manufacturers, and any other alternatives.

Comments: Comments were received from the affected industry strongly urging the Agency to allow deficits to be carried over from one model year to another in the early years of the program. One industry group recommended EPA implement an initial averaging period through MY 2000 to provide manufacturers with reasonable flexibility during the initial years of the program, given the difficulty of achieving immediate reductions. They argued no loss from the environment would be incurred if provided this flexibility since manufacturers would be responsible for overall compliance for the entire averaging period. The industry group suggested EPA allow a 50 percent deficit carryover from MY 1999 to MY 2000 for PWC, and for OB, a 30 percent carryover from MY 1998 to MY 1999 and a 20 percent carryover from MY 1999 to MY 2000. A comment was received in opposition of allowing deficits to be carried over. The commenter suggested requiring manufacturers to purchase needed

credits from an industry bank.

Analysis: EPA recognizes that enormous technological changes that will be required of this industry as it converts from existing, relatively simple charge crankcase scavenged two-stroke engines to new, highly sophisticated electronically controlled direct injection two-stroke or four-stroke technology in order to achieve the required emission reductions. Additionally, the short lead time between final rule promulgation and implementation, coupled with the potential for problems to arise which may be beyond a manufacturers control, heighten the need for flexibility in the early years of regulation. One commenter suggested EPA not allow deficit carryover because manufacturers can purchase credits. EPA believes that in the initial years of the program there are important reasons that allowing deficit carryover is necessary rather than relying on the credit market. The short time frame, approximately 1 year, between the finalization of the regulation and the implementation date leaves many unknowns for manufacturers regarding the ability to market the new technologies necessary to meet the emission reductions targeted in the first several years of the phase-in. For this reason, manufacturers who do generate emission credits will be hesitant to make those credits available for sale in order to avoid the risk of falling short the next year. EPA proposed in the SNPRM that the Agency would decided on a case-by-case basis if deficit carry-over were needed for manufacturers who requested it. However, EPA received comment supporting a limited deficit carry-over, and because of the administrative burden which would be placed on the Agency of determining circumstances beyond a manufacturers control on a case-by-case basis, the Agency has finalized a limited deficit carry-over program available to all manufacturers. For these reasons, EPA is providing manufacturers with the flexibility of a multi-year averaging period in the initial years of the phase-in period for the final rule. Specifically, for the certification credit program, EPA will allow manufacturers of PWC engines a 50 percent deficit carry-over for MY 1999 to MY 2000. For OB engines, EPA is finalizing a 30 percent allowable deficit carry-over from MY 1998 to MY 1999, and a 20 percent deficit carryover from MY 1999 to MY 2000.

Table 01 illustrates how this provision would work. The expected emission reductions of this rule call for an annual 8 1/3% reduction from the baseline

beginning in MY 1998 for OB engines. Because EPA is allowing a one-year deferral in the implementation date for PWC engines, manufacturers of PWC must meet an emission reduction of 16 2/3% in MY 1999, with an annual 8 1/3% reduction from the previous year levels thereafter. Assuming an OB manufacturer's production line is expected to produce 1000 tons mass emissions in MY 1998, that manufacturer would normally be required to reduce emissions by 8 1/3%, that is, reduce emissions by 83 kilograms (8 1/3% x 1000). However, this provision allows them to carryover 30 percent of the targeted reduction amount (83 kilograms) in the first year. Thus, by being allowed to carryover 25 kilograms (.3 x 83), they are actually only required to reduce emissions by 58 kilograms (83 - 25) in the first year in this example. Similarly, in MY 1999, the manufacturer is allowed to carry-over 20 percent of the targeted reduction amount in 1999 (167), plus the carryover amount from the previous year (25), for a total of 192 kilograms (25 + 167). Hence, assuming mass emissions of 1000 kilograms in MY 1998, the minimum reduction allowed by that manufacturer would be 154 kilograms (192 - 20% x 192 = 192 - 38 = 154). In MY 2000, the minimum reduction allowed (assuming carry-over of maximum amount allowed) would be the reduction target required for that year (25%) plus the carry-over amount from the previous years. This approach provides for compliance to be maintained in MY 2000 for the entire averaging period, while providing manufacturers with the needed flexibility in the beginning of implementation.

Table 01

Illustration of Deficit Carryover

	A	B	C	D	E	F	G	H	I
Year	Emissions	Reduction Target %	Current Year Reduction Target Amount (A x B)	Em. Target, No Carry-Over (A - C)	Total Targeted Reduction Amount (C + G from previous yr)	Allowable % Carryover	Maximum Carryover Amount (E x F)	Minimum Reduction with Max Carryover (E - G)	Maximum Allowed Em. with Max Carryover (A - H)
1998	1000	8 1/3%	83	917	83	30%	25	58	942
1999	1000	16 2/3%	167	833	192	20%	38	154	846
2000	1000	25%	250	750	288	0	0	288	712
TOTAL	3000		500	2500				500	2500

4(vii)(c) Certification Credit Life

Proposal: For the sake of maintaining consistency with other mobile source credit banking programs, EPA proposed to allow banked certification credits to have a three year credit life.

Comments: EPA received comments both for and against the Agency providing a long credit life for banked credits. One environmental group commented that credits should be short-lived because it makes no sense to have credits earned during a year of greater emission allowances be worth the same three years later, during a year of more stringent allowances. This commenter goes on to say that if ABT must be a part of this rule, it should be phased-in after year three of the program and not before. Comments from the regulated industry ranged from suggesting certification credits have an infinite credit life, to allowing credits generated during the phase-in period be available throughout the phase in period, with a three-year credit life thereafter. No rationale was offered by the industry commenters as to why these credit life schemes were preferred over what was proposed by the Agency.

Analysis: The Agency is finalizing a three year credit life for banked certification credits for this rule. Requiring banked credits to expire within three years from when they are generated provides the Agency with some assurance that manufacturers will not be able to stockpile emission credits in the early years of the program when they may be easiest to generate, and then use them all at once in later years when standards are more stringent. The intent of allowing manufacturers to bank emission credits is to ease the transition into a tighter standard from year to year. The Agency believes a three year credit life will meet the needs of the regulated industry and adequately ease the transition to lower standards over the phase-in period. Also, three year credit life limits the possibility of stockpiling credits, thereby limiting the possibility that a large bank of credits could delay or erode future targeted emission reductions.

Thus, credits generated for certification in any given model year are available for use in the year generated plus in the three succeeding model years. Credits not used within this time frame will be forfeited.

4(vii)(d) Sales weighted power rating in credit calculation

Proposal: EPA proposed that when designating engine families for certification, manufacturers may include in the family a number of engine configurations which may have different power ratings. For credit calculation purposes, EPA proposed the use of the configuration with the lowest power rating when calculating credit generation, and the largest power rating in the case of credit need.

Comments: Commenters opposed this credit calculation approach, suggesting this would cause manufacturers to not include engines with different power ratings in the same family. Rather than use different power ratings, they recommended both credit and debit calculations be determined using the sales-weighted average power of the engine family. The commenters stated the proposal is inconsistent with the proposed use of the sales weighted average power for the credit-calculation in the in-use credit program.

Analysis: EPA agrees with commenters that the proposed approach is inconsistent with the in-use credit program's proposal, and inconsistent with the approach taken in defining the standards for this rule since the standards were derived on an average basis rather than a worst case emitter basis. Consequently, in today's rule, EPA is requiring credit calculations be determined using the sales-weighed average power of the engine family, rather than using the maximum/minimum power ratings as proposed.

4(vii)(e) Use of Net Present Value in Credit Calculation

Proposal: In the proposed credit calculation, the total credits generated by an engine family was the sum of the credits generated by that engine family for each year of the full useful life of the engine family. Because different engine families have significantly different useful lives the summation equation should reflect the time value of credits. A three percent per year discount was included in the credit calculation in keeping with EPA policy on the use of net present value. In other words,

the emissions credits for a given year in the summation equation would be divided by 1.03^n, where n would be the actual year minus the model year.

Comment: One engine manufacturer submitted comments that they considered the application of a consumptive goods discount to future emissions was inappropriate. In addition, they commented that the discounting term adds unnecessary complexity to the credit calculation formula. This manufacturer did not consider the discounting factor to have a significant effect on the relationship between positive and negative credits since it applies to both.

Analysis: EPA considers the discounting of emission reductions in future years to be philosophically correct and the 3% rate is appropriate in this instance. Although the discounting factor may not have a large effect on credit trading between engine families, there will be a significant effect, especially between engines with dissimilar useful lives. With today's sophisticated data processing software, EPA does not believe that the discounting term unreasonably affects the complexity of the credit calculation. EPA's certification and compliance staff will be available to those manufacturers who require assistance in understanding or performing the credit generation calculations.

4(vii)(f) Relative Use by Age Function

Proposal: Engine usage is an important factor in determining certification and in-use emissions credits. In the NPRM, engine usage was considered to be dependent on application only. EPA proposed the following usage figures: 34.8 hrs/yr for outboards, and 77.3 hrs/yr for personal watercraft.

After receiving input from commenters on the NPRM, EPA requested comment in the SNPRM on whether outboard engine usage may also be dependent on the age of the engine. Specifically, comment was requested on whether and to what extent an engine is used less as the engine gets older. In the SNPRM, EPA proposed a function that related actual engine use to the mean life, mean use, and the age of the engine. However, to check the relative use by age hypothesis, EPA stated that it might consider boater survey results regarding relative use of OB engines by age collected in 1995 by Wisconsin Department of Natural Resources (WI DNR). This data was unavailable at the publication time of the SNPRM.

Comments: Commenters agreed that an analysis of the WI DNR survey data should be performed before determining a relationship between marine engine use and age. One manufacturer analyzed the data and suggested using fuel consumption data, normalized by power, and a geometric function be used rather than hours of use data to describe the relationship between use and age. Fuel consumption was recommended as a surrogate for hours of use because it was collected for a two week period while hours of use information was only collected for one day. Also, fuel consumption is easier to measure quantitatively. The geometric functional form was recommended because it represents larger changes in use during the early years of an engine's life when its use is affected by the novelty of owning a new engine, and because the geometric curve asymptotically approaches zero use as the engine ages. The final result of this analysis was that there was a small decrease in use as an engine aged. However, the manufacturer would support using a constant usage figure regardless of engine age because the magnitude of the decrease was small.

Analysis: The final regulation retains the constant annual use estimates for both OB and PWC proposed in the NPRM: no relative use by age function for OB engines will be used. EPA performed an analysis (Memorandum from Mike Samulski

to the Docket # A-92-28, "Analysis of Outboard Engine Usage Relative to Age Based on Fuel Use Survey Data Supplied by WI DNR") of the relative use of outboard marine engines as they age using survey data collected by the WI DNR. This survey data included information on power ratings, engine age, hours of use for one day, and fuel consumption for a two week period for outboard marine engines. After the database was screened for incomplete data, 3624 lines of data remained on outboards from 0.7 to 245 KW. For EPA's analysis, a geometric function was used to relate fuel consumption divided by power to engine age. EPA thinks a geometric function is an acceptable functional form because it represents larger changes in use during the early years of an engine's life when its use is affected by the novelty of owning a new engine and because it asymptotically approaches zero use as the engine ages.

Based on this analysis, EPA concluded that it is more appropriate in the certification and in-use emission credit calculations to use constant use by age for both OB and PWC engines. Although the data regression through the data showed some reduction in use by OB engine age, this reduction was very small, especially when compared to the wide scatter in the data. EPA is not aware of any alternative data on relative use by age for gasoline marine engines. If further information is brought forward in the future, EPA would be interested in reviewing this issue as this particular assumption could significantly impact the emission credit calculations.

4(vii)(g) Point of First Retail Sale

Proposal: In the NPRM, the Agency proposed a definition for the point of first retail sale to mean the point at which the engine is first sold directly to an end user. The Agency proposed a definition because of the importance for tracking sales for the purposes of averaging, banking and trading of emission credits. Comment was requested on the definition and alternative methods of tracking engines.

Comments: Comments received generally stated that determining the point of first sale to an end user would be difficult because it would involve more tracking than is currently done, given that sales of engines are generally to boat or engine dealers. The Agency received comment in support of tracking of the engine to the vessel manufacturer. Manufacturers commented that the Agency should presume that an engine which the vessel manufacturer could not identify as being exported or not,

should be included in the average unless the engine manufacturer can demonstrate that the engine is exported. Also, manufacturers commented that engines that are exported and subsequently re-introduced into the US should be included in the average. One comment from an exporter of marine engines suggested that the definition should reflect the establishment of the final destination of the engine in the US.

Analysis: Since the comments were generally supportive of tracking to the vessel manufacturer, EPA will finalize point of first retail sale as defined in the proposed regulations. Specifically, point of first retail sale means the point at which the engine is first sold directly to an end user. This point is generally the dealer of the engine or boat retailer. The boat or vessel manufacturer may be the point of first retail sale if purchasing the engine for installation in a vessel, if the boat or vessel manufacturer can determine if the engine is or is not exported once they have sold the boat or vessel. Manufacturers must be able to adequately identify U.S. sales for use in determining accurate credit calculations. If the boat or vessel manufacturer cannot determine whether an engine is exported or not, EPA thinks it conservative to require that the engine be presumed not an export and included in the average. This approach is conservative because it assumes that the engine impacts the United States air quality even though it may not. Engines cannot be imported into the US for sale in the US unless covered by a certificate of conformity and included in the engine manufacturers average for that model year. EPA is clarifying this in the final regulations. Further, engines exported from the United States and then subsequently imported installed in a boat or vessel for sale in the United States must be certified and included in the manufacturer's average.

EPA believes engine and vessel manufacturers currently identify exported engines for their own purposes, and EPA believes this tracking requirement will not impose any additional burden on the marine engine manufacturers. EPA is not requiring vessel manufacturers to report any information to EPA directly.

4(viii) Labeling

Proposal: EPA proposed marine engine manufacturers label each engine as

required in the current on-highway heavy-duty engine and the nonroad large CI engine certification requirements. Included in this requirement is the necessity for each certified engine to bear a label indicating the engine family name and the standard or FEL to which it is certified. EPA also proposed that each engine bear a unique engine identification number for enforcement purposes. Provisions were included that allowed for flexibilities due to space limitations. Refer to Section 4(iii).

The NPRM also contained a proposal to include a voluntary labeling program for manufacturers of gasoline spark-ignition engines who produce engines that meet or exceed the final model year 2006 HC emission standards. Such a "green" labeling program could be used as a marketing tool for replacing dirtier engines. EPA rescinded its proposal for a voluntary labeling program in the SNPRM, but requested comment from the public on the advisability of labels identifying clean or dirty engines at some future date.

Comments: Comment in response to the NPRM was split on this issue. One environmental group stated that this type of labeling should be mandatory, not voluntary, and argued for additional information such as noise level and energy efficiency of the engine to be added to the label. Other commenters, however, opposed the voluntary program, arguing that it provided no benefit and could create a potential for misuse in marketing. No comments were received in response to requiring labels for certification purposes or requiring a unique engine identification number be added to the engine label.

Analysis: As proposed, marine engine manufacturers will be required to appropriately label each engine as currently required for on-highway heavy-duty engine and nonroad large CI engine certification purposes. EPA is also finalizing the requirement for marine engine manufacturers to provide a unique engine identification number as part of the engine label for purposes of tracking engines for production line testing, SEAs, etc. EPA believes these labeling provisions are a necessary part of an effective certification and enforcement program.

However, the Agency will not pursue the implementation of a voluntary labeling program at this time which would identify "clean" and "dirty" engines. EPA is exploring these types of labeling programs in other mobile source areas (eg., small

spark-ignited engines). Consumer-oriented labeling programs must be carefully constructed to be an effective means of communicating appropriate and understandable information to purchasers in order to influence consumer choice. EPA appreciates the comments received encouraging the development of a labeling system for gasoline marine engine as well as those comments expressing concern that such a system may be misused. Due to the inherent complexities in designing an appropriate system, EPA's need for further input on such a system, and the lack of a detailed labeling plan submitted for comment, EPA is not finalizing a consumer oriented labeling program. EPA will likely revisit the concept of implementing such a labeling system in the future.

4(ix) Noise Requirements

Proposal: EPA did not propose any noise measurement, reporting, or control from marine engines. The proposal requested comments on EPA's expectation that engine changes to meet the proposed emission standards will result in the same or marginally reduced noise levels.

Comments: One marine industry commenter strongly opposes any noise requirements as a part of this regulation. Another commenter suggests that noise information should be part of the labeling requirements. One environmental organization commented that, while no specific studies have been done on the effects of boat-induced noise pollution on people or the environment, stringent emission standards would promote quieter engines, which the proposed emission standards do not do because they are not strict enough.

Analysis: EPA's primary goal for this rulemaking is the significant reduction of hydrocarbon emissions from SI marine engines. EPA performed a technical analysis looking at the type of technologies EPA believed would be used to meet the proposed air emission standards. From this analysis, EPA does not believe there will be an increase in the noise levels from the engines certified to the final rule. EPA has reason to believe that the direct injection two-stroke and the four-stroke gasoline engines, the principal technologies which will be used to meet the proposed standards, will have lower noise levels than current technology two-stroke engines. However, EPA has not

developed noise measurement test procedures or standards for marine engines, nor will the final rule contain any noise measurement protocol or requirements.

Therefore, noise information will not be required on the engine label that manufacturers must apply to engines. However, should EPA in the future ever develop a consumer-oriented labeling program for marine engines, EPA will consider the appropriateness of including noise information at that time. EPA expects that test procedures would need to be developed if EPA were to consider any type of noise labeling.

4(x) New Boat/Old Engine

Proposal: EPA proposed to prohibit the sale of new vessels with old engines. EPA was concerned that some vessel manufacturers would purposely use rebuilt sterndrive or inboard engines in new vessels as a means of avoiding the purchase and installation of certified engines. This was mostly a concern with the subcategory of air boats which utilize sterndrive or inboard type engines. Comment was requested on the need for this restriction.

Comments: A marine industry group suggested EPA eliminate the restriction against selling a vessel that incorporates an engine of a MY previous to that of the vessel. The commenter did not believe the restriction was necessary and stated that sometimes engines remain in inventories for a period of years before they are incorporated into a boat. Commenters were opposed to the restriction because some vessels are sold without motors, such as boats designed for outboard engines. Sometimes, consumers purchase the outboard boats with the intention of applying an older engines they already own to the boat. Also, many times it is the boat dealer who pairs a boat with an outboard engine based on what the customer wants. Dealers sometimes carry inventory for several years during economic downturns and this restriction would be unreasonable to impose on dealers because the economic cycle is outside of their control. Additionally, it would be practically impossible to enforce.

Analysis: EPA will not be finalizing the proposal that new vessels may not incorporate engines of a previous model year than the vessel. The final rule only applies to marine engines and contains no provisions affecting the vessel. The

proposal was largely in response to EPA concerns about SD/I engines. Since EPA is not finalizing emission standards for SD/I engines, and EPA agrees with the comments submitted regarding OB engines, EPA thinks it appropriate to finalize the regulation without the proposed restriction.

4(xi) Independent Commercial Importer Program

Proposal: EPA proposed no independent commercial importer (ICI) program for marine engines.

Comments: One comment was received in support of EPAs proposal for no ICI program.

Analysis: At this time the need for an ICI program for marine engines has not been demonstrated to the Agency. Based on the lack of adverse comments the final rule does not contain an ICI program.

5. Production Compliance--Production Line Testing Program and Selective Enforcement Auditing Program Issues

5(i) Production Line Testing Program Issues

5(i)(a) Sampling Rates

Proposal: In the SNPRM, EPA reproposed a Production Line Testing (PLT) program, this summary and analysis section addresses the SNPRM proposal. EPA proposed manufacturers of spark-ignition marine engines conduct self-audits of new marine engines. This program would require manufacturers to test engines as they leave the assembly line for emission compliance without EPA oversight. The manufacturers could determine, with reasonable statistical certainty, whether or not new engines would be in compliance. This would alert them to any non-compliance problems from the engines before they are entered into commerce, a benefit to both the manufacturer and the environment. The program would assure that engines from each engine family each model year would be tested periodically. EPA proposed the testing scheme be based on a CumSum test procedure which enables manufacturers to select engines at appropriate sampling rates for emission testing. EPA proposed a maximum sampling rate for the PLT program for an engine family to be the lesser of three tests per month or one percent of projected annual production.

Comments: Marine industry commenters were concerned that the required number of emission tests per engine family would be too burdensome for some smaller engine families. EPA also received comments opposing the proposed maximum sample rates stating those rates as being too minimal, especially for larger engine families. One marine industry group supported a maximum sampling rate of 30 tests/year.

Analysis: The number of emission tests an engine manufacturer performs on an engine family is directly related to the engine family's production volume. Although the Sample Size Equation contained in the PLT program may calculate sample sizes greater than the proposed maximum sample rates, EPA believes sample sizes greater than these maximum rates would be unnecessarily burdensome for manufacturers of marine engines. In the SNPRM the Agency proposed a maximum

sampling rate to be the lesser of three tests per month (36 tests/year) or one percent of projected annual production. Following the publication of the SNPRM, the Agency preformed hundreds of simulated runs of the CumSum program. This analysis indicated there was no additional benefit by requiring manufacturers to run a maximum of 36 tests/year (as proposed) versus 30 tests/year. The Agency received comment supporting a maximum sampling rate of 30 tests/year. Therefore, sample sizes greater than 30 do not provide sufficient benefits fo require additional testing. Thus, EPA is finalizing the maximum required sample size for an engine family (regardless of the result of the Sample Size Equation) that is the lesser of thirty tests per model year or one percent of projected annual production distributed evenly throughout the model year . The CumSum procedure will reduce these rates further for engines that are consistently below the standards.

5(i)(b) Adjusting the FEL Based on PLT Results

Proposal: EPA proposed that manufacturers may change certification FELs up or down during the course of a model year and make running changes. The proposal outlined how the sample size and CumSum procedure would be affected. EPA proposed specific provisions depending on whether the FEL was changed or not. If the FEL was changed, provisions considered whether the actual engine was changed or not. EPA proposed that all data accumulated during that model year but prior to the FEL change would be recalculated with the new FEL, when the engine was not changed.

Comments: Manufacturers commented that EPA should not require reporting of any change that does not affect emissions or an emissions related part. Manufacturers requested clarification as to whether the proposal required all data, including certification credits, to be recalculated when an FEL was changed.

Analysis: FEL changes prompted by production line testing data may be made upon the approval of the Administrator. In approving such FEL changes, the Administrator will consider whether the production line testing data generated and the revised FEL identified by the manufacturer adequately indicate the worst case emitter in the engine family, including the expected in-use emission level. EPA is

concerned about manufacturers making marginal adjustments to FELs (e.g., "shaving FELs") so as to maximize the certification emission credit balance. This would increase the risk that the engine family may not comply with the emission standard in use. To the extent that the production line testing data and the revised FEL are adequate in light of the concern regarding shaving FELs, the Administrator may approve FEL changes. Whether these FEL changes apply to engines previously produced, future production, or both, EPA is clarifying that the certification credits must be recalculated accordingly for the affected engine prodution.

Under the final rule, EPA may allow FEL changes to engines previously produced based on PLT testing. EPA is adopting this more flexible approach for this rulemaking as a pilot program provision. This rulemaking is an appropriate place to try this provision because the total scope of the marine requirements include a fairly comprehensive production line testing and in-use testing program based on the principle of gaining more and better emission information upon which to determine compliance. The PLT program achieves this by testing engines frequently off the production line and the in-use testing program achieves this by testing actual engines from in-use fleets. EPA will monitor manufacturers' use of FEL changes and may implement appropriate regulatory changes if manufactures are attempting to change FELs to levels that do not provide adequate assurance of in-use emission levels (e.g., "shaving FELs") or gaming the system to skew certification credits at the expense of or to the benefit of in-use credits.

While EPA may allow FEL changes to apply to engines previously produced based on PLT data and Administrator approval, EPA has not allowed this for Selective Enforcement Auditing (SEA) or as an alternative to recall in the past for other mobile sources and is not allowing it for SEA or as an alternative to recall of gasoline marine engines either. Allowing FEL changes to be made on engines previously produced in this rulemaking does not imply that it will be preferred for other rulemakings, SEA, or as an alternative to recall in the future. EPA thinks it important that the deterrent effect of the SEA and recall programs be maintained. Therefore exceedance of the FEL in an SEA may be the basis for recall and exceedance of the FEL in use may be the basis for recall or the use of the in-use credit program.

EPA is finalizing the running change reporting requirements as proposed, with modification that manufacturers notify the Administrator of running changes that may potentially affect emissions, emissions durability, an emission related part, or the durability of an emission related part. Manufacturers should contact EPA if there is a question as to whether a running change affects emissions or an emission related part, but manufacturers are responsible for correctly identifying changes that affect emissions or an emission related part. EPA will issue guidance regarding the process for submittal of running changes. For existing technology, notification of running changes may occur periodically but must occur at least on a quarterly basis and may be submitted summarily.

5(i)(c) Exemption for Mature Technology Engines

Proposal: EPA proposed production-line testing be required for new marine OB/PWC engines. This requirement would be applicable to all engine families, regardless of the consistency of emissions performance of an engine family from year to year. In the SNPRM, EPA proposed to exempt old technology engines from production line testing. See section 4(iii).

Comments: An industry group provided a suggestion in their comments that EPA eliminate production-line testing requirements when new technologies are deemed mature based on achieving emission data variability comparable to SD/I engine performance. They recommended that an engine family be considered "mature" once the manufacturer can demonstrate that it has sufficient test and other data to predict emissions performance with reasonable confidence. The reader is referred to Section 7 ("Provisions for Mature Technology OB/PWC") of this document for a more detailed discussion of mature technology engines.

Analysis: The Agency has not eliminated PLT for "mature" technology OB/PWC engines. As discussed in detail in Section 7, Provisions for Mature Technology OB/PWC, the Agency has finalized a program which can significantly reduce the quantity of production line testing a manufacturer would be required to perform if the engine family demonstrates that it is consistently "clean" and well below the standard. The reader is referred to Section 7 for additional analysis.

5(i)(c) Appropriateness of Production-line Testing and SEA

Requirements

Proposal: . EPA proposed the newly innovated manufacturer Production Line Testing program as the main assembly-line emission test program for marine engines. The traditional compliance assurance program, SEA, would be maintained as a means to spot-check engines for compliance, enabling EPA to evaluate manufacturer testing practices and follow-up on concerns EPA may have with regard to a particular engine family. In the SNPRM, EPA proposed to delay the implementation of the production line testing program for one year.

Comments: Comments received on the SNPRM were generally supportive of production line testing. Manufacturers commented that, while they do not think production line testing is needed, they would support the inclusion of production line testing in the final rule if such testing was limited to new technology OB/PWCs and used the CumSum procedure. Comments in support of production line testing were also received from an environmental group, stating that PLT provides a balanced approach to checking the emission characteristic of production engines, while not placing undue financial and administrative burden on manufacturers.

Analysis: EPA has determined that the production-line testing program is an appropriate testing activity which can detect whether a manufacturer has failed to translate an engine design successfully into mass production while the manufacturer still is producing that design. This program offers the manufacturer the opportunity to correct emission related problems early in an engine's life, thus reducing a manufacturer's in-use liability.

The finalized PLT program also will serve the following additional purposes: 1) ensure that manufacturers follow precisely the emissions test procedures listed in the CFR, 2) ensure that the manufacturers' test equipment accurately measures emissions, and 3) ensure that production engines are in conformity with applicable Federal emission requirements as they come off the assembly line and that individual engines tested conform to applicable family emission limits.

PLT is especially important for a rule where certification is built around an averaging, banking, and trading program. Manufacturers will be producing engines which generate emission credits that can be bought or sold or used to offset other

families produced by the same manufacturer. It is important to ascertain that actual production engines achieve proper certification family emission limits to ensure that credits are bona fide and real. EPA is finalizing, as proposed in the SNPRM, that requirements of the production-line testing program become effective one-year later than proposed in the NPRM, i.e., MY 1999 for OB and MY 2000 for PWC.

5(ii) Selective Enforcement Auditing Program

5(ii)(a) Application of Subpart

Proposal: In the NPRM, EPA proposed to implement a Selective Enforcement Audit (SEA) program for OB/PWC engines. In the SNPRM, EPA also proposed a Production Line Testing (PLT) Program which would be used by manufacturers to monitor production line quality. EPA stated that the PLT program would serve as the main production line emission test program for OB/PWC engines, and that SEA would only serve as a spot-check or backstop measure and enable EPA to evaluate testing practices used by manufacturers, follow up on concerns reported to EPA, and address any configurations not covered by the PLT program. In the SNPRM EPA requested comment on whether SEA should become a more important programmatic emphasis if EPA opted to not finalize a Production Line Testing Program. EPA requested comment on whether SEA regulations (i.e., Part 91, Subpart G) should be finalized for OB/PWC if commenters do not think SEA should become a more important programmatic emphasis.

The Agency noted that, even if the SEA provisions were not finalized in the regulation, EPA would retain authority under Sections 206(b)(1) and 208 of the CAA to test or require testing of newly manufactured engines and to inspect production facilities and processes to determine whether a manufacturer is complying with the information submitted for certification. However, by not applying the SEA subparts in the regulations, the SEA process could become more cumbersome. EPA requested comments on both the advantages and disadvantages of finalizing the SEA subparts for the rule. In addition, in the SNPRM, EPA proposed to exempt existing technology engines from the SEA Subpart of the regulation.

Comments: No adverse comments were received on the necessity for EPA to

retain the SEA provisions for OB/PWC engines in the final regulation. However, the Agency did receive comments from marine engine manufacturers supporting the exemption of existing technology OB/PWC engines from the SEA Subpart of the rule.

In response to the SNPRM, one marine industry organization commented that the removal of the proposed PLT program should not necessitate that the SEA program become a more important programmatic element.

Analysis: The final regulation will retain the selective enforcement auditing program and related subpart for OB/PWC engines. The final regulation also provides for an exemption from the SEA subpart for existing technology OB/PWC engines for the initial years of the phase-in period of the rule, see Section 4(iii) for more detail on the flexibilities provided for existing technology engines. The final regulation also contains the Production Line Testing (PLT) Program for OB/PWC engines. The SEA program 1.) will only be used to serve a spot-check function, 2.) will enable EPA to evaluate testing practices used by the manufacturers, 3.) allows EPA to follow up on concerns reported to the Agency, and 4.) provides EPA with a mechanism to address engine family configurations not covered by manufacturers in their PLT program. The Agency does not intend to conduct routine testing under the SEA program. However, the Agency believes it is appropriate to retain the SEA provisions in the final regulation in order to facilitate the Agency having a back stop for the PLT program.

5(ii)(b) Reduced testing burden for SEA

Proposal: EPA proposed that engine manufacturers with projected United States annual sales of less than 7,500 would be required to complete a minimum of one engine test per day during an SEA.

Comments: Several marine engine manufacturers commented on the NPRM that the proposed SEA program was overly burdensome, particularly for smaller volume manufacturers. Several manufacturers commented that the Agency should reducing the testing burden required by the SEA provisions contained in the NPRM.

Analysis: The final regulation retains the SEA program as proposed in the NPRM. The Agency has not altered the testing burden requirements within the SEA program as requested by engine manufacturers in their comments. As discussed under Section 5(ii)(a), the finalization of the PLT program will minimize the need for

the Agency to perform SEAs which will minimize the burden from the SEA program accordingly.

5(ii)(c) SEA location for Foreign Manufacturers

Proposal: In the NPRM, EPA proposed to include ports of entry or storage locations in the United States as locations for EPA selection of foreign-produced marine engines for SEA emission testing at laboratories in the United States. The proposal stated that EPA would allow manufacturers reasonable time to locate a contract testing facility in the United States and to schedule such tests.

Comments: EPA received comments from engine manufacturers as well as a marine industry organization recommending that EPA allow the marine engine manufacturer the option of choosing the port of entry selection or the assembly line selection of foreign-produced engines for SEA testing. Manufacturers commented that contracting with U.S. based emission testing facilities was difficult and costly.

Analysis: The provisions for SEA remain as proposed. EPA maintains, as it has in SEA programs for other regulations, that the manufacturer may submit a listing of preferred plants for selection of engines involved in SEA testing. However, EPA maintains the authority to have the final say over where an SEA will be conducted, including the selection of foreign manufactured engines at the port of entry or storage facility with in the U.S., and the testing of selected engines within the U.S. The Agency does not intend to conduct routine SEAs of marine engines but rather will likely use SEA as a way to follow up on concerns reported to the Agency. In such cases, engines need to be quickly selected for testing without delays caused by the extensive preparations and complications involved with governmental international travel. If EPA elects to conduct "spot check" SEAs, it will provide foreign manufacturers with appropriate warning and time so that manufacturers can line up test facilities in the U.S. EPA will work with manufacturers to pick the most convenient U.S. port, where appropriate, for selection.

6. In-Use Compliance Issues

6(i) Alternatives to a Finding of Noncompliance

Proposal: In the NPRM the Agency requested comment t on the circumstances under which alternatives to a conventional recall would be considered as a voluntary action by the manufacturer. In the SNPRM, the Agency proposed a voluntary program as an alternative to a finding of noncompliance: an in-use averaging, banking and trading program (in-use credit program). In the SNPRM, the Agency proposed the details of how the in-use credit program would function as an alternative to a finding of noncompliance (see section IV.F., 'In-Use Credit Program' of the SNPRM).

Comments: The Agency received comment from a marine industry organization in response to the NPRM suggesting eight alternatives to recall; (1) using banked credits or create credits from other engine families to offset the non-compliance, (2) recertify the engine family at a higher FEL, while maintaining compliance on a corporate average basis, (3) purchase credits from another marine engine manufacturer, (4) recertify the engine family in the following model year to a lower level that makes up for the noncompliance in the previous model year, (5) use market-based incentives to make up the noncompliance, (6) make a running change to the engine family to correct future noncompliance and make up for past non-compliance, (7) conduct a "field fix" or a "fix at fail" program, and (8) pay a non-compliance penalty. The commenter gave no additional detail on the eight suggested alternatives. In response to the SNPRM, this same commenter restated it's recommendation of the eight options to recall listed above, in addition to supporting the proposed in-use credit program. One marine engine manufacturer commented in response to the NPRM that as an alternative to recall all manufacturers should be allowed to either take actions that benefits the environment through more stringent new engine emissions or be allowed to purchase credits or use banked credits to offset the non-compliance.

Analysis: The Agency has finalized the in-use credit program as an alternative to the finding of a non-compliance. The Agency did not propose most of the alternatives to the finding of a non-compliance mentioned by the commenters. The programs suggested by commenters that aren't finalized either lacked sufficient detail for the Agency to consider incorporating into the final rule or suggested options that are legally questionable. However, suggested options 1 and 3 are allowed in the final

rule provisions. EPA encourages the manufacturers to utilize the information gained from the in-use testing program as a basis for deterioration factor determination when identifying future FELs. This is in fact a key goal of the in-use testing program. If a situation arises where a manufacturer in the future suggests an alternative to the in-use credit program as a means of avoiding the finding of a noncompliance the Agency will evaluate such proposals on a case-by-case basis. As the finalized in-use credit program is the preferred alternative, EPA will evaluate suggested alternatives on the basis of whether the alternative achieves a better environmental remedy than the in-use credit program.

6(ii) In-Use Testing Program and In-Use ABT Program Issues

6(iii)(a) Discounting In-Use Program Credits

Proposal: In the SNPRM, the Agency proposed that manufacturers offset the negative credits identified by the in-use testing program with positive credits at a rate of 1.2 to 1. This discount was for the specific reason of penalizing the underestimation of the certification FEL. EPA sought comment on the appropriateness of this penalty, including whether the penalty should be larger or smaller, or not imposed at all. EPA also proposed a relative sample size adjustment discount that varied by the number of engines tested to determine the in-use ABT compliance level (CL).

Comments: Comments received by a state group support the discounting of negative credits (i.e., for underestimation of the certification FEL) at 10 percent because they felt it is similar to other credit programs. Comments by an environmental group supported the discounts as proposed. Comments received by manufacturers express opposition to any discounting in theory, but also state support for the penalty for underestimation of the certification FEL discount at no more than 10 percent after model year 2003 provided that a manufacturer can accumulate tests for a given family over time to obtain full credit value for the relative sample size adjustment.

Analysis: This regulation finalizes the proposed relative sample size adjustment discount with the ability of manufacturers to accumulate sample sizes over

time and the discounting of negative credits at 10 percent for the specific reason of underestimation of certification FELs. The Agency believes it is reasonable to allow manufacturers to accumulate sample sizes over time as long as the engine family configuration has not changed in a manner which would affect in-use emission performance. As stated in the SNPRM, the discount of negative in-use credits provides an added incentive for manufacturers to adequately identify expected full useful life emission levels when choosing the certification FELs. This particular discount for the underestimating the certification FEL is being finalized for the reasons discussed below because support was received for the 10% rate in this instance from both states and industry. Further, environmentalists have expressed a desire to have a discount in this instance, although they supported a 20% discount.

EPA thinks that a 20% rate is too high in this instance. EPA would be concerned if the size of the discount drove the targeted emission reductions rather than the corporate average and individual engine family emission standard, which reflects the level of the emission standard that EPA is determining is appropriate. EPA is concerned that a 20% rate may have such a result. EPA has no similar discount in the certification program. However, the in-use ABT program is an innovative, new type of compliance program that is separate from certification and EPA thinks the success of the in-use ABT program depends on manufacturers adequately identifying the certification FELs in expectation of full useful life emissions, EPA thinks it appropriate to finalize a discount in instances where an engine family does not, on average, comply with the FEL.

EPA thinks that 10% is not too large a discount given that EPA will allow manufacturers to accumulate in-use test data over time as their historical sample sizes increase. Industry comments did not oppose this approach when given sufficient time to gain experience with in-use emissions. Industry recommended the discount not begin until model year 2004. The impact of this particular 10% discount and its success in creating an incentive for manufacturers to adequately identify the certification FEL will be evaluated over time as the program is implemented. EPA will consider whether this discount is too large should it become obvious over time that the discount is driving the targeted reductions of the program rather than the

corporate average emission standard itself. Conversely, EPA will consider whether this discount is too small should it become obvious that manufacturers are gaming the certification FELs by setting them too low because they have excess positive in-use program credits with infinite life to rely on. Additionally, should it become obvious that the in-use infinite credit life adds to gaming FELs between the certification and in-use credit program given that certification credits have a 3 year credit life, EPA will evaluate the need to restrict credit life.

EPA is not concluding that the 10% rate is appropriate for discounting generally or that discounting of negative credits is always appropriate. It should be emphasized that this particular discount and the size of this discount should not be viewed as precedent setting for other programs, mobile or otherwise, even other in-use ABT programs. EPA is trying new, innovative program provisions in this regulation that may or may not be appropriate for other types of sources, mobile or otherwise. The experience EPA gains with these innovative approaches in the marine regulation will be used to evaluate whether these programs are possibilities in other areas, should the programs exhibit emission reduction integrity and administrative efficacy as EPA expects they will.

The specific reasons EPA thinks the 10% discount for the underestimation of the certification FEL in the marine in-use ABT program is appropriate are twofold. It is important that manufacturers adequately identify the expected full useful life emission rate for the engine family so that certification credits are not gamed against in-use credits. Also, the 10% rate seems to adequately incentivize attaining this objective while not being so large as to subjugate the targeted reduction deemed appropriate by the level of the corporate average emission standard.

While EPA is very concerned with manufacturers adequately identifying the expected full useful life emission rate for each engine family in order to appropriately set the certification FEL, EPA realizes that the control technologies that will be applied (e.g., direct-injection two-stroke technology, four-stroke technology, catalyst technology) have not been implemented yet and manufacturers will have to gain implementation experience in order to fully understand the full useful life emissions of engine families. EPA expects that the in-use testing program will be an integral part

of the process of gaining this experience and sees the gain of information as one of the important results of the in-use testing program.

While it is important that manufacturers adequately identify the expected full useful life emission rate for the engine family so that certification credits are not gamed against in-use credits, EPA thinks that manufacturers should not be penalized before they have been given an adequate time period to gain experience. EPA will not implement the 10% discount for underestimation of the certification FEL until model year 2004, which is six model years after 1998 (1998 is the first model year of implementation for OB) and five model years after 1999 (1999 is the first model year of implementation for PWC). EPA is also limiting the amount of in-use testing that EPA will require to at most 25% of the manufacturers product line per model year. As this is a maximum, it should be recognized that EPA may require less in-use testing than 25%. Therefore, it may take five to six years or more for manufacturers to have a complete set of in-use test data across their product line. EPA thinks it is appropriate to allow manufacturers time to gain knowledge through the generation of the in-use test data before imposing the 10% penalty for the underestimation of the certification FEL. EPA is not allowing more time because by 2004 manufacturers should have sufficient knowledge of the expected full useful life emissions of all their engine families.

6(ii)(b) Multiyear Averaging in the In-Use ABT Program

Proposal: In addition to the certification credit program, EPA proposed in the SNPRM to establish an in-use credit program for marine OB/PWC engines, designed to provide manufacturers with flexibility in meeting the standards in-use. Similar to the certification ABT program, EPA proposed not to allow a manufacturer facing a deficit situation at the end of the model year to carry the deficit over to the next model year. A manufacturer could seek purchasing credits from another manufacturer to remedy a deficit situation, or, test additional engine families of that MY beyond the 25 percent proposed for the in-use testing program to generate additional positive credits. However, EPA stated that is was considering allowing a manufacturer to carry over a deficit in the in-use ABT program to the next model year in the beginning of the phase-in period, and requested comment on the appropriateness of allowing

deficit carry-over, the length of time deficit carry-over should be allowed, and under what circumstances deficit carry-over should be allowed.

Comments: In response to the proposal, an industry group recommended EPA implement a multi-year averaging provision for the in-use ABT program to ensure that manufacturers have sufficient credits to meet unanticipated shortfalls. They suggested limiting carry-over of in-use deficits to the first six years of the program, where deficit carryover would be based on three-year rolling periods, but all deficits generated during the first six years of the program would have to be trued-up by the end of MY 2003.

Analysis: The final rule contains a multi-year averaging provision for the in-use ABT program because of the technological changes needed to be made in a short time period, the short lead time between the finalization of the regulation and the beginning of the in-use ABT program, and to address unforseen situations beyond the manufacturer's control. For additional discussion on this issue, see section 4(vii)(b) on Certification ABT Multiyear Averaging. Specifically, manufacturers will be allowed to carry-over an unlimited amount of deficits from one model-year to another during the first six years of the phase-in period (5 years for PWC). The Agency decided not to impose a limit on the amount of deficits carried over each year for several reasons. It will provide the manufacturers with the flexibility needed to become comfortable with maintaining the appropriate emission reductions throughout the useful life of the marine engines. EPA believes this provision will help facilitate compliance of in-use emissions from an industry which has not had, until now, much experience in identifying or controlling emissions in-use. Also, EPA is finalizing limitations that EPA can at most require 25 percent of a manufacturers engine families to be tested per year. EPA estimates it will be between four and six years, depending on a manufacturers product line and EPAs process for choosing engine families to by tested, before data on engine families approaches 100 percent of a manufacturers product line. Therefore, the six year period is a sensible choice to allow deficit carry over. EPA would like to avoid problems associated simply with the process of gathering data rather than an overall non compliant status on a corporate average basis.

However, this provision does not compromise the amount of emission reductions expected to be maintained in-use since manufacturers are required to achieve compliance over the averaging period by MY 2003.

6(ii)(c) Use of Manufacturer Controlled Fleets

Proposal: The NPRM articulates a proposal by NMMA that suggests the use of fleets instead of individually owned engines for in-use compliance testing. EPA requested comment on the appropriateness of this approach as well as an engineering analysis and/or data regarding the relationship between emission performance of such fleets and the in-use performance of individually owned engines

Comments: One commenter suggested that manufacturer fleets do not represent actual field engines. Comments suggested that the emission levels of fleet engines do not represent actual field engines because the fleet engines have better maintenance than actual field engines. EPA did not receive engineering analysis or data regarding OB/PWC engines.

Analysis: EPA thinks that the logistical difficulties of tracking marine engines necessitates fleet testing in the in-use testing program. In some states boats are registered, but for the most part engines are not, making tracking difficult if not impossible. EPA thinks it would be costly and unduly burdensome to require that actual field engines obtained from consumers be required for in-use testing because it would necessitate a new system of tracking engines. It would be unduly burdensome on manufacturers, especially smaller manufacturers, to require the manufacturers to implement a tracking system. EPA ruled out this option in consideration of the draft Regulatory Flexibility Analysis.

EPA expects that fleet OB/PWC engines will be adequate representations of actual field engines. EPA's in-use testing program requires that test engines have a maintenance history representative of actual in-use conditions. Additionally, the new types of marine engines that utilize control technology (e.g., direct-injection two-stroke technology, four-stroke technology, catalyst technology) require little maintenance. EPA expects that the typical maintenance that manufacturers will recommend in their owner's manuals will not be extensive (e.g., changing the spark plugs yearly, changing the oil). EPA will be working with the manufacturers to

develop guidance policy for the in-use testing program that will outline standard maintenance guidelines based on manufacturer's recommended maintenance schedules and the amount of maintenance seen in actual field engines. EPA will be evaluating the success of this guidance policy on this aspect of the in-use testing program in EPA's evaluation of these new, innovative programs generally. Should it become obvious that manufacturers are unreasonably requiring maintenance that consumers are unlikely to do, EPA will be evaluating the need to pursue putting maintenance limitations in regulation as opposed to pursuing this issue through guidance, pursuant to EPA's authority under section 207(c)(3)(A).

EPA sees other advantages to allowing in-use testing of manufacturer fleets rather than actual field engines. Fleet testing is more expedient because it allows for higher usage accumulations in a shorter time frame.

6(iii) Recall--Application of Subpart

Proposal: EPA proposed in the NPRM regulations regarding recall. Under Section 207(c) of the CAA, EPA is required to order a recall should the agency determine that a substantial number of marine engines do not conform to the applicable emission standard or FEL during their regulatory useful life. The proposed regulations specified procedures to implement Section 207(c).. In the SNPRM, EPA requested comment on whether the Agency should omit the recall portion of the proposed Subpart I from the final rule.

Comments: EPA received numerous comments on this issues. The majority of comments opposed applying recall provisions to marine engines. Commenters argued recall would be unnecessary, burdensome, and ineffective due to the difficulty of tracking marine engines because they are generally not registered with any state agency and since length of original ownership is on average 4 years. A range of alternatives to recall were proposed as a means for dealing with in-use non-compliance. Suggestions were made for restricting recall to only credit-generating engines or to only high production volume engine families.

Analysis: After careful consideration of the comments, EPA has decided to finalize regulations regarding recall applicable to all OB/PWCs. The Agency is optimistic that the administrative programs finalized in this rule will work effectively,

obviating the need for the Agency to order a recall. The in-use ABT program makes it unlikely that this provision would ever need to be applied since engine families with in-use test results above their certification FELs may be offset through ABT. However, EPA has determined it would be helpful to have regulations specifying procedures under Section 207(c) should the in-use ABT program fail to address noncompliance adequately.

6(iv) Useful Life and In-Use Testing Period

Proposal: EPA proposed that the useful life and in-use testing period be set at 10 years or 350 hours of operation (whichever occurs first) for OB, and 5 years or 350 hours of operation (whichever occurs first) for PWC.

Comments: Two commenters suggested EPAs proposal was too short given that marine engines typically last much longer than the proposed useful life and in-use testing period. One state air quality agency suggested 15 yrs/525 hours for outboards and 8 yrs/525 hours for PWCs. In reference to Section 91.107(a) of the proposal, an environmental organization suggested the useful life be $\geq$ 15 yrs/1500 hours, the Agency has interpreted this comment as refering to the in-use testing period. One commenter supported extending the in-use testing period beyond the regulatory useful life of the engine. Manufacturers supported the proposal. In later comments, NMMA urged EPA to specify in the regulations that a manufacturer must remedy nonconformity only if an engine is within the useful life at the time of the nonconformity determination.

Analysis: EPA is finalizing a useful life and in-use testing period for gasoline OB/PWC marine engines of 10 years or 350 hours of operation (whichever occurs first) for OBs, and 5 years or 350 hours of operation (whichever occurs first) for PWCs. The final rule applies the maximum potential actual life of each engine through the credit calculation equation, however, the Agency has decided to limit the useful life and in-use testing period the engines because of the very long lives of these engines. Gasoline OB/PWC marine engines covered by this final rule have an average life of between 14 and 27 years depending on the engine power. This period is substantially longer than other mobile source categories the Agency has regulated in the past. The

finalized useful life and in-use testing period for OB/PWCs is somewhat longer than the in-use testing period for on-highway heavy-duty engines and large compression-ignition nonroad engines.[8] However, EPA believes the finalized useful life and in-use testing period are reasonable due to the long actual lives and the difficulties involved in finding engines for testing beyond this period. This is generally consistent with the Agency approach in other mobile source programs. For example, the Agency notes that the in-use testing period limits the age and hours of test engines that can be used to generate in-use data for which the manufacturer can be held accountable. It does not limit the manufacturer's liability to address engines of any age based on test data generated by test engines within the in-use testing period. Consistent with NMMA's comments, EPA is exercising its discretion so that the final regulations specify that the useful life does limit recall repair liability to engines within this time period at the point of any Agency nonconformity determination under §207(c). Therefore, a manufacturer is not required to recall for repair an engine that exceeds the useful life in hours or years at the date of the nonconformity determination. The manufacturer is required to recall for repair engines that do not exceed the useful life in hours or years at the date of the nonconformity determination even if the engine has accumulated additional years or hours by the time it is actually repaired or recalled. EPA is taking this discretionary action for the reasons described in the preamble. EPA will monitor the adequacy of these time periods and may revisit the issue if it becomes apparant that the limitations are adversely affecting attaining the in-use reductions over the actual lives of marine engines expected from the emission standards.

6(v) Nonconformance Penalties

Proposal: EPA did not propose to include nonconformance penalties (NCPs) for emission control of spark-ignited marine engines. The Agency stated its belief that the proposed certification ABT program should offer enough flexibility to meet the proposed standards and should alleviate any concerns the manufacturers may have

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[8] The current Agency policy on in-use testing for on-highway heavy-duty engines limits in-use testing to approximately 75 percent of an engine's regulatory useful life (see 48 FR 52170, 52173, November 16, 1983).

about their ability to bring all engines into compliance.

Comments: The Agency received several comments on the issue. Two marine industry commenters supported the idea of NCPs as an alternative to recall. One smaller marine engine manufacturer suggested that NCPs could force small entities to shut down. This same smaller manufacturer suggested that as an alternative to NCPs, a manufacturer should be given a significant "free" period to correct the noncompliance, followed by a modest quarterly fine for as long as noncompliance continues.

Analysis: Nonconformance penalties are not included in the final regulation. NCPs are designed to provide relief at certification for engine manufacturers who cannot develop the emission control technology needed to meet technology forcing standards. NCPs are not available to address in-use noncompliance. The certification averaging, banking, and trading program should provide manufacturers sufficient flexibility to meet the proposed standards at certification and should alleviate any concerns that manufacturers may have regarding their inability to bring some engines into compliance with the proposed standards. Similarly, the in-use ABT should provide sufficient flexibility to allow manufacturers to avoid the threat of recall. EPA acknowledges the smaller manufacturer concerns regarding the impact of NCPs on their economic viability. EPA is not finalizing NCPs and therefore all manufacturers must comply with the corporate average emission standards, either by applying control technology or by purchasing credits in the market to achieve compliance for their product line. EPA is finalizing the broadest flexibilities possible in the certification ABT programs in order to facilitate manufacturers addressing the concerns regarding the application of control technology via the emission credit market. This is because addressing the concerns via the emission credit market means that the targeted emission reductions are achieved. On the other hand, addressing the concerns through allowing NCPs at certification means that the targeted emission reductions are not achieved. The certification ABT provisions provide both an alternative for manufacturers who are unable to apply adequate control technology and assurance that the targeted emission reductions are attained for this source.

6(vi) Defect Reporting

Proposal: EPA proposed that a defect report would be required whenever a manufacturer identifies the existence of a specific emission-related defect in 25 or more engines manufactured in the same model year. No report would be required if the defect was corrected prior to the sale of the affected engines. In the SNPRM EPA proposed to exempt existing technology OB/PWC engines for the first six years of the phase-in period from Subpart J, which includes the defect reporting requirements.

Comments: Comments received were opposed to the proposal, stating that using 25 engines as the trigger would be too burdensome, but offered no rationale as to why this would be burdensome. One commenter did state that some components, such as injectors, are used in numerous engine families, making the trigger of 25 far too low a number. Several commenters suggested that defect reports be based on volume, such as 1% for production auditing. Several other commenters suggested that defect reports should be required only when $\geq$ 25 in the same engine family shows the defect or 1 % of production, whichever is greater. Comments from engine manufacturers recommended that old technology OB/PWCs should never be subject to defect reporting.

Analysis: The final regulation will retain the proposed defect reporting requirements and trigger number, 25, for new technology OB/PWC engines. The Agency has waived the defect reporting requirements for existing technology OB/PWC engines for a period of years (see Section 4(i.) Existing Technology - Definition and Administrative Flexibilities). As described in the preamble for the NPRM, the Agency believes, based on an analysis of the on -road heavy-duty manufacturers defect reporting submissions, that the entire marine industry will be expected to submit between 5 and 15 defect reports per year. Thus, EPA has no reason to believe that the defect reporting requirements as proposed are too burdensome , since EPA expects the number of reports submitted by a single manufacturer to be very small (less than two per year). Furthermore, if a manufacturer finds and remedies a defect prior to sale of the engine to the ultimate purchaser, no defect report to the Agency is required.

6(vii) Defect Warranty

Proposal: Under the authority of section 207(a) of the CAA, the NPRM proposed a defect warranty period of four years for emissions related parts on spark-ignition marine engines.[9] A four year period was chosen since manufacturers indicated that this is the average period that a first owner possesses a marine engine. EPA requested comment on the appropriateness of this time period. In addition, an advisory parts list covering all mobile source engines and vehicles issued by EPA on July 15, 1991 was added to the marine docket to help define what would be considered an emissions related part.

Comment: Environmentalists commented that the four year warranty proposal was too lenient due to the long lives of marine engine. One commenter suggested fifteen years for outboards and eight years for personal watercraft. Another commenter stated that they did not believe that the engines would be difficult to track after four years; therefore, the term of first ownership should not set the warranty period.

Marine engine manufacturers commented that a four year defect warranty would be expensive without providing any real emission benefits. They commented that current warranties are generally for only one year. Their concern with a longer warranty period is that dealerships could replace high-cost parts under warranty rather than determining actual, lower cost, repairs on engines. The incentive to do this would be that replacement is faster and easier for dealers. However, simply replacing warranted parts does not mean that the parts were actually defective. This would result in higher costs which would be passed to the consumers, regardless of whether the impact was immediate or passed on through the need for manufacturers to cover higher costs generally. Manufacturers commented that this results in

[9]Section 207(a)(1) of the CAA requires manufacturers to provide both (1) a "time of sale" warranty that the engine is designed, built, and equipped so as to conform at the time of sale with applicable emission regulations, and (2) a "defect" warranty that the engine is free from defects in materials and workmanship which would cause the engine to fail to conform with the applicable emission regulations during a warranty period to be specified by the Agency. See 42 USC 7541(a)(i). Here, EPA is establishing a warranty period for the defect warranty, in accordance with the statute.

warranty costs incurred without any impact on air quality since the problem wasn't an emission related problem. Manufacturers commented that it is important to produce reliable and durable emission related components. They emphasized the need to phase-in the warranty requirements to allow time for them to teach the technicians and dealers about the new types of product and how to diagnose emission related component failure so as to avoid wrongly replacing warrantable parts that are not defective.

Another concern expressed by manufacturers was that many commercial applications will require very high use of a given marine engine. Therefore, an engine could pass its design life before the end of the defect warranty period. To protect the manufacturers from warranty claims on engines with very high use, the manufacturers suggested an hourly limitation on the defect warranty. Manufacturers commented that some engines already have hour meters and that it would not be much of a burden to add hour meters to other engines.

To develop a reasonable warranty proposal, the Association of Marine Engine Manufacturers (AMEM) created a warranty subgroup. This subgroup developed the following three phase proposal: In phase one (1998-2000 model years), manufacturers would have to continue offering their standard defect warranty with a one year minimum warranty for all emission related components. In phase two (2001-2003 model years), the standard warranty would still be offered with a three year/200 hour defect warranty of specified major emissions control components. In phase three (2004 and later model years), an additional requirement of two years/200 hours would be required for all emission related parts as well as the three year/200 hour on specified major emission control components.

Analysis: After careful consideration, EPA has decided to adopt the three phase defect warranty approach proposed by the (AMEM) warranty focus subgroup. Because this approach results in a longer warranty period with respect to certain emission related parts than is currently offered, EPA considers it to be an added incentive to purchase new technology engines. It should be noted that the warranty period is only one of several programs in this regulatory package designed to ensure the durability of marine engines with new emission control technology.

6(viii) Maintenance Issues

Proposal: The NPRM proposed no provisions requiring engine manufacturers to provide specific maintenance language in engine owner manuals, nor were any programs proposed specifically addressing required owner maintenance. However, manufacturers are required to provide owners with maintenance schedules in the owners manual. The in-use testing program proposed in the SNPRM requires manufacturers to use only properly maintained engines representative of actual in-use emissions in their in-use fleets, and maintenance could not be performed on these engines beyond what is required in an owners manual.

Comments: One comment was received on this issue from an environmental organization. The commenter believed that the deterioration of in-use engines seen from on-highway vehicles which results in non-complying vehicles is mostly attributable to poor maintenance. The commenter believes the same phenomena will occur for regulated marine engines. The commenter encouraged EPA to establish programs specifically addressing issues related to ensuring proper maintenance of in-use marine engines.

Analysis: The Agency shares the commenter's concerns regarding the need for good maintenance of in-use OB/PWC engines. However, the Agency believes there are sufficient differences between existing on-highway vehicles and the technologies the Agency believes will be used to meet the standards contained in this final regulation for OB/PWC engines that the assumption the commenter has made that proper maintenance of in-use OB/PWC will play the same critical role as for on-highway engines is unfounded or at least unproven. The Agency will be working with marine engine manufacturers to ensure that consumers are provided with sufficient information regarding maintenance to ensure in-use certified engines continue to be in compliance throughout their useful lives. Refer to Section 6(iii)(c) for additional discussion on maintenance issues.

6(ix) Tampering

Proposal: EPA proposed to apply existing on-highway tampering provisions to marine engines covered by the proposal such as the prohibition against any

individual rendering inoperative any emission control device. EPA requested comments on how to establish specific criteria or parameters under which a manufacturer would be allowed to modify an engine without jeopardizing the integrity of the emission control program and without causing the manufacturer to have to recertify or risk being in violation of EPA tampering guidance in Memorandum 1-A. The Tampering Enforcement Policy Memorandum 1-A contains EPA's guidance policy regarding Section 203(a)(3) of the Clean Air Act, which specifically prohibits tampering.

Comments: Engine manufacturers and marine industry groups commented that anti-tampering provisions should apply only to new technology engines. Industry commenters were very opposed to any anti-tampering provisions applied to existing technology engines because manufacturers would have to redesign existing technology engines to make them more tamper proof, yet these engines would be phased out of production anyway. Commenters also suggested that certain adjustments do need to be performed by marine engine dealerships, and that anti-tampering requirements should be satisfied by the use of special tools only available to dealerships.

Analysis: The final regulations will retain the proposed anti-tampering restrictions as they apply for on-highway engines. The basic purpose of these restrictions is to prohibit any person from tampering with an emission related component on an engine both prior to and after the sale to the ultimate purchaser. This restriction therefore applies to dealerships as well as the general public, including the consumer. EPA received comment from engine manufacturers on the need for dealerships to be able to make certain adjustments to engines prior to sale related to extreme temperature and altitude conditions.

The Agency would deal with this type of request by manufacturers under guidance after the finalization of the regulation. A manufacturer would have to demonstrate to the Agency that the adjustment made to the engine would not cause the engine to exceed the FEL of the certified engine under the extreme conditions. In addition, the manufacturer would have to provide the Agency with documentation demonstrating that the adjustments could only be made with special tools by the dealerships, and that dealerships were well informed regarding the conditions under

which the adjustments should and should not be made.

The anti-tampering provisions in the final rule are not open to EPA discretion regarding existing vs. new technology. Section 203(a)(3)(A) of the Clean Air Act specifies that tampering with a certified engine is a prohibited act. Therefore, the anti-tampering provisions of the final regulation will apply to both new and existing technology engines certified to this regulation.

7. Provisions for Mature Technology OB/PWC

Proposal: Neither the NPRM nor the SNPRM specifically mentions "mature technology" OB/PWC engines, nor did EPA request comment on mature technology.

Comments: Several marine engine manufacturers and a marine industry organization commented the Agency should provide a process by which OB/PWC engine families which could demonstrate they were consistently clean and below the final year standard (MY 2006) would be allowed the same reduced certification and compliance burdens afforded to SD/I engines. The commenters suggested the establishment of criteria by which OB/PWC engines could be classified as "mature." Several commenters included suggestions for the criteria which would be used to define when a OB/PWC engine family would qualify as mature. The commenters believed that engine technology which could demonstrate the same degree of emission performance level and consistency as SD/I engines should be subject to the same provisions as SD/I engines.

Analysis: The final regulation does not contain a definition of mature technology OB/PWC nor does it apply the same provisions to "mature" technology OB/PWC engines as are afforded to SD/I engines. The Agency acknowledges the appropriateness of reducing the burden of the regulation on OB/PWC engines which make the demonstration they have emission performance which is consistent and well below the final year emission standard (MY2006). However, as the Agency has discussed, the primary goal of this regulation is to reduce HC emissions from the OB/PWC category of marine engines. As discussed in the preamble and in Section (3)(ii) of this document, the Agency has finalized no standards for SD/I engines. In

order for the Agency to have confidence that the projected 75% HC reduction from the OB/PWC category will occur, all engines within the OB/PWC industry must be included in the regulation, therefore, the Agency can not exclude "mature" technology OB/PWC engines from the regulation as has been done for SD/I engines.

The Agency agrees with the commenters that some level of reduced burden should be given to engines which demonstrate they are below the final year emission standard and have demonstrated consistent in-use emission performance. The Agency has designed the final regulation to accomplish this goal. Four provisions in the final regulation provide significant reductions in burden to manufacturers of engines which demonstrate they are below the final year emission standard and have consistent in-use performance; (1) simplified certification allows EPA to use administrative guidance in the data reporting requirements for certification, which allows the Agency to reduce reporting burden at its discretion, (2) certification carry-over allows manufacturers to carry-over certification test data from one year to the next provided no significant change in engine design has been done which changes emission performance, (3) the production line testing program, using the CumSum approach, allows manufacturers to demonstrate with real test data that they are consistently below the standards, and if they are, the testing burden can be as minimal as two tests per year for each family which makes the demonstration, and (4) the in-use testing program allows EPA considerable discretion in the choice of engine families to be tested, at most EPA can choose up to 25% of a manufacturers engine families per year, but EPA can elect to choose no engine families, if a manufacturer has demonstrated consistent in-use emission performance, the Agency has the discretion to drop that family from the in-use testing program.

In summary, the Agency has not included a definition nor provisions addressing "mature" technology OB/PWC engines per se. However, the Agency has finalized several significant provisions in this regulation to reduce the burden on engine manufacturers who demonstrate consistent production line and in-use emission performance below the final year emission standard.

8. Test Procedure and Durability Issues

8(i) Test Cycle

Proposal: EPA proposed a 5-mode steady state test cycle for the emission measurement of all SI marine propulsion engines. The development of the proposed cycle is described in the Society of Automotive Engineers technical paper 901597. The 5-mode cycle is also referred to as the ISO E4 cycle, based on the International Standard Organization standard 8178, test cycle E4.

Comments: One commenter expressed concern regarding the proposed test cycle's ability to predict emissions from non-steady state operation, and the commenter believed a transient test cycle would be more appropriate. However, EPA received many comments from engine manufacturers supporting the proposed test cycle for SI marine propulsion engines. One marine industry organization submitted