Control of Emissions from Marine SI and Small SI Engines, Vessels, and Equipment

Summary and Analysis of Comments

Chapter 3
Marine SI Engines and Vessels

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

United States
Environmental Protection
Agency

EPA420-R-08-016
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3 Exhaust Emission Standards and Related Requirements for Marine SI Engines

What We Proposed:

The comments in this section generally correspond to Sections III, IV, and VII of the preamble to the proposed rule, where we describe the proposed emission standards and certification procedures associated with exhaust emissions from Marine SI engines. The applicable regulatory provisions for these proposed requirements are in 40 CFR part 1045. The Regulatory Impact Analysis describes the feasibility of these standards, special provisions that apply to small businesses, and alternative standards under consideration in Chapters 4, 10, and 11, respectively. There are also several technical amendments to the regulatory provisions in 40 CFR part 91.

See Chapter 1 of this document for a discussion of issues that apply more broadly than only for Marine SI engines. See Chapter 4 of this document for a discussion if issues related to evaporative emissions.

3.1 Scope and applicability

3.1.1 Differentiating Small SI and Marine SI engines

See Section 3.12.3 for a discussion of issues related to installation of certified Small SI engines in marine vessels.

3.1.2 OB/PWC and SD/I definitions

What Commenters Said:

NMMA and Brunswick commented that they have no objections to creating a single term that would include both sterndrive and inboard engines in a single category of engines and that also clarifies that hovercraft and air boats are specifically included in this engine category.

BRP and Yamaha commented that they use PWC engines to propel their jet boat products (also called “sport boats”), which would be classified as sterndrive/inboard under the new regulations. BRP commented that both EPA and CARB currently categorize Sport Boats with outboards and personal watercraft. Currently, BRP certifies its Sport Boat models in the same engine families as PWC models for both EPA and CARB. BRP and Yamaha commented that including jet boat engines in the SD/I category creates a new more stringent set of emission standards for these engines. Both manufacturers commented that this is only appropriate if jet boats are given sufficient lead time to comply with the standards and the corporate average provision is expanded to allow CO averaging.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Yamaha	0721
Mercury	0693

Our Response:

We are finalizing the definition of sterndrive/inboard engines as proposed. We believe classifying engines used in hovercraft, air boats, and jet boats as SD/I engines is appropriate because it will subject the engines in these applications to the same emission standards as other boats with similar size, power, and usage characteristics. As described in Section 3.2.3, we are providing flexibility in meeting the new emission standards for jet boat engines because they are currently designed to use engines derived from OB/PWC applications and because of their relatively low sales volumes. We believe that this flexibility, coupled with the additional lead time, addresses the comments raised by BRP and Yamaha regarding lead time and CO averaging.

3.1.3 Maximum engine power and displacement

What Commenters Said:

NMMA and Mercury Marine commented on § 1045.140 at which EPA defines "maximum engine power" as the "maximum brakepower point on the nominal power curve for the engine configuration." 72 Fed. Reg. at 28,268. Section § 1045.140(b) states that "[t]he nominal power curve of an engine configuration is the relationship between maximum available engine brake power and engine speed for an engine, using the mapping procedures of 40 CFR part 1065, based on the manufacturer's design and production specifications for the engine." Id. The reference to the mapping procedures in Part 1065 is inappropriate. Under EPA's current regulations for OB and PWC engines, manufacturers use SAE J1228 to determine maximum power, and the California regulations also require the use of SAE J1228. For the EU, manufacturers use ISO 8665, which is equivalent to the SAE standard. EPA's proposal to require the procedures in Part 1065 would be inconsistent with these existing requirements and, importantly, would require significant additional testing over and above what is required for compliance with the California and EU requirements. This considerable cost burden on manufacturers is unjustified given there is no environmental benefit. NMMA recommends that EPA replace the reference to Part 1065 with SAE J1228 and ISO 8665. This would ensure consistency among the different regulatory schemes and reduce unnecessary compliance costs.

Indmar has concern over the procedure for establishing the nominal power curve and the resulting rated speed and rated power. California and the European Union use SAE J1228 or ISO 8665 (same except for English vs. metric). Section 1045.140(b) references 40 CFR part 1065 and should reference SAE J1228. They think EPA should remain common with CARB and eliminate the possibility of duplicate testing for EPA at a slightly different power level.

Bombardier commented that in 40 CFR 1045.140, EPA is proposing to redefine how maximum engine power is determined on marine spark-ignited engines by changing the current engine mapping procedures from SAE J1228 to 40 CFR 1065. Currently, the marine industry follows the procedures of SAE J1228 for EPA and CARB and ISO 8665 (functionally equivalent to SAE J1228) for the European Union (EU). By changing the mapping procedures for marine spark-ignited engines, EPA is forcing manufacturers to run a different test procedure for EPA than done for CARB and the European Union. This would impose a significant additional test burden on a manufacturer. BRP recommends EPA replace the reference to 40 CFR part 1065 with SAE J1228 and ISO 8665 to maintain harmonization with CARB and the EU.

Yamaha commented that EPA has elected to establish a test protocol that is without merit and will add increased cost to certification, possible additional costs for dyno replacements/updates and will not harmonize with what currently both the CARB and EU utilize which is SAE 1228 or the ISO equivalent for this purpose. Yamaha requests that EPA adopt the NMMA language of continued use of SAE J1228 for this purpose to harmonize on an International basis.

Letters:

Commenter	Document #
NMMA	0688
Indmar	0667
Bombardier	0674
Yamaha	0721
Mercury	0693

Our Response:

The regulations rely on the value for maximum engine power to establish which standards apply and to calculate emission credits. For example, the regulations include emission standards that differ for power ratings at 4.3, 30, 40, 250, 373, and 485 kW. It is important to have an objective method for establishing an engine's power rating for determining which standards apply and for calculating emission credits. The current regulations and the published SAE and ISO procedures direct the manufacturer to declare a value for rated power without any clear direction to establish that value based on an engine's power map or other operating characteristics.

It is true that manufacturers would need to run an engine map for each engine, but we expect that this is already common practice to establish the engine's power characteristics and determine the recommended prop range. Therefore, we disagree that the definition of maximum engine power in 40CFR 1045.140 will increase testing costs.

Note that maximum engine power is not related to testing engines. The relevant parameter for testing is maximum test speed. Manufacturers raised similar concerns about our approach for establishing maximum test speed, which we describe in Section 3.9.1.

3.1.4 Fuel additives for reducing emissions

What Commenters Said:

Pure Power commented regarding their EcoFuelTM Mach 3 Gasoline & Diesel Additive. They claim that independent test results reported by ATDS, Inc, Ontario, CA, (recognized by the EPA and CARB for automotive emission and fuel consumption) from both gasoline and diesel powered cars and trucks showed "across the board" reductions as high as: NOx (44%), HC (16.3%), CO (4.5%), opacity smoke (30.4%), particulates (18.3%), in addition to a 14% reduction in fuel consumption.

Pure Power also commented that their ThrustorTM & Schultz NozzleTM Marine Propulsion System reduces fuel consumption, while increasing overall vessel performance. The ThrustorTM is designed to mount on the anti-cavitation plate and skeg for all outboard and stern drive boats. The Schultz NozzleTM mounts to the vessel hull. Conservative projected fuel savings between 10% and 20% depending on vessels size and speed.

Letters:

Commenter	Document #
Pure Power	0664

Our Response:

Our regulations are intended to be fuel neutral and would not preclude the use of these fuels or additives. However, anyone wishing to obtain a certificate of conformity that relies on the use of a fuel that is not widely available or that relies on any particular additive would be required to demonstrate that the engines would consistently operate with such fuels or additives during in-use operation. Moreover 40 CFR 1068.101(b)(1) prohibits using the incorrect fuel if it renders the emission control inoperative.

3.1.5 Natural gas and LPG engines

What Commenters Said:

Rolls Royce submitted comment asking what legislation EPA will apply to our [natural] gas engines if they are to be used in marine application. Has EPA had a chance to check this?

Nautigaz shared commercial information related to their system for converting gasoline-fueled marine engines for operation on LPG. They pointed out the energy-security advantages of LPG based on the extensive domestic production of LPG fuels within the United States. They also maintained that engines operating on LPG will always be less polluting than diesel-fueled or gasoline-fueled engines. Nautigaz also pointed out various technical parameters of interest in designing marine systems, such as corrosion control, the advantages of fuel-level indicators and anti-deflagration devices.

Letters:

Commenter	Document #
Rolls Royce	0715
Nautigaz	0727

Our Response:

Oceangoing vessels that transport natural gas as a commodity product are increasingly using the stored (and vented) natural gas to fuel the ship's propulsion engines. The comment from Rolls Royce helped us realize that these engines would likely be subject to our Marine SI standards under the wording of the proposed regulations. These engines might be 20,000 or 30,000 kW, so the certification and testing protocol we have developed for Marine SI technologies would clearly not apply for these larger engines. To address this, we have revised the regulations to specify that natural gas engines above 250 kW would need to meet the standards that apply for marine compression-ignition engines. All automotive-type engines using natural gas today are less than 250 kW so this threshold should properly differentiate engines installed in conventional sterndrive and inboard vessels from the diesel-derived natural gas engines used in workboats and other commercial vessels. This is consistent with the recently adopted provision of 40 CFR 1042.1(e).

The emission standards in this rule are fuel neutral. Manufacturers may certify engines using LPG, gasoline, or other fuels. It may be possible for LPG-fueled engines to reach lower emission levels than gasoline-fueled engines, but our observation across the various engine categories is that catalyst-equipped engines have comparable emission levels whether they are fueled by gasoline, LPG, or natural gas. Diesel-fueled engines are subject to a totally different set of emission standards and other regulatory requirements.

3.2 SD/I standards and lead time

3.2.1 SD/I standards–level

What Commenters Said:

NMMA, Mercury Marine, Indmar, MECA, NACAA, Pennsylvania DEP, New York DEC, NESCAUM, and Environmental Defense support the HC+NOx standards of 5.0 g/kWh and CO limit of 75 g/kWh proposed by EPA for the SD/I engines.

NMMA stated that EPA is proposing a 5 g/kW-hr standard for HC+NOx and a 75 g/kW-hr standard for CO for SD/I engines starting in model year 2009. 72 Fed. Reg. at 28,263 (proposed § 1045.105). While NMMA fully supports the level of the proposed emission limits for HC+NOx and CO in § 1045.105(a), the 2009 model year implementation date is not feasible for the recreational marine industry.

Mercury fully supports the exhaust standards for SD/I Engines provided that the implementation dates are adjusted to provide necessary lead time.

Sea Ray wants to take this opportunity to express its concerns about the robustness of catalyst systems in the salt water environment. Since testing was never completed, CA will serve as a validation and feedback opportunity to all of us. The industry needs the additional time to understand what the problems might be should they arise.

Indmar commented that they were also actively involved in the test program to prove the technical feasibility of catalytic converters on SD/I engines for their useful life (480 hours) in both fresh and salt water. They supplied two boats as well as technical support to Southwest Research Institute to conduct the test program. They support the proposed federal emission regulations for new marine spark-ignited sterndrive/inboard engines that will substantially reduce emissions from these engines.

NMMA submitted comments regarding the Southwest Research Institute (SwRI) Saltwater Test Program. Even though the SwRI tests never proved catalyst feasibility in salt water, their members believe that, at this stage of catalyst development, there is little or no additional data to be obtained by completing the tests. The designs being tested at SwRI are not designs that any of the engine companies are considering pursuing. Whether or not they could survive 480 hours is of no value. Their members have their own compliance plans that include designs that appear to withstand saltwater operation, although they will not know for sure until it gets into the hands of customers. Therefore, NMMA agreed that EPA and CARB should discontinue the SwRI saltwater test program.

NMMA continued that in the context of EPA's recently proposed rules for exhaust controls for marine engines, there is a continuing concern regarding catalyst and sensor durability, especially in salt water, and in engine technologies not included in the SwRI test programs, for example, personal watercraft engines installed in jetboats. The manufacturers of those items also have been unable to provide any help to the engine manufacturers in this regard as they have no experience in the salt water environment. NMMA stated that it is critical to both the marine industry and the hundreds of thousands of American jobs that are created by this industry, that EPA delay implementation of any nationwide catalyst-based rule until the manufacturers have studied the effect of the catalyst through a complete warranty cycle (three years) and the manufacturers gain the necessary field experience in California. In any waiver decision regarding catalysts for SD/I, they commented that EPA must make clear that it is not predetermining the outcome of the ongoing rulemaking, and that if durability problems should arise in actual use in California, that EPA will work with CARB and engine manufacturers to adjust any rules applicable to these engines.

NACAA commented that with respect to marine spark-ignition engines and vessels, NACAA supports EPA's proposal to set CO standards for all sectors. We also support the agency's proposal to establish the first-ever federal standards for vessels powered by sterndrive or inboard engines.

Pennsylvania DEP supports EPA's proposed standards and implementation schedule for marine spark-ignition engines and vessels.

New York DEC stated that EPA proposes to adopt standards similar to California's, resulting in a 70% reduction in combined hydrocarbon and oxides of nitrogen (NOx) emissions. The Department supports the proposed emission standards, including not-to-exceed (NTE) standards and the requirement for closed crankcases.

NESCAUM supports EPA's effort to harmonize the federal emissions standards with those standards already adopted in California. In many respects, the proposed federal standards are identical to or analogous with California standards. This approach will make it easier for the engine and equipment manufacturers to provide 50-state products to the U.S. market.

Environmental Defense supports EPA's proposal to establish HC+NOx exhaust emission standard of 5g/kW-hr for sterndrive and inboard marine engines (SD/I engines). These standards are identical to those adopted by CARB. The proposed exhaust emissions standards represent significant reductions of 70% in HC and NOx and 50% in CO emissions. EPA predicts engine manufacturers will meet these standards by incorporating catalysts into the water-cooled exhaust systems used for these engines. Environmental Defense applauds the Agency for taking the initiative to set a carbon monoxide exhaust emission standard for SD/I engines for the first time. The addition of a CO standard should not impose any additional costs on engine manufactures since the same catalyst technology used to achieve the HC and NOx standards will ensure that the new CO standard is met as well.

MECA stated that the technology to reduce emissions from spark-ignited inboard and sterndrive marine engines will be based on automotive-type three-way catalyst with closed-loop control technology. This technology has been used on well over 300,000,000 automobiles with outstanding results and the same technologies can be adapted to marine inboard and sterndrive engines. Here again results from EPA and ARB sponsored test programs detailed in the EPA Draft Regulatory Impact Analysis confirm that three-way catalysts (TWCs) can be effectively integrated into marine inboard and sterndrive engines, and TWCs have the necessary mechanical integrity and catalytic durability to perform with high emission conversion efficiencies throughout the entire 480-hour useful life emissions requirement for these marine engines, regardless of operation in fresh or salt water environments. Important results from this demonstration program included the design and integration of exhaust manifolds with TWCs that provided relatively low exhaust manifold surface temperatures (through the use of a water-jacketed exhaust system) and minimized the potential for water ingestion into the region of the manifolds that contained the TWCs. Both ceramic- and metallic-based substrates were used to display a range of three-way catalyst formulations as a part of this durability test program, all with good results. Thus, a variety of TWC technology options used successfully in automotive applications were shown to be effective in these marine engine applications. The early commercial introduction of a catalyst-equipped marine inboard engine is further proof that catalyst can be used to achieve EPA's proposed HC+NOx and CO standards for this category of Marine SI engines.

SCAQMD staff believes that more stringent standards for this category are also appropriate, technically feasible, and absolutely critical for the South Coast Air Basin to meet its PM 2.5 and 8 hour ozone standards. Engines in this category are closely related to automobile engines which have achieved much lower emission levels using advanced emission control

systems for more than 20 years. Successful transfer of this technology to land based nonroad engines (which are also similar to automobile engines) has lead the California Air Resources Board and the U.S. EPA to adopt exhaust standards that will require new engines to meet exhaust levels two times, and by 2010, five times more stringent than those levels proposed in this rule.

See 3.2.3 for comments specifically related to jet boat engines. See 3.4 for comments specifically related to high-performance engines.

Letters:

Commenter	Document #
Sea Ray	0683
South Coast AQMD	0704
NY DEC	0659
NESCAUM	0641
Environmental Defense	0648
NACAA	0651
Indmar	0667
Mercury	0721
MECA	0668
Pennsylvania DEP	0676

Our Response:

As supported by the majority of commenters, we are adopting the proposed exhaust emissions standards for SD/I engines of 5 g/kWh HC+NOx and 75 g/kWh CO. The final HC+NOx standards are similar to the California ARB emissions standards for HC+NOx that began in 2008. We believe the type of catalyst used to achieve the HC+NOx standard will also be effective in reducing CO emissions enough to meet the new standard, therefore no additional technology will be needed to control CO emissions.

We believe the final federal exhaust emission standards for SD/I engines represent the greatest degree of emission reduction feasible in this time frame. Over the past few years, developmental programs have demonstrated the capabilities of achieving significant reductions in exhaust emissions from SD/I engines. Chapter 4 of the Final RIA presents data from several of the SD/I engines with catalysts that were tested as part of the development of the standards had HC+NOx emission rates lower that 5 g/kW-hr, even with consideration of expected in-use emissions deterioration associated with catalyst aging. The goal of the testing was to demonstrate catalysts that will work within the packaging constraints associated with water jacketing the exhaust and fitting the engines into engine compartments on boats. California ARB has acted on this information to set an HC+NOx emission standard of 5 g/kW-hr for SD/I engines, starting in 2008. At this time, three engine manufacturers have certified SD/I engines to these standards. In addition, Chapter 4 of the Final RIA presents data from these engines as detailed data on several developmental SD/I engines with catalysts packaged within water-cooled exhaust manifolds. Four of the developmental engines in our test program were operated with catalysts in vessels for 480 hours. The remaining developmental engines were tested with catalysts that had been subjected to a rapid-aging cycle in the laboratory. As stated in their

comments, Indmar has demonstrated the durability of catalysts over their full useful life of SD/I engines, both in fresh and salt water. Data from these catalyst-equipped engines also support the level of the standards. We also performed testing on SD/I engines equipped with both catalysts and EGR. Although this testing showed emission results in the 2-3 g/kW-hr range, we expect that similar reductions could be achieved more simply through the use of larger catalysts or catalysts with higher precious metal loading.

Past experience, in other engine categories, indicates that most manufacturers will strive to achieve emission reductions well below the final standards to give them certainty that they will pass the standards in-use, especially as catalysts on SD/I engines are a new technology. Therefore, we believe the emission standards for SD/I engines represent the greatest degree of emission reductions achievable taking into consideration the potential variability in in-use performance and in test data mean and do not believe it would be appropriate at this time to set a lower standard for these engines.

3.2.2 SD/I standards–lead time

What Commenters Said:

NMMA and Mercury Marine stated that while SD/I engine manufacturers have started the necessary research and development to produce engines and emission control systems to comply with the 2008 CARB standards, the California market represents only a small portion of the national marine engine market. As a result, they argued that some manufacturers will limit the engine models offered in California because there is not sufficient lead time to reconfigure their entire product line. They commented that the implementation date for the federal emissions standards must take into account the challenge of designing catalyst-based systems for all engines across the entire SD/I engine market. Mercury Marine adds that due to the issue of a major change in base engines supplied by GM (see below) a 2009 implementation date would force Mercury to apply for hardship relief as soon as the rule is finalized. This is not the way they would like to start off a new rule.

NMMA and Mercury Marine stated that EPA is proposing a 5 g/kW-hr standard for HC+NOx and a 75 g/kW- hr standard for CO for SD/I engines starting in model year 2009. 72 Fed. Reg. at 28,263 (proposed § 1045.105). While NMMA fully supports the level of the proposed emission limits for HC+NOx and CO in § 1045.105(a), the 2009 model year implementation date is not feasible for the recreational marine industry. NMMA has worked cooperatively with EPA over the past several years to share data and information on the status of the development of catalyst technology that can be used effectively and safely in both fresh and saltwater environments. While the technology is commercially available, the ability of manufacturers to develop catalysts and reconfigure all of their engines to accommodate catalyst-equipped exhaust systems by model year 2009 is not realistic for several important reasons that are specific to how the marine engine industry is structured.

NMMA urges EPA to adopt in the final rule the third option for implementation discussed—full compliance with the emission limits in model year 2010 for all SD/I engines except for the replacement engines for the 4.3L and the 8.1L and personal watercraft engines installed in jet boats, which should have until model year 2011 to comply. Mercury Marine is

limiting model availability in CA for 2008 – 2009 and needs until 2010 to have all of the horsepower levels covered for a National Rule. Mercury Marine has supplied a confidential list to EPA of the engines and power ratings that will not be available as catalyst engines for 2008 – 2009 and will not be sold in California.

NMMA and Mercury Marine commented as EPA notes in the preamble, a large number of SD/I engines are based on automotive engine blocks produced by General Motors (GM). 72 Fed. Reg. at 28,115. EPA also correctly points out that GM plans to discontinue production of the 4.3L and 8.1L engine blocks in 2009 and instead plans to offer a 4.1L engine block and a 6.0L supercharged engine as replacements. There are significant market and compliance implications associated with GM's product plans, which the NMMA-suggested compliance schedule would address. From a cost perspective (which EPA correctly identifies in the preamble), the small number of remaining years of sales of the 4.3L and 8.1L fail to justify the considerable costs associated with developing catalyst-based exhaust systems for these engines. From a compliance timing perspective, manufacturers that marinize the replacement engines will only be able to start designing catalyst systems sometime late this year when it is expected that manufacturers will see the first prototypes of the replacement engines. The development cycle for marinizing the base engine is over two years for some companies. Thus, a model year 2009 implementation date does not allow enough lead time for the industry to marinize the replacement engines and develop exhaust control systems.

Mercury Marine added that CARB has already provided relief on these engines for 2008 and 2009. The development cycle for marinizing the base engine is three years. Production base engines from GM are not scheduled to be available until 2010, and that assumes they maintain their current schedule. They commented that they have already been advised that the GM timeline has slipped a few months. Furthermore, having to develop these new engines as catalyst marine engines is taking resources away from being able to develop catalyst versions of the engines listed above that will not be available in California. Mercury Marine commented that the workload is more than can be accomplished to launch all of these new and modified engines on a national level before 2010 – 2011.

NMMA also commented that the other option for implementation that EPA suggests is to allow an additional year for the engines not using catalysts in California in 2008, namely the 4.3L and the 8.1L. NMMA stated that the model year 2009 is not practical and that an additional year for these engines until model year 2010 is appropriate and justified. California's marine engine standards will require catalysts on engines (other than the two engines noted above) starting in model year 2008. In light of this short lead time and the number of different products offered, NMMA argued that marine engine manufacturers will not have the ability to fully catalyze their entire line of engines for California in that time frame. Also important to consider is that the California market constitutes only a small percentage of the marine engine market (unlike the case with motor vehicles, which is larger than the percent of the overall population). Thus, marine engine manufacturers will in some cases limit the engines available in California to those that can be readily catalyzed and will continue to sell a mix of catalyzed and noncatalyzed engines in the other 49 states in 2008 and 2009. NMMA stated that, by model year 2010, engine manufacturers should have the necessary lead time required by Clean Air Act § 213 to resolve

most, if not all, of the technological challenges involved with catalyzing their entire product lines, with the exception of the replacement engines for the 4.3L and the 8.1L.

NMMA and Mercury Marine stated that the phase-in approach suggested by EPA in the preamble is not a workable option for this industry. With thousands of boat builders dispersed across the U.S., marine engine manufacturers do not have ultimate control of the type of engines purchased and installed on boats. This is particularly the case where the engine manufacturer is still manufacturing engines that are not catalyzed. Boat builders determine which engines are purchased and can choose either catalyzed or non-catalyzed versions of the engines since boat builders are not subject to emissions standards. For these reasons, they concluded that a compliance deadline in model year 2010 for the majority of SD/I engines, with full implementation in model year 2011, makes sense in the context of this particular industry.

NMMA summarized comments from its members of Four Winns Boats, LLC, Chaparral/Rodalo Boats, Massachusetts Marine Trade Association, Regal Marine Industry, Challenger Power Boats, Godfrey, Lowe Boats, Brunswick Corporation, North American Sleekcraft, S2Yachts, Sea Ray, Hallett, Cigarette Racing, Premier Marine Inc., and Larson/Glastron Boats. Two manufacturers urge EPA to adopt the third option for implementation: full compliance with the emission limits in 2010 for all the 4.3L & 8.1L and their replacements will have until 2011. Three manufacturers state engine supplier (Mercury Marine/GM) needs until 2010 to have all hp levels covered for national rule-if 2009, some models may be available for one year before phase-out. Four manufacturers commented the engines will need to be installed with onboard diagnostic emission notification systems - need time to engineer approach once receive engines from engine supplier. One commenter stated, as a small independent builder, the technology and the products to support this are clearly not available today and is pleading that the EPA will push this back until 2011 to allow for proper testing and implementation. Twelve commenters stated that California imposed requirement should be a testing ground until the system can be validated for a national release with a few years into the program. One commenter stated that the proposed implementation is not feasible due to changes being made in the availability of GM based engines which would result in some one year offering of motors and recommend gradual phase-in with full compliance by 2012.

VolvoPenta supports full industry compliance with standards in 2010, except for 4.1 and supercharged 6.0 which need until 2011. This option keeps a level playing field for all small business partners and allows more time for California catalyzed units to acquire hours of actual operation in consumer hands. The option will provide adequate time for Volvo Penta to develop full model lines demanded by customers and ensures compliance to the rule. Volvo Penta needs additional time to conclude its own saltwater testing and to monitor the durability of California compliant engines. Volvo Penta stated that, if U.S. EPA proceeds with a rule requiring full industry compliance on January 1, 2009, with the standards for SD/I engines, then their comments are intended to serve as Volvo Penta's application for a hardship exemption.

Sea Ray advocated EPA to adopt, in the final rule, the third option for implementation discussed—full compliance with the emissions limits in 2010 for all SD/I engines except for the 4.3L and 8.1L, and their replacements, which should have until 2011 to comply. Their engine supplier, Mercury Marine, is limiting model availability in CA for 2008 – 2009 and needs until

2010 to have all of the Hp levels covered for a National Rule. If the 2009 date is implemented, Sea Ray commented that some of these models may only be available for a single year before being phased out. Moreover, since these engines will need to be installed with on board diagnostic emission notification systems, they will need time to engineer their approach in coordination with the products they receive from Mercury. Sea Ray also expressed its concerns about the robustness of catalyst systems in the salt water environment. Because testing was never completed, California will serve as a validation and feedback opportunity to all of the industry. The industry needs the additional time to understand what the problems might be should they arise.

Mercury stated in a public hearing that if they had to meet the standard in 2009, as soon as the rule is signed, they would have to apply for relief under the hardship provision. Between the issues with GM that they have discussed, and the fact that they are not selling some models in CA, which they can not reconcile in their product line until 2010, Mercury stated that they need one of the options that is in the preamble. That option is compliance with the standard for the engine families that are not changing in 2010 and an extension to 2011 for the engine families being replaced by GM, keeping in mind that Mercury Marine will not get even prototype level hardware for GM's new engines until late this year or next year. According to Mercury, the development cycle for converting these auto base engines to marine engines is 30-36 months. This also allows for the possibility of GM missing the launch date of the new models and the industry not having to come back to EPA for hardship relief. Mercury will also gain some field experience with the catalyst engines in the California market, as catalyst feasibility testing at SwRI was terminated, with industry approval, without ever demonstrating catalyst durability in a saltwater environment. Because that independent testing, funded by EPA and CARB, was never completed, Mercury commented that it is reasonable to allow for the California market to be that testing grounds for 2 years. Lastly, when asked about phase-in programs, Mercury stated that one of the issues that they have is that they do not control the product mix in the field, instead the boat builder does. However, Mercury does like the provisions in the proposed rule for banking early credits which is an incentive to get catalysts into the market early.

California ARB strongly encourages U.S. EPA to adopt a 2008 start date of the 5 g/kW-hr HC+NOx standard for sterndrive/inboard engines to avoid putting California dealerships at a competitive disadvantage with out-of-State dealerships that would still be able to sell boats without catalyst-equipped engines at a significantly lower purchase price (less the cost of catalyst and associated hardware). Tooling will already exist for the catalyzed engines as a result of California's requirements, and an extra year to implement the same standards is unnecessary considering that the sole manufacturer already producing catalyst equipped engines for the California rule is doing so nationwide. Not only would nationally harmonized implementation eliminate the disparity in compliance costs between California and federal engines, it also makes sense from an economic perspective since the economies of scale (quantity discount) involved in producing a harmonized engine model nationwide rather than multiple state-based models would reduce the price of compliance both to the manufacturers and to the consumer. As EPA notes in the preamble, a sterndrive/inboard engine manufacturer that qualifies as a small business already offers a catalyst-equipped engine nationwide. Thus, the implementation delay and small volume manufacturer provisions proposed by U.S. EPA may be unnecessary, and would result in a delay

in public health benefits. If U.S. EPA still believes it necessary to provide industry with some sort of compliance cushion, ARB suggested restructuring the federal program such that 2008 models could be treated leniently in-use initially, providing industry with a greater learning opportunity for fine tuning their catalyst system designs, rather than a delay in implementing the 5 g/kW-hr HC+NOx standard.

New Jersey DEP commented that several CARB standards for exhaust emissions are fully phased-in between 2005 and 2008, whereas the proposed phase-in dates for the corresponding federal standards do not begin until 2010. Of most concern, the special provisions for small and medium manufacturers may delay full compliance until 2014. In light of the fact that manufacturers will already be providing cleaner engines and equipment to California and that technology issues will not be a factor, New Jersey DEP stated that these cleaner engines and equipment should be required to be made available sooner nationwide.

MECA believes that the 2009 model year implementation date provides industry with adequate time to meet these standards.

NACAA noted that sterndrive and inboard engines with catalysts are already in production and engine manufacturers are already tooled to produce catalyzed engines for California for 2008. Therefore, although they believe the proposed federal implementation schedule – beginning in 2009 – is appropriate and should not be delayed, they recommend that EPA require that once a certified engine is available in California it be sold nationwide.

Pennsylvania DEP supports EPA's proposed standards and implementation schedule for marine spark-ignition engines and vessels.

NESCAUM supports EPA's current proposal, that the SD/I catalyst-based exhaust emissions standards take effect in 2009, one year following implementation in California. They agree with EPA's position that once the catalyst-based technology is introduced across product lines in California, it should be readily available nationwide soon thereafter. They see no need for EPA to implement the alternative approach of extending the compliance date to 2010. At the same time, as it appears that General Motors is discontinuing supplying the 4.3 and 8.1 liter engine blocks in 2009, they would not object to allowing additional time, as suggested, for the orderly transition to the 4.1 and 6.0 liter blocks. Their understanding is that the engines based on the 4.3 and 8.1 liter blocks represent a relatively small portion of the new marine engine market, compared to other more widely-used blocks. Presumably, the new 4.1 and 6.0 liter blocks will not claim a large share of the market, at least in their introductory years. Therefore, concluded commented that the overall emissions impact should be minimal if additional transition time is provided. They would support this approach (allowing additional time for engine blocks representing a small fraction of the market) over the alterative approach of allowing all engine families to certify to a more lenient transitional standard over the 2009-10 timeframe.

New York DEC urges EPA to require implementation of the standards in 2009 for all engines.

Wisconsin DNR commented that EPA shall require CARB certified sterndrive or inboard engines available in California from 2008 to be sold nationwide.

Environmental Defense commented that EPA has proposed an implementation date for the SD/I exhaust emission standards of model year 2009. California's HC and NOx standards take effect in model year 2008. Accordingly, the national standards will go into effect one year after the identical standards in CA. EPA observes that a "one year delay [in implementing the national rules] allows manufacturers adequate time to incorporate catalysts across their product lines as they are doing in California." Environmental Defense strongly opposes any delay beyond this proposal. Indeed, one engine manufacturer is already selling engines equipped with catalysts nationwide. Reducing the HC, NOx and CO emissions from these small recreational boats will assist many states and local governments in achieving or maintaining healthy levels of ozone, PM and CO and will help to ensure better air quality for many Americans.

Letters:

Commenter	Document #
NMMA	0688
Sea Ray	0683
NJ DEP	0710
Wisconsin DNR	0663
NESCAUM	0641
Environmental Defense	0648
NACAA	0651
Volvo Penta	0708
Mercury	0693
MECA	0668
NY DEC	0659
Pennsylvania DEP	0676
Mercury (hearing)	0642
Hallett	0713
Sea Ray	0683
S2Yachts	0697
North American Sleekcraft	0666
Brunswick Corporation	0695
Lowe Boats	0660
Godfrey	0645
Challenger Power Boats	0644
Regal Marine Industry	0635
Massachusetts Marine Trade Association	0634
Chaparral/Rodalo Boats	0630
Four Winns Boats, LLC	0650
Cigarette Racing	0637
Premier Marine Inc	0613
Larson/Glastron Boats	0626

Our Response:

Our SD/I standards start to take effect with the 2010 model year, two years after the same standards apply in California. We believe a requirement to extend the California standards nationwide after a two-year delay allows manufacturers adequate time to incorporate catalysts as they are doing in California across all of their product lines. Once the technology is developed for use in California, it will be available for use nationwide soon thereafter. In fact, one company currently certified to the California standards is already offering catalyst-equipped SD/I engines nationwide.

To address the challenge related to the transition away from the current 4.3 and 8.1 liter GM engines, we are adopting in the final rule a direct approval for a hardship exemption allowing manufacturers to produce these engines for one additional year without certifying them (see §1045.145). Starting in the 2011 model year, we would expect manufacturers to have worked things out such that they could certify their full product lineup to the applicable standards.

3.2.3 Issues related to jet boats

What Commenters Said:

NMMA commented that the proposed definition includes jet boats in the SD/I category. 72 Fed. Reg. 28,290. NMMA supports the inclusion of jet boats in the definition of SD/I engine with the condition that manufacturers of jet boats would receive until 2011 to comply with the more stringent SD/I emissions standards. Jet boats utilize the same engine technology as personal watercraft engines and have been regulated under the EPA standards applicable to personal watercraft and outboards. This technology is very different from SD/I engines, which rely on automotive-based engines. Additional lead time for compliance, therefore, is necessary to allow engine manufacturers sufficient time to redesign and develop engines—which typically takes three years for known technologies—that will comply with the new, more stringent SD/I emissions limits. It is inappropriate to subject jet boats to the same implementation lead-time as the SD/I engines considering that those manufacturers have been in product development for the 2008 implementation of the CARB standards over the last few years. It is also critical that, as proposed, jet boats be allowed to average credits, both HC+NOx and CO, generated by other personal watercraft and outboards to provide flexibility and ensure that jet boats will be able to meet the SD/I emission standards. NMMA is supportive of the proposed approach discussed in the preamble and in the proposed regulatory text in § 1045.701(d) provided CO averaging is included**.**

NMMA also stated that related to the inclusion of jet boats in the SD/I category is the treatment of the useful life for these engines. For PWC engines used in jet boats, NMMA supports a 5 year, 350 hour useful life. This is consistent with the proposed useful life for outboard and personal watercraft engines in the rule discussed below and is appropriate for jet boats given that the engines are identical. To force dual compliance levels for identical engines leads to confusion and increases the certification burden imposed on the engine manufacturer. NMMA also recommends that the useful life for jet boat engines be reviewed by EPA three years

after the recommended model year 2011 compliance date and adjusted as experience is gained in the field with the unproven after treatment technology.

BRP stated in a hearing and submitted written comments that they cannot support EPA's proposed catalyst based emission standards for stern drive and inboard engines as it presently applies to water-jet sport boats. This product category has been regulated under the standards applied to outboard and personal watercraft engines on the basis that water-jet sport boats utilize the same engine technology as personal watercraft engines. It is understood that the EPA now desires to regulate this boat category, which has exclusively utilized automotive-based engines. These sterndrive and inboard engine manufacturers have effectively been developing a catalyst solution in preparation for the CARB regulation since approximately 2004. It is therefore very inappropriate to subject the water-jet sport boats to the same proposed lead-time given the difference in basic engine technology and prior catalyst development time.

Furthermore BRP commented there are numerous patents held by a competitive water-jet sport boat manufacturer which represent clear and significant design constraints to BRP in order to avoid patent infringement. There are effectively 30 related patents which have applicability to water-jet sport boats, 13 which have specific catalyst application constraints. These constraints include catalyst positioning, layout, cooling and sensor placement issues. The fundamental nature of these challenges results in the need for greater development lead-time.

BRP development and application lead-time for an established engine technology is approximately three years. The patent issues they have briefly explained represent complex design challenges and it is therefore not possible at this point to project the amount of additional development time required to meet the proposed catalyst application to water-jet sport boats.

BRP also stated that however, the lead-time challenge can be justly addressed by providing water-jet sport boat manufacturers which utilize an outboard personal watercraft engine technology the following allowances:

1. An implementation lead-time of model year 2011, and
2. BRP is supportive of the proposed corporate averaging provisions in 40 CFR 1045.701 (d) which allow "Sterndrive / Inboard engines certified under 1045.660 for jet boats may be use HC + NOx exhaust credits generated from outboard and personal watercraft engines, as long as the credit-using engine is the same model as an engine model from an outboard or personal watercraft family." For the corporate averaging provision of 40 CFR 1045.701 (d) to be meaningful to a manufacturer, CO averaging is essential for achieving compliance. **(also listed in 3.6.2)**

Yamaha stated in a hearing, after considerable discussions with their engineers to reach a feasibility consensus they request that if the EPA were to agree on a MY start date of 2011 (which again for Yamaha is April of 2010) for compliance at the Inboard level of 5 g/kW-hr, this would afford additional time to an already taxed staff, to design and build a "ground up engine" required to meet the target levels presented in the proposal. As the EPA may be aware, PWC engines utilized in Jet boats is a very small quantity, and short runs of catalyst based engines would be cost prohibitive. Therefore, this short additional lead time will have the positive effect of bringing into a lower compliance level, a greater amount of PWC engine families to help

offset production costs. Again by allowing this lead time, the EPA will have championed even further emission reductions over the broad engine spectrum.

In Yamaha's view, a MY 2011 compliance date (although aggressive) was agreed upon internally as this appears to parallel what the EPA has considered acceptable lead time for the SD/l members affected by this rule as a result of new engine block design and feasibility issues. If the industry is in fact subject to classify PWC engines used in Jet Boats as a different engine then we need the additional lead time.

Yamaha submitted written comments stating the proposed definition includes Jet boats into the SD/I Category. Yamaha utilizes PWC engines (complete exact units) to propel their Jet boat product. The number of units used currently does not quite come to 8% of their entire PWC engine production, Yamaha will most likely by defacto have to produce en mass a compliant 5gr engine that will carry the day for both PWC and Jet Boat compliance. By allowing additional requested lead time this will in actuality further reduce emissions over a larger engine group. Even though this is an engine rule and should remain so, Yamaha will support this reclassification if the following flexibilities are granted or represented within the rule.

a. Enough lead time to develop, test and produce the necessary engine block, exhaust and catalyst systems required to achieve a 5gr level of HC+Nox emission and 75gr CO levels as proposed for SD/I engines. Yamaha estimates this to be achievable in M/Y 2011 which is reflective of the proposed lead time flexibility being requested by the SD/I engine suppliers due to the engineering challenges of a ground-up new engine block w/ catalyst being produce as a replacement to current available units.
b. Yamaha commented that language to exclude 75gr. CO requirement on PWC engines utilizing banked HC+NOx credits for Jet Boat reclassification compliance (between M/Y2009 and 2011) should be included in the rule as no banking of CO credits existed on previous Tier 1 requirements and currently are above the 75gr limit set for a catalyzed SD/I automotive based engine.

Yamaha requests that the useful life period for Jet Boat engines be the same as current PWC useful life of 5 years or 350 hours as these engines share same design and product use and, upon completion of a successful EPA technical review in 2014 raise the useful life period to that of SD/I. This would allow for proper long term durability testing of catalysts systems that would need to be in place. This request is not a large departure than the EPA seeking comment on the proposed reduced useful life structure of the High Performance SD/I engines. Yamaha strongly requests for PWC engines used in Jet Boats be granted similar flexibility and remain at the same useful life period as our PWC engines.

Mercury Marine stated that EPA is proposing to define "sterndrive/inboard engine" in § 1045.801 as "a spark ignition engine that is used to propel a vessel, but is not an outboard engine or a personal watercraft engine. This includes engines on propeller-driven vessels, jet boats, air boats, and hovercraft." 72 Fed. Reg. at 28,290 (emphasis added). Mercury Marine has no objections to creating a single term that would include both sterndrive and inboard engines in a single category of engines and that also clarifies that hovercraft and air boats are specifically included in this engine category. However, it is also critical that, as proposed, jet boats be allowed to utilize credits, both HC+NOx and CO, generated by outboards to provide flexibility

and ensure that jet boats will be able to meet the SD/I standards. **(also listed in 3.6.2)** In addition, Mercury recommends that the new SD/I standards for jet boats become effective in 2011.

Yamaha asked whether the requirement to have smaller sales of jet boat engines than the analogous outboard or personal watercraft engines needed to be in place for every model year. The concern related to a scenario in which the outboard and personal watercraft versions of an engine would be discontinued while the jet boat engines would continue in production for another year.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Yamaha	0721
Mercury	0693
Yamaha (hearing)	0642
Bombardier (hearing)	0642

Our Response:

We are providing some flexibility in meeting new emission standards for jet boat engines because they are currently designed to use engines derived from OB/PWC applications and because of their relatively low sales volumes. We will finalize the proposal to allow manufacturers to use emission credits generated from outboard and personal watercraft engines to demonstrate that their jet boat engines meet the new HC+NOx standards for SD/I engines. We are also adding the flexibility of CO emission averaging that was not previously included in the NPRM. This is necessary to fulfill the intent of the proposed flexibility.

Manufacturers of jet boat engines subject to SD/I standards and using credits from outboard or personal watercraft engines must certify these jet boat engines to an FEL that meets or exceeds the standards for outboard and personal watercraft engines. We are providing manufacturers a one year delay to meet the FEL requirement which now becomes effective in 2011.

Jet boat engines are now by definition sterndrive/inboard engines, so the default useful life period is 10 years or 480, whichever comes first. However, we understand that jet boat engines that are common to personal watercraft or outboard engine models depend on the preexisting certification demonstration. As such, we believe it is appropriate to allow for a 350-hour useful life so that the original certification can continue to be valid without additional durability demonstration for the jet boat engines. This shorter useful life does not apply for jet boat engines that are certified independently. Note that, under 1045(3)(2), any SD/I engine manufacturer may request that we approve a shorter useful life on a case-by-case basis.

We understand that there are valid business reasons to discontinue engine models in stages for certain applications. We believe the regulations should address Yamaha's concern, especially because their plan involves a long-term strategy to design their jet boat engines to

comply with the SD/I standards without relying on emission credits. We have revised this provision such that it no longer requires a demonstration of lesser sales of jet boat engines for every model year. This would allow us to respond to a special situation such as that described by Yamaha and acknowledge that their situation meets our intent. We would expect such a demonstration rarely to be based on sales information from more than two consecutive model years.

3.3 OB/PWC standards and lead time

3.3.1 OB/PWC standards–level and form of standard

What Commenters Said:

NMMA and Mercury Marine commented for outboard (OB) and personal watercraft (PWC) engines in § 1045.103, EPA is proposing a HC+NOx standard of 28 - 0.3 x P g/kW-hr for engines <= 40 kW. For engines > 40 kW, EPA is proposing 16 g/kW-hr for HC+NOx. 72 Fed. Reg. at 28,262. EPA explains in the preamble that the HC+NOx standards are similar in stringency to the 2008 model year California limits but use a "simplified form" as opposed to the one used by the CARB regulations. 72 Fed. Reg. at 28,130. While NMMA appreciates efforts to simplify a regulatory requirement, the best approach for emissions standards for the PWC and OB engine categories is to harmonize any new federal standards exactly with those in place in California. To establish a separate formula for developing the federal number, even if it is similar in stringency, creates additional complexity for the marine industry with no environmental benefit.

NMMA and Mercury Marine continued that with respect to CO emission limits, EPA is proposing in § 1045.103 for engines = 40 kW, a standard of 500 – 5.0 x P g/kW- hr, and for engines > 40 kW, a standard of 300 g/kW-hr. The proposal also would allow manufacturers to average, bank and trade emission credits and would require a family emission limit (FEL) for engines > 40 kW at a maximum of 450 g/kW-hr. The maximum value for the FEL for all other engines would be a formula of 650 – 5.0 x P. 72 Fed. Reg. at 28,263 (proposed § 1045.103(b)). These proposed CO levels are technologically achievable and assure that PWC and OB engines will be able to still meet the CARB 2008 HC+NOx emission standards. From a safety perspective, these levels are also appropriate. USCG boating safety statistics for deaths from CO poisoning clearly indicate that PWC and OB engines have no history of CO poisoning. A more stringent standard would impose a significant cost burden on these manufacturers with no health or welfare benefits as evidenced by the science and accident statistics associated with CO poisoning. Thus, NMMA supports these standards in the proposal and agrees that if EPA is to set a limit for CO, these levels are appropriate for these two engine segments.

Mercury Marine commented that EPA has requested comment on catalyst level emissions on OB/PWC. Mercury Marine is the only OB company that has to meet the CA SD/I catalyst level emissions standard for 2008. Since they have been developing catalyst systems for SD/I, Mercury states that they are in the best position to comment on this. For SD/I engines, where weight and packaging are much less of an issue, the cost to develop catalyst engines is in the vicinity of $3M per engine family. The engineering challenges to deal with water intrusion, condensation, exhaust gas temperatures, etc. have been enormous.

Mercury Marine continued that for Outboards, these challenges, and the associated costs, are more extreme. Due to the tight packaging, under cowl thermal management, and closer proximity to water, catalysts on outboards will be a larger, and more expensive, undertaking, and technical feasibility is not a given. It will entail a complete redesign of every outboard engine and, if technically feasible, will cost in the range of $8M – 15M per engine family, just in engineering costs, and take 4 – 5 years after a rule is finalized to launch the first models. Any such rule can not be finalized until technical feasibility is established. Therefore, it is inappropriate to consider catalyst level emissions on outboards at this time.

Honda commented on the Outboard and Personal Watercraft (PWC) Exhaust Standard Proposal. They suggest that EPA use the CARB's equation when setting the exhaust emission standard for outboard engines. Emission standards in the proposal's Section 1045.103 are described in the preamble as "simplified". Honda believes that they are not "simplified", but simply different with no real reason or environmental benefit. The proposed standard diverges from the original EPA standards curve and the California standard creating, not a simplified uniform standard for the United States, but rather two separate standards.

Bombardier commented that EPA explains these standards are of similar stringency to the CARB 2008 standards (3-Star), but are in a simplified form. However, creating a new standard different from the California standard complicates certification. BRP urges harmonizing the proposed HC +NOx exhaust emissions standards for PWC and Outboards with the CARB 3-Star emission standards.

Suzuki appreciates EPA's attempt to simplify the certification process wherever possible; however EPA's direction with the proposed HC+NOx standards creates a situation where some outboard engines currently certified to comply to CARB 2008 standards will require calibration and design changes to comply with the slightly different levels proposed by EPA while still maintaining reasonable compliance margins . This will be an expensive and resource-intensive effort which will not be of benefit to the environment. It is also important to note that the effort required to calculate the appropriate emission standard for a given engine family is not materially different between EPA's proposal and the CARB 2008 HC+NOx requirements. Considering that the rational for the proposed new Federal-specific HC+NOx standards is to simplify the certification process, and the actual effect will be to increase certification cost and effort, it is not reasonable for EPA to proceed with their proposed federal-specific HC+NOx standards. Suzuki requests EPA reconsideration of their proposal to create new Federal-specific HC+NOx emission standards, and requests EPA adopt a requirement that strictly harmonizes with the CARB 2008 HC+NOx standards.

Suzuki continued that EPA has proposed all-new CO standards of 500 - 5 .0 x P g/kW-hr for engines <40kW, and a standard of 300 g/kW-hr for engines of >40 kW. Additionally, EPA has proposed to limit maximum emissions of CO to levels of 150 g/kW above the applicable standard. Suzuki believes EPA's proposal represents levels that are technically achievable given reasonable lead-time and will allow for continued compliance with CARB 2008 HC+NOx standards without major design changes. However, EPA's proposed CO standards will require design changes and development for some Suzuki outboard engine families. Assuming that EPA

harmonizes with the CARB 2008 HC+NOx standards and a reasonable amount of lead-time is provided, Suzuki can support EPA's new CO standards as currently proposed.

Tohatsu stated in a hearing that contents of the new regulations should be the same as the current CARB standards to avoid having to comply with two different sets of standards and testing methods. They would like to see one national standard rather than a national standard and then also other standards set by different local areas.

California ARB supports adoption of a federal 16 grams per kilowatt-hour (g/kW-hr) hydrocarbon plus oxides of nitrogen (HC+NOx) standard for outboard/personal watercraft engines greater than 40 kilowatt (kW). This standard is technologically feasible and is similar in stringency to the existing 2008 California standards for the majority of the category.

California ARB also supports U.S. EPA's proposed carbon monoxide (CO) standards for outboard/personal watercraft and sterndrive/inboard engines. These standards are technologically feasible. ARB staff will likely propose the adoption of identical CO standards when it next revises California's regulations for recreational marine engines.

NESCAUM supports EPA's effort to harmonize the federal emissions standards with those standards already adopted in California. In many respects, the proposed federal standards are identical to or analogous with California standards. This approach will make it easier for the engine and equipment manufacturers to provide 50-state products to the U.S. market.

Environmental Defense supports EPA's proposal to establish more stringent HC and NOx emission limits for outboard and personal watercraft (O/PW). The proposed standards, if implemented, would achieve more than a 60% reduction in HC and NOx emissions over existing standards. These standards are consistent with those previously adopted by CARB. Manufacturers will be able to achieve these emissions reductions by replacing older carbureted two-stoke engines with more advanced, direct injection two-stroke or four-stroke engines. This transition should be relatively easy and inexpensive for manufacturers as the market trend has been moving toward the retirement of carbureted two-stoke engines in favor of cleaner two and four-stroke engines. Environmental Defense is also pleased that EPA's proposal includes a CO limit for OB/PWC engines. Achieving the proposed CO standard is readily achievable as the same two and four-stroke engines required to meet the HC and NOx standards will achieve the CO standard.

NY DEC stated that EPA proposes to adopt standards generally similar to existing California standards, yielding a 60% reduction in combined hydrocarbon and NOx emissions compared to current federal standards. The Department supports these proposed standards. NY DEC also stated that additional work is needed to facilitate the application of catalysts to outboard and personal watercraft engines, many of which are automotive sized.

NACAA commented with respect to personal watercraft and outboard engines, they support the proposed standards for implementation in 2009. They note that EPA anticipates manufacturers will meet these standards with readily available technology – improved fueling systems and other in-cylinder controls – and, therefore, question why the agency did not assess

the feasibility of catalysts for these engines, for the purpose of pursuing future, more rigorous catalyst-based standards. They recommend that the agency conduct such an analysis and proceed with additional standards accordingly.

Pennsylvania DEP supports EPA's proposed standards and implementation schedule for marine spark-ignition engines and vessels. Since the standards proposed for personal watercraft and outboard engines appear to be easily achieved by manufacturers, DEP urges EPA to assess the feasibility of additional technology for the future as quickly as possible.

MARC AQ Forum stated that EPA should investigate the feasibility of using catalysts to reduce emissions from personal watercraft and outboard engines. If such technology proves workable, EPA should move expeditiously to set more stringent emissions standards for these engines.

SCAQMD staff believes that more stringent catalyst based standards are appropriate for this category. The California Air Resources Board staff in developing the outboard/personal watercraft standards in 1998 identified catalyst based technology as one of the possible technologies to meet the proposed standards. Their analysis showed that challenges in bringing catalyst technology to marine engines existed, but concluded that they were not insurmountable. Consistent with this conclusion, the California Air Resources Board proposed state strategy measure will require new outboard and personal watercraft engines to meet a 5.0 g/kW-hr by 2013 (approximately three (3) times lower than the U.S. EPA currently proposed standard). This level of control is expected to be reached using catalyst based technology. Review of the Draft Regulatory Impact Analysis document also shows that currently one personal watercraft manufacturer has certified engines equipped with an oxidation catalyst, demonstrating that catalyst based technology is feasible. Therefore, they believe that a more stringent catalyst based standard beginning in the 2013 timeframe is appropriate and they strongly urge EPA to consider adopting this additional standard (i.e., 3 to 5 g/kW-hr) for the outboard/ personal watercraft category as a second phase of catalyst based standards.

Wisconsin DNR requested EPA to assess the feasibility of more stringent catalyst-based emission standards for personal watercraft and outboard engines.

Letters:

Commenter	Document #
NMMA	0688
Honda	0705
South Coast AQMD	0704
Wisconsin DNR	0663
NY DEC	0659
Environmental Defense	0648
NACAA	0651
Bombardier	0674
Mercury	0693
MARC AQ Forum	0696
Suzuki	0698
CARB	0682
Pennsylvania DEP	0676
Tohatsu (hearing)	0642
Yellowfin	0681

Our Response:

Section 213(a)(3) of the Clean Air Act specifies the criteria EPA needs to consider in revising existing emission standards. Revised emission standards are to achieve the greatest degree of emission reduction technologically achievable taking into consideration the cost of technology in the lead time available to manufacturers, as well as noise, energy and safety factors. Given these criteria, EPA continues to believe that the proposed OB/PWC standards are the appropriate standards for these engines for the years in which they were proposed. These standards can be met through the expanded reliance on four-stroke engines and two-stroke direct-injection engines.

Based on industry input, we understand that our proposed simplification of the form of the HC+NOx standard would cause undue complexity for industry. Therefore, we will be finalizing a HC+NOx standard that utilizes a functional relationship to set the emission standard for each engine family depending on the power rating, common with the CARB 2008 emission standards. The final HC+NOx standard is roughly equivalent to the proposed standard, in terms of stringency, and will achieve more than a 60 percent reduction from the existing 2006 standards.

We will finalize the proposed CO emission standards for OB/PWC engines. These standards will result in meaningful CO reductions from many engines and prevent CO from increasing from engines that already use technologies with lower CO emissions. The new emission standards are largely based on certification data from cleaner-burning Marine SI engines, such as four-stroke engines and two-stroke direct-injection engines.

We believe the catalyst technology that will be required to meet emission standards substantially more stringent than we are adopting has not been adequately demonstrated for outboard or personal watercraft engines. Outboard engines are designed with lower units that are

designed to be as thin as possible to improve the ability to turn the engine on the back of the boat and to reduce drag on the lowest part of the unit. This raises concerns about the placement and packaging of catalysts in the exhaust stream. As such, we believe the new standards for HC+NOx and CO emissions are the most stringent possible in this rulemaking. While there is good potential for eventual application of catalyst technology to outboard and personal watercraft engines, we believe the technology is not adequately demonstrated to determine whether or when such technology would be available. More time to gain experience with catalysts on sterndrive and inboard engines and a substantial engineering effort to apply that learning to outboard and personal watercraft engines may allow us to pursue more stringent standards in a future rulemaking.

3.3.2 OB/PWC standards–lead time

What Commenters Said:

NMMA and Mercury Marine commented that EPA's proposal has model year 2009 as the implementation date for the proposed HC+NOx and CO standards, including the FEL caps, for PWC and OB engines. 72 Fed. Reg. 28,262 (proposed § 1045.103). One calendar year lead time to comply with the federal emissions standards and the FEL caps is simply not workable for these engine segments because of the nationwide scope of the standards. Although these manufacturers will have some families that will meet the model year 2008 compliance date in California, a national rule (with fleet-averaging and FEL caps) in model year 2009 would disallow the sale of older, carbureted 2-stroke engines and would force these companies to re-engineer their entire product line. In turn, this would have a major impact on existing signed supply agreements with small boat builders which will lead to product shortages and disrupted business plans. The implementation of a national rule is a considerable undertaking that cannot be achieved in one year. Assuming that the rule is signed by the end of 2007, manufacturers will not see a rule published until early 2008. This means that some manufacturers could be starting production of model year 2009 PWC and OB engines at the same time a final rule is published. Even if a final rule is signed and published by the end of 2007, there is less than a one-year lead time for manufacturers. NMMA requests that EPA extend the implementation date for PWC and OB engines until model year 2010 and delay the imposition of FEL caps for PWCs until model year 2011. This results in the industry being able to meet the standards (with fleet averaging) in model year 2010, and gives industry an additional year to re-engineer the remaining PWC engine families that might be subject to FEL caps. Individual NMMA members will provide additional support in their separate comments as to why the additional delay of the FEL cap for PWCs is warranted.

NMMA and Mercury Marine continued to state that a two-year period for implementation is well supported by several EPA rules promulgated pursuant to its authority in CAA § 213. For example, for Recreational Vehicles, EPA provided a four year lead time and allowed for a phase-in. See Control of Emissions from Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based), Final Rule, 67 Fed. Reg. 68,242 (Nov. 8, 2002). In addition, for the first marine engine standards for PWC and OB engines, EPA provided industry with a two year lead time from the time of promulgation of the standards until the first implementation date for the emissions standards. See Control of Air Pollution; Final Rule for

New Gasoline Spark 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, Final Rule, 61 Fed. Reg. 52,087 (Oct. 4, 1996). As an alternative, EPA can draft the implementation date as two years from the date of publication in the Federal Register to ensure that a two-year lead time is preserved.

NMMA suggested that another approach that also would assist manufacturers in transitioning to a national standard is a phase-in of 50 percent in model year 2009 and the remaining 50 percent in model year 2010 and a delay of the FEL cap until model year 2011 for PWCs. Unlike the SD/I engine category, which is a very different market with unique distribution and sales arrangements, a phase- in approach for implementation is well-suited for the PWC/OB market. This would allow manufacturers to phase out carbureted 2 stroke engines and provide additional time for redesign and development of engines that can comply with the standards. EPA used a similar 50-50 percent phase-in for Phase I of the standards for Snowmobiles in the Recreational Vehicle Rule. See 40 C.F.R. §1051.103.

Mercury Marine also requests that EPA phase-in the OB standard between 2009 and 2010. Their recommendation is to allow 10% of the manufacturer's carryover product line to be excluded from the FEL caps in 2009. These units would still be required to utilize credits to meet the standard. They believe that there is no need for any exclusions, or modifications, in credit use or calculations. Starting in 2009, all Outboards would switch over to the new credit calculations in the new rule. Carryover credits from the current rule would still be useable for 3 years. Further, in order to not have to recertify most of the product line in just a few months, the final rule should allow carryover certifications, conducted under the requirements of the current rule, to be used until recertification of the product is required for other reasons.

Yellowfin commented that they are a low volume builder of high end offshore center console outboard boats. They commented that it is imperative for them to have ample supply of a variety of engines (2-stroke and 4-stroke). EPA's proposal that outboards meet the CARB 2008 standards nationally in 2009 would impact their business severely. They recommended that the CARB 2008 standards should be implemented nationally in 2010.

Honda requests that the effective date for compliance be extended to 2010 and not be 2009. They stated that EPA has proposed a 2009 implementation date for outboard exhaust emissions and outboard fuel lines. Honda will have certified and begun production of engines for the 2009 MY before this regulation is projected to be finalized. It will be quite difficult to certify and produce product with this negative lead time. However, they do believe that it will be possible to exhaust certify engines beginning in the 2010 model year.

Bombardier commented that provided EPA adopts the current 3-Star California exhaust emission standard for PWC and Outboards, BRP can fully comply with this standard in MY2009 if EPA allows carry-over data to be used.

Suzuki stated that although their full outboard engine product line is currently certified to the 2008 CARB HC+NOx standards, implementation of EPA's new proposed CO standards will require design changes to some Suzuki models to ensure that emissions of HC+NOx and CO are

attained with sufficient compliance margin. Considering that production of 2008 models has already begun, EPA's proposed 2009 model year effective date will provide less than one year of lead-time which is insufficient for engine families that require changes from their 2008 model year configuration. As discussed above and assuming harmonization with CARB 2008 HC+NOx levels, compliance with the new CO standards proposed by EPA will require development effort for some Suzuki models. Therefore, Suzuki requests EPA adopt a 70%/100% phase-in of the new HC+NOx and CO standards for the 2009 and 2010 model years to allow for a reasonable development process.

Yamaha stated in a hearing that in the preamble, EPA has proposed to implement a start date of Outboard and PWC exhaust emission levels in MY 2009. To Yamaha, Model Year 2009 would mean compliance as of April, 2008 production which may come and go without signage of this very rule. Due to the protracted direction and ever dynamic time frames experienced with this NPRM, their Engineering and product planning staff are respectfully requesting that in order for Yamaha to re-evaluate their current model line-up, readjust the mapping and fuel calculation of current 4 stroke technology required to achieve a lower emission level across our product line and to be allowed to utilize our emission credits earned in 2006, 2007 and 2008 Tier I, an additional 1 model year lead time will be needed.

Yamaha continued to comment that this would be MY 2010 which for Yamaha would be production starting April of 2009. At this point all elements of the emission levels including the FEL cap within this proposal would go into effect. This in essence would disallow the sale of all carbureted 2 stroke engines from this point on, achieving one of EPA's objective goals.

Yamaha commented that the implementation dates outlined in the proposal reflect a Compliance Date of M/Y (model year) 2009. For Yamaha this would mean compliance for their line up of 25 engine families by April of 2008 production start period. That is if the rule is even signed on a time frame prior to this date. Yamaha recognizes the EPA is aware of compliant engines in California under the California ARB mandates but that quantity and models sold in CA is very small compared to a 50 state basis (10 families vs. 25 nationally). Yamaha has over 200 different model variations to supply the marine industry with appropriate designs and use characteristics for the boating public. It is their position that the M/Y 2009 is unreasonable and unobtainable for Yamaha based on many factors. Their current facility is working at and beyond peak output to supply a world market. To affect new mapping and fuel calibrations to any already taxed system will not be achievable in the proposed time period.

Yamaha continued to comment that another area affected by the proposed dates is long term supply contracts to many boat builders in the US that in their long term planning pre-existed EPA action and could not foresee a start date of this proposal. Due to its dynamic nature, to incorporate the necessary changes in boat design (flotation and transom strength) and sales structure is impossible for 2009. If Yamaha cannot continue to supply these engines currently being used by the builders a product shortage will occur causing business disruption to very small business owners and many parties face potential litigation for breech of contract.

Yamaha also stated that US protectorates and isolated attainment states (example Hawaii, Puerto Rico) fall under EPA reach but are supplied by our factory in Japan with product. These

regions due to their remote locations have not embraced (both for technology infrastructure and cost reasons) new technology in regards to outboard product but, Yamaha USA must list these units in our product certification process and numbers.

Yamaha commented that as the EPA can realize, they have a monumental task ahead of them to achieve compliance even if allowed 3 years lead time. Yamaha also realizes that they can bring forward certain engines that can meet the new emissions levels as demonstrated by their compliance in CA. With this knowledge Yamaha is requesting that if the EPA cannot see the need to hold off starting exhaust emission compliance until M/Y 2010 then they propose a phase in amount of 50% of compliant engines (based on total engine sales) in 2009 with 50% exemption with no FEL or NTE caps and achieve 100% compliance in Model Year 2010 with all caps in place. This extra year is consistent with lead time flexibilities allowed in other EPA rulemakings.

NMMA member companies such as Ranger Boats, Triton, Premier Marine Inc., S2Yachts, Lund Boat Co, Brunswick Corporation, Brunswick Commercial and Government Products, Inc., Lowe Boats, Godfrey, Challenger Power Boats, Cigarette Racing, Massachusetts Marine Trade Association submitted comments to the proposed rule. Fourteen equipment manufacturers support 2010 (or later) for outboards due to the fact that outboard manufacturers were planning their new OB engine designs for 2010 and moving implementation to 2009 would result in some engine designs not being available for about one year. In order to remain competitive and assure a smooth transition, they need to have engine designs available. Some companies have international business and reputations that are needed to maintain for success. Some companies work on smaller margins and need all engine designs to be available. One manufacturer stated their desire for a gradual phase-in with full compliance by 2012.

Tohatsu stated in a hearing that it is quite a tough job for a small manufacturer like Tohatsu who has total employees of less than 500 people to re-develop and set calibration fuel, ignition timing, etc. and also comply with evaporation requirements. And naturally these changes will also require a new batch of deterioration testing at 350 hours for all models.

Sea Ray commented that in the rule, it is proposed that OB engines be compliant to the CARB 2008 emission standards by 2009. It is understood that OB manufacturers have been preparing for this changeover but with a 2010 target date in mind. Although it appears that most engines will comply by 2009, having this extra transitional year will be beneficial to all concerned. If the implementation date is accelerated to 2009, there may actually be some outboard model engines that will no longer be able to be sold in the United States. The industry currently faces enough issues regarding sales of boats in these use categories.

NACAA commented that with respect to personal watercraft and outboard engines, they support the proposed standards for implementation in 2009.

Pennsylvania DEP supports EPA’s proposed standards and implementation schedule for marine spark-ignition engines and vessels.

CARB recommends that U.S. EPA revise the implementation date for this standard to begin in 2008 rather than in 2009 as proposed. Although slight, the potential exists for unfair competition between California dealerships and out-of-State outboard/personal watercraft dealerships that would be permitted to sell higher emitting, but less expensive, outboard/personal watercraft engines in 2008. ARB believes that sufficient flexibility already exists in federal regulations (e.g., 40 CFR 1068.240, 245, or 250) to address the compliance concerns mentioned in the preamble for manufacturers, if any, that do not sell outboard/personal watercraft engines in California and which because of this, may need more time to comply with the proposed standard.

NJ DEP commented that specifically, several CARB standards for exhaust emissions are fully phased-in between 2005 and 2008, whereas the proposed phase-in dates for the corresponding federal standards do not begin until 2010. Of most concern, the special provisions for small and medium manufacturers may delay full compliance until 2014. In light of the fact that manufacturers will already be providing cleaner engines and equipment to California and that technology issues will not be a factor, these cleaner engines and equipment should be required to be made available sooner nationwide.

Environmental Defense commented that EPA is proposing to implement the O/PW standards in model year 2009. California's comparable HC and NOx emissions standards take effect in model year 2008. While Environmental Defense agrees with EPA that it is feasible to implement these standards nationally one year after CARB's take effect, they see no reason why the standards cannot be implemented in 2008. As EPA notes in its explanation for this near-term implementation date, many manufacturers are already selling lower emission engines that meet the CARB HC and NOx standards nationwide. These manufacturers will not need to do anything in order to comply with the proposed federal O/PW standards. Therefore, they urge EPA to better explain its reason for the 2009, as opposed to 2008, implementation date.

Letters:

Commenter	Document #
NMMA	0688
Sea Ray	0683
Honda	0705
NJ DEP	0710
Environmental Defense	0648
NACAA	0651
Bombardier	0674
Yamaha	0721
Mercury	0693
Suzuki	0698
CARB	0682
Pennsylvania DEP	0676
Yamaha (hearing)	0642
Tohatsu	0642
Ranger Boats	0628
Triton	0656
Premier Marine Inc.,	0613
S2Yachts	0697
Lund Boat Co	0655
Brunswick Corporation	0695
Brunswick Commercial and Government Products, Inc.	0652
Lowe Boats	0660
Godfrey	0645
Challenger Power Boats	0644
Cigarette Racing	0637
Massachusetts Marine Trade Association	0634

Our Response:

We have considered the many comments we received supporting our proposed OB/PWC timing or arguing for different timing. Several air quality agencies and environmental organizations argued that earlier implementation of technologies is feasible. Many manufacturers commented that they will require an additional year to make their entire lineups compliant with the national rule.

We have considered the time required by the industry to complete the necessary design, development, and validation activities for their product lines, and have concluded that 2010 is the appropriate date for the new emission standards of OB/PWC engines. The option suggested by commenters for a 50/50% phase-in for 2009 and 2010 was not a feasible option because the rule will not be signed until after the 2009 model year begins. Essentially this phase-in would have allowed them to sell carbureted two-stroke engines for an additional year beyond the proposed implementation dates. The majority of the remaining engines can meet the new standard either directly, or through credit exchanges. By delaying the implementation date to 2010, manufacturers still have the additional year of lead time requested, beyond the proposed

implementation date, to phase-out carbureted two-stroke engines. The final rule gives two years beyond the implementation date of the California standards of similar stringency. In addition to phasing-out carbureted two-stroke engines, manufacturers may need additional time to refine emissions calibrations for engines not currently sold in California. The additional time will give manufacturers time to address any models that may not meet the upcoming California standards or are not sold in California. This also accommodates the lead time concerns with the timing of this final rule as expressed by the commenters.

The new exhaust emission standards represent the greatest degree of emission control achievable in the effected time frame. While manufacturers can meet the standards with their full product line in 2010, requiring full compliance with a nationwide program earlier, such as in the same year that California introduces new emission standards, will pose an unreasonable requirement for manufacturers to develop entire product lines compliant with the new standards with little to no lead time. Allowing two years beyond California's requirements is necessary to allow manufacturers to certify their full product line to the new standards including the additional CO requirement, not only those products they will make available in California.

3.4 High-performance engines

3.4.1 Standards and relationship to ABT

What Commenters Said:

NMMA commented that for CO, EPA is proposing a 350 g/kW-hr standard for high-performance engines. NMMA supports this level and agrees that the technological challenges faced by high performance engines require a CO standard at that level. Individual NMMA members will provide further comments and test data supporting the CO level proposed by EPA in the rule. With regard to HC+NOx, EPA requests comments on the need for and level of alternative emissions standards for high-performance SD/I engines. While EPA proposes two possible alternatives, NMMA members believe that the most appropriate approach for the high-performance engine segment is a modification of the second suggested alternative, which is a 15-22 g/kW- hr standard for the high-performance segment, and to disallow credits. 72 Fed. Reg. at 28,117. NMMA recommends instead that EPA adopt a non-catalyst based standard with a cap set at 20 g/kW-hr for engines with rated output of 373 kW-484 kW in 2010 with a further reduction to 16 g/kW-hr in model year 2011. NMMA will also support a cap of 25 g/kW-hr for engines with rated output of 485 kW and above in model year 2010 with a further reduction to 22 g/kW-hr in model year 2018. These recommended levels are conditioned on the option of using the modified test cycle described below. Consistent with EPA's second alternative, NMMA also recommends that no averaging, banking or trading of credits be allowed for either HC+NOx or CO. Most high-performance engine manufacturers do not have products below the 373 kW rating with which to average. In addition, these manufacturers cannot rely on credits being available on the open market from their competitors. By removing the option for averaging, banking and trading, EPA will ensure a level playing field among all manufacturers of high-performance engines.

As EPA finalizes the standards for high-performance engines, NMMA encourages the Agency to work with CARB to ensure that the standards for high-performance engines are

harmonized to the greatest extent possible. CARB staff included in the "ARB Staff Report: Initial Statement of Reasons for Rulemaking, September 30, 2005" that it was the staff's intention to return to the Board prior to the scheduled 2009 implementation date of the standards for "High Power Engines (greater than 373 kW)" and that they are awaiting the promulgation of the federal regulation. Thus, harmonization is clearly a priority for the CARB and NMMA urges EPA to work cooperatively with CARB to ensure consistency among the two regulatory schemes.

Ilmor supports fixed standards for all high-performance engine manufacturers. Two-tiered: 373-484 kW and >485 kW. Ilmor supports a rule with no ABT for high-performance sector. Ilmor supports harmonized standard for high-performance engines (>373 kw) for EPA and ARB. In a hearing, Ilmor commented that they estimate that 80% of the High-Performance engines are produced by 5 or possibly 6 manufacturers. (Mercury, llmor, Teague, Sterling, Flagship, Chief). An additional 10-20 very small businesses, produce as little as 15-25 engines per year each.

NMMA members (North American Sleekcraft, Inc., Brunswick Corporation) commented that catalytic converters not practical for low niche market. They produce boats that use engines over 500hp. EPA should put a cap on the current emission limitations for high performance for level playing field for those who make such boats. They believe EPA realizes catalytic converters are not feasible on high performance engines.

Brunswick makes boats that use engines over 500HP. They commented that the only logical choice for USEPA is to put a cap on the current emission limitations for high-performance engines in order to create a level playing field for those few manufacturers that make high performance engines. Brunswick believes USEPA realizes that catalytic converters are not feasible on high performance engines.

Mercury Marine commented that EPA's proposal recognizes the unique aspects of high-performance engines and will provide the necessary flexibility as long as several additional revisions are implemented. Mercury Marine is supportive of the flexibility provided for high-performance SD/I engines in the proposed rule. Mercury Racing produces High-Performance Engines as a stand alone division, and competes with several small businesses in this market. This is a uniquely American Industry, employing several thousand people between the engine manufacturers, boat builders and dealers. It is imperative that the same standards apply to all manufacturers. That said, several of these measures require additional revision in several respects to ensure that the standards both achieve the reductions that EPA intends as well as remain workable for the high-performance segment.

For CO, EPA is proposing a 350 g/kW-hr standard for high-performance engines. Mercury Marine supports this level and agrees that the technological challenges faced by high-performance engines require a CO standard at that level. Mercury Marine has supplied confidential test data that supports this standard.

EPA suggested that a possible way to reduce emissions from High Performance Engines was to add an air pump. Mercury Marine commented that first, the size of an air pump that

would result in any meaningful reductions in emissions would be very large, and require considerable power to drive it. Further, no such pump currently exists. Mercury Racing tested air pumps some years ago, and was unable to get them to survive for more than 90 minutes of operation.

With regard to HC+NOx, EPA requests comments on the need for and level of alternative emissions standards for high-performance SD/I engines. While EPA proposes two possible alternatives, Mercury Marine believes that the most appropriate approach for the high-performance engine segment is a modification of the second suggested alternative, which is a 15-22 g/kW-hr standard for the high-performance segment and disallow credits. 72 Fed. Reg. at 28,117. Mercury Marine recommends instead that EPA adopt a non-catalyst based standard with a cap set at 20 g/kW-hr for engines with rated output of 373 kW-484 kW in 2010 with a further reduction to 16 g/kW-hr in 2011. Mercury Marine will also support a cap of 25 g/kW-hr for engines with rated output of 485 kW and above in 2010 with a further reduction to 22 g/kW-hr in 2018. These recommended levels are based on EPA offering the option of using the modified test cycle described below.

Mercury commented that these standards will provide meaningful reductions in emissions from High Performance Engines. Mercury Racing has tested several existing engines. The current engines in the under 485 kW category have shown HC + NOx values in the range of 11 – 18 g/kW-hr. They believe that there are engines, built by smaller companies, utilizing carburetors that are considerably higher on emissions. Every engine company has access to fuel injection technology, and they believe that a standard that forces the use of better, available, technology is appropriate. By 2011 they are recommending a cap of 16 g/kW-hr.

For the category of over 485 kW, Mercury Racing currently has engines that have shown emissions totals of over 34 g/kW-hr. As with the lower category, they believe that there are carburetor equipped engines being produced by other manufacturers that are considerably higher than this. As previously stated, every engine company has access to fuel injection technology, and Mercury believes that a standard that forces the use of better, available, technology is appropriate. Mercury Racing has been able to calibrate their large engines down to approximately 21 g/kW-hr HC + NOx. Given those results, they endorse a standard set at 25 g/kW-hr HC + NOx for this category in 2010, with a long term reduction to 22 g/kW-hr for 2018.

Sterling Performance is a small business engaged in the building of high performance marine engines and has been in this business for over 20 years. They are involved with racing and pleasure boat engines of the highest performance and durability. The high performance inboard marine sector consists of a very low volume of engines that we estimate the total U.S. annual sales of all builders combined to be less than 1500. These engines are generally used by other small businesses to power the watercraft they sell. Sterling Performance supports the proposal of the removal of the option for allowing the averaging, banking or trading of credits for either HC+NOx or CO. Since they do not produce engines below a rated output of 485 kW, they have nothing with which to average. Sterling asks that only a “level playing field” be considered for all manufacturers of high performance engines. They support a cap of 25 /kW-hr for engines with a rated output of 485 kW and above in model year 2010 with a further reduction

to 22 g/kW in model year 2018. In regards to certification testing, the E4 duty cycle overstates the idle fraction and an alternate duty cycle that allows for a nominal load factor of 15% in mode 5 would be more appropriate. With the current ARB standard in place in California, Sterling Performance as a small business is essentially "out of business" in that state. It is of course their hope that the USEPA adopts a standard which will enable them to continue to build engines and further more that it may be harmonized with ARB so that once again the California market is open to them as a small business manufacturer of high performance engines.

California ARB recommends that U.S. EPA remain committed to the 5 g/kW-hr HC+NOx standard and 2009 start-date for high performance sterndrive/inboard engines to align with existing California requirements, or to at least pursue an approach that yields equivalent emission benefits. ARB recognizes the challenges faced by small volume manufacturers of high performance engines to comply with the 5 g/kW-hr HC+NOx standard; however, they have equity concerns over giving a more lenient standard to the segment of industry with the product most able to absorb the costs of compliance. Still, ARB recognizes the benefits of national harmonization and is open to reasonable alternatives that would preserve the emission reductions of the existing spark-ignition marine regulations in California. ARB staff will carefully review the final U.S. EPA decision in this matter and proceed accordingly in determining whether or not a change is warranted for California's high performance engine requirements.

NY DEC commented that high performance engines available to the general public (i.e., not solely for competition) should be held to the same standards as all other sterndrive and inboard engines.

Letters:

Commenter	Document #
NMMA	0688
NY DEC	0659
Ilmor	0658
Sterling	0665
Mercury	0693
CARB	0682
North American Sleekcraft, Inc.	0666
Brunswick Corporation	0695

Our Response:

We considered all the comments and are finalizing non-catalyst based standards for high-performance engines. The final rulemaking sets the HC+NOx emissions standards in 2010 at 20 g/kWh for engines with output less than 485kW and 25 g/kWh for engines with output over 485 kW. In 2011 and later model years, the HC+NOx emission standards drop to 16.0 g/kW-hr for engines at or below 485 kW and 22.0 g/kW-hr for bigger engines. The final standard maintains the proposed 350 g/kWh CO standard that is effective in 2010. Since the standards being adopted for SD/I high-performance engines are less stringent than originally proposed, we are not including the SD/I high-performance engines in the ABT program. Manufacturers are

required to meet the emission standards for SD/I high-performance engines without using emission credits.

We respect NY DEC's desire to obtain greater emission reductions in the high performance engine segment; however, we have determined that the SD/I emission standards are not a feasible option for the high performance engines. Catalytic converters, which are required to meet the new SD/I emission standards, are not a viable technology in high performance engines. These engines produce very high exhaust flow rates and temperatures that make catalysts incapable of sustained and effective operation over extended engine operation. We are therefore implementing the most stringent standards achievable through calibration development and the expanded use of electronic fuel injection in high performance engines.

ARB has recently relaxed its exhaust emission standards for SD/I high performance marine engines to be reflective of emission levels that can be attained without the use of catalysts. These emission standards are similar to those finalized today in this rule. To compensate for the associated shortfall in emission reductions, compared to the original standards, ARB is requiring that high-performance vessels use evaporative emission control systems including carbon canisters and low permeation tanks and hoses. Similarly, we are finalizing evaporative emission standards for all SI marine vessels subject to this rule.

3.4.2 Lead time

What Commenters Said:

NMMA commented that the SD/I marine engine manufacturing industry will need lead time to comply with the emissions standards in the proposal. They continued to comment that this is especially true for the high-performance engine segment which will have to develop the technology to ensure compliance with the emissions standards without the use of averaging. The fact that engine manufacturers must comply with the high-performance California emission standards in 2009 does not assure compliance with a model year 2009 implementation date for national emission standards. As EPA states in the preamble, California represents only a small portion of the market and manufacturers will need to develop control technology for their entire product line. This cannot happen overnight and certainly manufacturers cannot begin the process of developing the control technology until the levels of the standards are finalized. Therefore, NMMA supports a model year 2010 implementation date for large businesses.

With regard to small businesses that are in the high-performance segment, NMMA supports the additional compliance time proposed for these manufacturers. They believe that 2011 is appropriate for high-performance small businesses and provides the requisite time for the control technology to be developed and tested. In addition, given that NMMA is recommending no averaging for this segment, the additional years for compliance will be critical for this segment.

Mercury Marine also commented that the SD/I marine engine manufacturing industry will need lead time to comply with the emissions standards in the proposal. This is especially true for the high-performance engine segment which will have to develop the technology to ensure compliance with the emissions standards without the use of averaging. The fact that

engine manufacturers must comply with the California emission standards in 2009 does not assure compliance with a model year 2009 implementation date for the federal emission standards. As EPA states in the preamble, California represents only a small portion of the market and Mercury Racing may not offer all products in California in 2009. Therefore, the national rule implementation needs to be at least 2010 to provide sufficient time to develop lower emissions versions of these engines.

With regard to small businesses that are in the high-performance segment, Mercury Marine will support additional time for compliance, but that additional time should be 2011. Allowing all of Mercury Racing's competitors to not comply until 2013 is creating an unfair advantage to these companies which have access to the same technologies and capabilities as Mercury Racing.

NMMA members (North American Sleekcraft, Inc., Lowe Boats, and Cigarette Racing) supported 2010-2011 implementation for catalysts to evaluate and design the lower emission engines into boats while ensuring performance and safety and soundness in economy.

Letters:

Commenter	Document #
NMMA	0688
Mercury Marine	0693
North American Sleekcraft, Inc	0666
Brunswick Corporation	0695
Baja Marine Corporation	0726
Cigarette Racing	0637
Lowe Boats	0660

Our Response:

Given the timing of the final rule, we agree with NMMA's suggestion to delay implementation until 2010 for large businesses. This will allow sufficient lead time to complete the design and certification effort associated with meeting the new emission standards. We however, will maintain the 2013 implementation date for small businesses. Small businesses do not currently have access to the testing equipment necessary to perform emission testing and subsequent emissions calibration. This additional lead time will allow them sufficient time to perform this testing and emissions calibration work. In addition, it will provide them sufficient time to upgrade their carbureted engines to electronic fuel injection. Given the high fuel rates of high performance engines, custom fuel injection systems will need to be developed for many of these engines.

3.4.3 Special provisions for high-performance engines

Summary of Comments	Response
NTE Testing: NMMA and Mercury Marine support the proposal to not to apply NTE requirements to the high performance engine segment. They state that many of the manufacturers in this segment are small businesses and the additional testing will cause significant testing burden and costs.	We will finalize these provisions as proposed. Therefore, we will not apply NTE requirements to the high performance segment.
Certification Testing: NMMA, Mercury Marine, and Ilmor support an alternative E4 test cycle for the high performance engine segment. They propose to increase the idle load at the Mode 5 point in the E4 test cycle from 0% to 15% load. The proposal is based on data from high performance boat builders and owners. The data reflected that high performance vessels spend significantly less time at idle (15%) than the E4 test weighting of 40%. In addition, the data showed that typically 8% of operating time is at idle with no load and 18% of the time is at idle in gear, which is represented by the 15% load proposed at idle.	We will adopt the optional alternate E4 test schedule for the high performance engine segment which allows 15% load at the Mode 5 idle point based on the data supplied by industry. We believe this is sufficient relief for the high performance engine segment based on the data provided by industry.
Portable analyzers: NMMA suggested that portable analyzers do not provide any meaningful relief in testing burden. They stated that this equipment was not developed for the high-performance segment and that discrepancies between portable analyzers and a full test lab would create problems. In addition, NMMA expressed confusion that EPA would refer to portable analyzers for in-use testing of high performance engines given that in-use testing requirements were not proposed for SD/I engines.	We have used currently available portable analyzers to perform valid and accurate measurement of emissions from high performance marine engines. It is true that portable analyzers will in some cases have somewhat greater variability than conventional laboratory equipment. Manufacturers may choose to take this greater variability into account as part of the decision whether or not to use portable analyzers for certification. If compliance margins are not big enough or where engine manufacturers otherwise do not want to deal with this greater availability, they may instead opt for the more expensive testing with conventional laboratory equipment. We note, however, that portable analyzers in some cases meet laboratory specifications, in which case no greater variability would be expected. The final preamble clarifies that EPA is adopting a provision that allows for SD/I high performance engine testing to be performed with different equipment than is specified for the laboratory with less restrictive specifications and tolerances. The less restrictive specifications are typical of the specifications required for in-use testing.
Warranty and Useful Life: NMMA and Mercury Marine support the high performance warranty and useful life limits proposed in the NPRM. The proposal limits warranty and useful life to three years or 150 hours for engines with 373-484 kW output and one year or 50 hours for engines with >485 kW output. They also state that the warranty and useful life limits proposed by EPA are consistent with CARB's limits and it makes sense from a policy and technical perspective to harmonize the	We will finalize the proposed high performance warranty and useful life provisions, which are harmonized with California ARB's provisions.

requirements.	
Broad Definition of Engine Families: Ilmor supports the proposed broad definition of engine families in the NPRM. This proposal allows high performance engine manufacturers to group all high performance engines into a single engine family based on good engineering judgment.	We will finalize the proposed provisions for grouping all high performance engines into a single engine family based on good engineering judgment.

Commenter	Document #
NMMA	0688
Mercury Marine	0693
Ilmor	0658

3.5 Cross-category issues related to emission standards

3.5.1 NTE limits (NTE Testing Burden and Need)

What Commenters Said:

Several commenters stated that they do not support the not-to-exceed (NTE) standards proposed in the regulation. Suzuki does not believe that NTE standards are necessary for the outboard engine product category in general. Honda suggested that EPA reconsider the NTE proposal of this marine engine regulation and not adopt NTE for marine engines. Honda also commented that the NTE section of this marine regulation should address the basic issue of defeat devices and not attempt to create a new undocumented test cycle with infinite test points. NMMA and Mercury suggested that the ABT program ensures that the emissions from a manufacturer's fleet meet the standards, therefore NTE is not necessary.

NMMA, Mercury, and Suzuki commented that the test burden associated with NTE standards is considerable. NMMA and Mercury also claim that the costs associated with the NTE tests are not adequately represented in the draft RIA. The commenters claimed that the practical effect of this requirement is that marine engine manufacturers will have to run hundreds more tests in the development process for engines. Such a resource intensive requirement is a considerable burden for this industry with little to no benefit to the environment.

Yamaha commented that EPA originally explained that NTE was a component of certification only but now wants to utilize it as a form of Selective Enforcement Audit protocol causing undue and unsubstantiated burden on the engine maker.

As an alternative to NTE, Honda suggests that EPA consider the acquisition of data from actual boat use (SD/I, outboard, and PWC with the full variety of engine technology that is available to power these vessels) that represents the nominal and off-nominal operating conditions. The data can be used to define a test procedure that is not infinitely burdensome and can be applied to all marine engine technologies.

Honda does not support adoption of an NTE provision for marine engines. They were not in support of NTE provisions for ATVs in an earlier EPA rulemaking and the fundamental principles behind their opposition then apply here for this marine engine proposal. As an alternative, they would suggest that EPA consider the acquisition of data from actual boat use (SD/I, outboard, and PWC with the full variety of engine technology that is available to power these vessels) that represents the nominal and what is claimed to be off nominal operating conditions. From this data it may be determined that the extremes of operating conditions can be better defined. The data can also be used to define a test procedure that is not infinitely burdensome and can be applied to all marine engine technologies. On-the-water test procedures are also a section in the proposal where EPA is attempting to create a compliance limit when there is no test data, no test procedure, no hardware input and output parameters, and no basis to assume that there is some actual, reliably measurable, data that could be generated and compared with a dynamometer test. This is the basis for Honda's suggestion that the NTE section of this marine regulation should address the basic issue of defeat devices and not attempt to create a new undocumented test cycle.

Honda does not understand how the NTE sections apply specifically to outboards and PWCs. They assume that EPA may have intended that some of these sections apply only to SDI vessels. Outboards and PWC do not necessarily include any sensors or controls in a basic 4-stroke carbureted engine so including them in this requirement, especially torque value broadcasting, would be a complete change in their configuration clearly not anticipated in either the regulatory implementation date nor in the cost analysis associated with the emission reductions. Without engine management, a simple air / fuel map of the engine in the operating range would be sufficient to demonstrate that the engine will provide proper emission performance and not introduce any form of "defeat device". The basic purpose of NTE is to prevent the use of a defeat device that would impair emissions performance under normal operating condition or, under particular conditions, change the engine performance for some other benefit while adversely affecting emissions. EPA seems to have clearly stepped beyond this purpose and is in effect creating a new engine test cycle with infinite test points. Creating a new test cycle and setting standards for that cycle without real world data demonstrating that it is representative of boats in operation and is technically achievable by the boats / engines being regulated are clearly a violation of the basic technical principles upon which EPA has always developed test cycles.

ARB commended U.S. EPA for its leadership role in developing and adopting NTE standards and test procedures for sterndrive/inboard engines. ARB believes the standards will allow sterndrive/inboard engine performance to be evaluated in-use under real-world operation. ARB staff recognizes the value to industry of harmonized requirements and will carefully review U.S. EPA's NTE program when determining what NTE standards are appropriate for California's own program.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Yamaha	0721
Mercury	0693
Suzuki	0698
CARB	0682
Honda	0705

Our Response:

We disagree with commenters' position that NTE is unnecessary. NTE is a critical part of a comprehensive emissions program that is intended to ensure that emission controls function with relative consistency across the full range of expected operating conditions. Without NTE, we would not be able to ensure the emissions benefits expected from the regulation are realized in-use.

Commenters stated that the ABT program ensures that emissions from a manufacturer's fleet meet the standards and therefore NTE is not required. However, the commenter did not explain their perceived relationship between ABT and NTE. These are two very different programs. ABT refers to emission credit exchanges between different engines. NTE is a set of standard test procedures intended to ensure that emission control is achieved in–use.

We disagree with Honda's comment that NTE should solely address the use of defeat devices. No single test procedure or test cycle can cover all real-world applications, operations, or conditions. Yet to ensure that emission standards are providing the intended benefits in use, we must have a reasonable expectation that emissions under real-world conditions reflect those measured on the test procedure. The defeat device prohibition is designed to ensure that emission controls are employed during real-world operation and as a result emission reductions are achieved in the real world, not just under laboratory testing conditions. However, the defeat device prohibition is not a quantified standard and does not have an associated test procedure, so it does not have the clear objectivity and ready enforceability of a numerical standard and test procedure. We believe using the traditional approach, i.e., using only a standardized laboratory test procedure and test cycle, makes it difficult to ensure that engines will operate with the same level of control in use as in the laboratory and therefore makes it difficult to enforce a defeat device prohibition. Thus, we believe there are significant advantages to establishing NTE standards. In addition, the final NTE test procedure is flexible, so it can represent the majority of in-use engine operation and ambient conditions. The NTE approach thus takes all the benefits of a numerical standard and test procedure and expands it to cover a broad range of conditions. With the NTE approach, in-use testing and compliance become much easier because emissions may be sampled during normal boating. In sum, by establishing an objective measurement, our NTE approach makes enforcement of defeat device provisions easier, provides more certainty to EPA and the industry, and is crafted to be flexible and represent most in-use engine operation and ambient conditions.

We disagree with industry's comments that the test burden associated with NTE is considerable with either current or future engines. Data supplied by manufacturers show that emissions from existing low emission engines in many areas of the NTE zone are generally below the limit today. We believe the technology used to meet the standards over the five-mode duty cycle will meet the caps that apply across the NTE zone. We therefore do not expect the final NTE standards to cause manufacturers to need additional technology. We believe the NTE standard will not result in a large amount of additional testing, because these engines should be designed to perform as well in use as they do over the five-mode test. However, our cost analysis in the Final RIA accounts for some additional testing, especially in the early years, to provide manufacturers with assurance that their engines will meet the NTE requirements and therefore meet applicable standards in-use.

The test burden also will not be as great as industry assumed from the proposal because of the lead time and carry-over provisions permitted in the final regulation. Manufacturers have at least two years to develop efficient NTE test methods that focus on areas of high emissions before NTE is required. We also added a small business provision that allows an additional year of lead time. We exempted the high performance engine segment from NTE testing altogether because we have very limited information on their detailed emission characteristics and we are concerned about extent of testing that would be required by the large number of affected engine manufacturers that are small businesses. We also considered testing burden by allowing manufacturers to carry-over certification on engines certified prior to 2010 until 2012 for OB engines and 2013 for PWC and SD/I. Like emissions certification, the manufacturers will be able to carry-over NTE certification until the engine design changes significantly.

We also disagree that the NTE testing burden is not accounted for properly in the RIA. In the RIA Chapter 6.3.5, we recognized that manufacturers may need to adjust engine calibrations to meet the proposed standard and collect further data to demonstrate compliance with the proposed not-to-exceed zone. We therefore allow on average two months of R&D for each engine family as part of the certification process. Considering two engineers and three technicians and the corresponding testing costs for the two-month period, we estimate a total cost of $130,000 per engine family. Unless engine designs were significantly changed, manufacturers could recertify engine families each year using carryover of this original test data. Commenters did not provide detailed information on their cost estimates for NTE testing.

Honda commented that actual in-use boat data should be used to create the NTE zone. We developed this zone based on the range of conditions that these engines typically see in use. Manufacturers collected data on several engines installed on vessels and operated under light and heavy load. Chapter 4 of the Final RIA presents this data and describes the development of the boundaries and conditions associated with the NTE zone. Although significant in-use engine operation occurs at low speeds, we are excluding operation below 40 percent of maximum test speed because brake-specific emissions increase dramatically as power approaches zero. An NTE limit for low-speed or low-power operation will be very hard for manufacturers and EPA to implement in a meaningful way.

We value CARB's support for our NTE testing and we agree with them on the value of harmonized requirements for NTE test protocol and standards.

3.5.2 Lead time for NTE standards

NMMA and Mercury Marine commented that there are certain NTE implementation issues that EPA's proposal fails to consider and accommodate in the proposed requirements for Marine SI engine manufacturers in § 1045.205. Specifically, the requirement in § 1045.205(p) that the application for certification contain a statement that all the engines in the engine family comply with the NTE limits and the requirement to include any relevant testing, engineering analysis, or other information to support the statement is particularly troublesome. 72 Fed. Reg. at 28,270. While this requirement may not be a problem for new engine families, for engine families that are carried over, EPA must delay the NTE requirements in the certification application. Otherwise, manufacturers would have the impossible task of having to retest all of their engine families, including those that existed prior to the applicability of the NTE standards. To address the carryover situation, NMMA and Mercury recommend that EPA include in § 1045.205(p) language that would specify that test data for carryover engines compliant with the standards can be carried over through model year 2014 and that certification is valid until the engines must be recertified for other reasons. Section 1045.205(p) should be revised to state:

> (p) For new engine families, state that all the engines in the engine family comply with the not-to-exceed emission standards we specify in subpart B of this part for all normal operation and use when tested as specified in § 1045.515. Describe any relevant testing, engineering analysis, or other information in sufficient detail to support your statement. Through model year 2014, any prior model year engine certified under the Tier I standards in Part 91 may carry over test data and is not subject to NTE as long as the engine meets the applicable standards in this subpart.

This additional language will ensure that manufacturers will be able to transition to the new standards without having to retest all of their prior engine families that are already compliant with the standards.

Mercury commented that they have a suggestion on the NTE Zone Implementation that may make it easier to come to an agreement and implement. Whatever approach is put in the rule, for 2010, 2011, 2012 manufacturers would test to it and report the results with new certifications. They would make a good faith effort to comply with it, but there would be no penalty for noncompliance. Then, in 2012, EPA and industry would do a tech. review and see what worked and what didn't, modify it as needed, and future new certifications would need to meet it. This is similar to the concept that CARB is using on catalyst monitoring, where for the first two years, industry has to do catalyst monitoring and store fault codes, but they do not have to activate the warning horn/MIL light.

Provided EPA adopts the current 3-Star California exhaust emission standard for PWC and Outboards, BRP can fully comply with this standard in MY2009 if EPA allows carry-over data to be used. It is not possible for BRP to re-test their PWC or Outboard engines for compliance with the proposed Not To Exceed (NTE) Zone requirements or proposed change to the maximum test speed in time for MY2009 certification. As a result, BRP is supportive of the NMMA comment to exempt carry-over engine families from the NTE and maximum test speed

provisions in this regulation through MY2013. Please refer to the carry-over certification discussion below.

BRP supports NMMA proposal to have carry-over engine families from the existing marine regulation and early-certified engine families meeting the exhaust emission standards of the proposed regulation be exempt from the proposed NTE test requirements and maximum test speed definition change through MY2013. It is necessary for BRP to phase in engine families to the new testing requirements over the next few model years. It is infeasible to re-test every engine family within the next couple years to verify compliance with the NTE proposal. In addition, allowing carry-over data to be exempt from the NTE and maximum test speed provisions will create an incentive for BRP and other manufacturers to certify their engine families to the new emissions standards in an earlier model year.

Yamaha supports NMMA comments that all HC+NOx compliant engine families under Tier 1 not be subject to NTE testing until that family undergoes a major change or resubmitted as new model until M/Y 2014. This will help offset the time and costs associated with an NTE test.

Letters:

Commenter	Document #
Bombardier	0674
Yamaha	0721
Mercury	0693
NMMA	0688
Mercury	0693
Mercury	0716

Our Response:

Manufacturers commented that certification to the NTE standards requires additional testing for engine models that are already certified to the new emission standards for California. In addition, they expressed concern that they may need to recalibrate existing engine models to meet the NTE standards. Manufacturers commented that this would not be possible by the date of the duty cycle standard. For engines already certified in California, manufacturers carry over preexisting certification test data from year to year. Manufacturers commented that additional time would be necessary to retest, and potentially recalibrate, these engines for certification to the NTE standards. To address these issues regarding lead time needed to retest these engines, we are not applying the NTE standards for 2010-2012 model year engines that are certified using preexisting data (i.e., carryover engine families). For new engine models, manufacturers indicated that they will be able to perform the NTE testing and duty-cycle testing as part of their efforts to certify to the new standards. Therefore the primary implementation date of 2010 applies to these engines. Beginning in the 2013 model year, all OB/PWC and conventional SD/I engines must be certified to meet the NTE standards.

We believe that the NTE requirements are technologically feasible in the time frame adopted in this rule. These NTE limits are supported by data in the RIA and have been further

confirmed by confidential data submitted by individual manufacturers. Therefore, we do not believe that a tech review is warranted.

3.5.3 NTE zones, subzones, and test specifications

What Commenters Said:

NMMA, Mercury, and Bombadier commented that EPA's proposed NTE requirements do not reflect how marine engines are certified and designed and do not accommodate the majority of engine designs. They stated that exhaust emissions vary by engine technology across the 5- mode weighted average test cycle used to determine Marine SI emission certification levels. In addition, the commenters stated that the emission levels at each of the five test points can vary significantly from the declared FEL. The commenters believe that EPA's NTE proposal forces an area around each point of the certification duty cycle to meet the engine family's FEL times a multiplier regardless of the certification data for that point. Suzuki commented that their full line of outboard engines comply with the stringent CARB 2008 HC+NOx levels but EPA's proposed NTE test requirements and emissions standards under any of the available NTE subzone sets will be too severe for several existing engine families to attain without costly and time consuming redesign.

NMMA, Pleasurecraft Marine, Indmar, Mercury Marine, Bombardier, Volvo Penta, and Suzuki support using the second alternative discussed in the NPRM preamble, which is a weighted average approach to the NTE limit rather than an individual NTE limit for each subzone. Under this approach, an emission measurement would be made anywhere within each of the subzones plus idle. The measured emissions would then be combined using the weighting factors for the E4 modal test. The commenters believe that the proposed alternative NTE Zone will ensure a common test methodology to test all different types of marine engines.

NMMA has provided EPA with a full description of a NTE zone shape that they believe makes sense for all engine categories and addresses the open loop phase of catalyst operation during the marine duty cycle. The proposed shape of the subzones was supported by industry. NMMA's proposed a dividing line for Subzone 1 at 85% engine speed and 80% engine torque to accommodate all Marine SI technologies, including open-loop fueling for catalyst protection in the SD/I engines. They proposed that Subzones 2 and 3 are defined by the ICOMIA 5-mode cycle, but the wide open throttle point was defined by the 85% speed and 80% torque boundary of Subzone 1. NMMA proposed the lower boundary for Subzone 2 at 68% of rated test speed and Subzone 3 at 51% of rated test speed. Subzone 4 is defined as the remaining areas of the NTE zone.

Bombardier commented that EPA's NTE proposal forces an area around each point of the certification duty cycle to meet the engine family's FEL times a multiplier regardless of the certification data for that point. They also stated that despite the three sets of multipliers available, this is not a proposal BRP can comply with without substantial lead time. BRP desired to meet with EPA and other industry members to reach a consensus on the NTE requirements.

Mercury stated that the key to ensuring that the NTE limits will be workable for all engine categories is to have a multiplier that will allow for the "worst case" engines. Otherwise, they believe EPA would need to develop subgroups to accommodate every engine category. Mercury Marine believes that a multiplier of 2.0 with the weighted zone approach is required to make this concept work.

Assuming the proposed weighted-average test method is adopted, Suzuki believes an appropriate NTE multiplier for 4-stroke outboard motors is 1.6 times the certification FEL for HC+NOx and CO emissions. Suzuki believes this proposed multiplier will accomplish EPA's stated objectives for NTE, and will not penalize small 4-stroke outboard engines that that are not equipped with fuel injection.

Yamaha's PLT testing indicates that the multipliers outlined in the proposal are too stringent when applying to PLT tests of various engine technologies and fuel delivery methods with little or no break-in time beyond what is allowed for current PLT preparation. Yamaha recommends NTE multipliers of 1.5 times the FEL (un-weighted).

Manufacturers have commented that do not have enough information to fully evaluate the feasibility of the NTE zone for future SD/I engines. Manufacturers have expressed concern that the new line of supercharged GM will result in engines with higher exhaust temperatures than current designs. The commenters suggest that higher exhaust temperatures may require open loop fuel operation at lower speeds and loads, including some operation in subzone 2.

Several manufacturers submitted data for our analysis and development of multipliers. The data can be found in the RIA Chapter 4.

Letters:

Commenter	Document #
NMMA	0688
Indmar	0667
Bombardier	0674
Mercury	0693
Suzuki	0698
Pleasurecraft Marine (hearing)	0642

Our Response:

We have re-worked the NTE test protocol with industry to develop a new approach. The proposal discussed several approaches to the NTE testing protocol. We requested comment from industry on several alternatives. Industry commenters provided input to the advantages and shortcomings of these approaches. Manufacturers specifically stated that there are many different engine technologies and suggested high multipliers that could be met by existing engines. We continued to work with the manufacturers since they submitted their written comments to address these important issues.

The OB/PWC NTE multipliers are slightly revised from the proposed procedure to better reflect the emissions performance of four stroke engines. We are raising the HC+NOx limit in Subzones 1, 2, and 3 from 1.2 to 1.4. In the event where OB/PWC engines are fitted with catalysts, manufacturers would use the NTE requirements for catalyzed engines that were originally designed for SD/I engines (with catalysts). This is appropriate because the emissions characteristics for engines equipped catalysts, in the NTE zone, are driven primarily by the catalyst efficiency rather than the engine calibration. This is especially true at high speed/power operation when the engine may need to run rich as a catalyst protection strategy. During this rich operation, the catalyst would not effectively reduce HC or CO. Detailed data is included in the RIA Chapter 4.

The two-stroke OB/PWC engines have apparent high engine operation variability, as stated in the proposal. Therefore, we singled out the two-stroke engines based on industry recommendation. We are adopting a single weighted limit of 1.5 times FEL for the entire zone.

Four-stroke SD/I engines are unique from the OB/PWC engines because they are expected to use a catalyst to meet the new standards. We are adopting changes to the subzone shapes for SD/I in the final rule based on industry comments. First, we are modifying the shape of the NTE zone to reflect the emissions performance differences between open loop and closed loop fuel operations. We are combining subzones 2, 3, and 4 into a single subzone to reflect the common closed loop engine operation in these areas. Second, we are increasing the subzone 1 area to address the points that require open loop fuel operation to maintain safe exhaust temperatures based on data from industry. We believe that the finalized subzone 1 area is properly defined for catalyst-equipped engines based on current engine blocks. In addition, initial data from General Motors indicates that the finalized subzone 1 may also be appropriate for 6.0L supercharged engines. However, this is not certain. As engine manufacturers begin their development of the new catalyst-equipped, supercharged, SD/I engines, more information will become available on the exhaust temperature characteristics of these engines. If it becomes apparent that these engines cannot be designed to meet the NTE requirements, then we would consider revisiting the NTE subzones and limits to address this issue.

3.5.4 Altitude

What Commenters Said:

ARB strongly encourages U.S. EPA to withdraw its proposal for exempting all recreational marine engines from compliance with emission standards at altitudes greater than 2000 feet above sea level (< 94 kPa) as described in Section IV.D.(4) of the preamble. Although the preamble justifies this limitation because of a presumed majority of boating activity at sea level or low altitude, many lakes in California popular to boaters reside significantly above 2000 feet. Examples include Lake Tahoe at 6225 feet above sea level, Lake June at 7612 feet above sea level, and Big Bear Lake at 6743 feet above sea level. Furthermore, the proposed altitude limitation would effectively exempt recreational marine engines from having to comply with emission standards in-use for all of New Mexico, Wyoming, Utah, and Colorado, which reside entirely at or above 2000 feet above sea level. Additionally, fourteen U.S. states in total have a mean elevation at or above 2000 feet above sea level. While ARB understands that requiring

manufacturers to perform certification testing at high altitudes may be inconvenient, they maintain that manufacturers must remain liable for complying with emission standards in-use, as feasible, at all elevations where significant boating activity occurs. As a compromise, ARB recommends allowing manufacturers to certify engines using test data generated at or around 2000 feet above sea level, but to provide an engineering evaluation stating that the engine will still comply with the applicable emission standards up to 8000 feet above sea level. Requests for exemptions from the 8000 feet above sea level threshold could be considered on a case-by-case basis.

Letters:

Commenter	Document #
CARB	0682

Our Response:

We acknowledge that there are lakes at elevations greater than 2000 feet above sea level. While this boating activity is less prominent than that occurring at lower altitudes, we agree that the regulations should not automatically exempt marine engines based on operation above 2000 feet of altitude. For electronically controlled engines with feedback controls, designing engines that can compensate for altitude effects is straightforward. The bigger challenge is for open-loop engines where there is much less opportunity to incorporate design parameters that would compensate for altitude effects.

In discussions with engine manufacturers after the proposal, there was general agreement that the approach we proposed for nonhandheld Small SI engines would be appropriate to extend to Marine SI engines. We are therefore adopting those same requirements for Marine SI engines in the final rule. In summary, this would include the following provisions:

- Engines must comply with emission standards in the standard configuration at all atmospheric pressures above 94 kPa, which generally corresponds to an altitude of 2000 feet above sea level.
- Engines must comply with emission standards at atmospheric pressures above 80 kPa, which generally corresponds to an altitude of about 6400 feet above sea level. This may involve an altitude kit, which would be described in the application for certification with supporting information (engineering analysis and/or test data). This atmospheric pressure is the lowest value for performing a valid test under 40 CFR part 1065.
- Manufacturers must describe their plan for making information and parts available to reasonably expect that altitude kits would be widely used in high-altitude areas if the engine depends on such a kit for complying at high altitudes.

See the discussion of altitude-related comments for Small SI engines in Section 2.2.7 for additional information.

3.5.5 Methane measurement

What Commenters Said:

CARB commented that although not in alignment with California's existing regulations for outboard/personal watercraft and sterndrive/inboard engines, the use of a total hydrocarbon (THC) criterion for determining compliance with the HC+NOx standards is not opposed by ARB since a numerically equivalent THC standard would be more stringent than basing compliance on only the reactive component of hydrocarbon emissions. California's existing recreational marine standards are based solely on non-methane hydrocarbon because methane is not an ozone precursor. However, methane is a greenhouse gas with climate changing potential; therefore, inclusion in the HC+NOx standard could be beneficial if methane emissions are always decreased in proportion to non-methane components regardless of the emissions control technology employed. As an alternative to the present proposal, U.S. EPA might consider the adoption of a separate standard for methane to ensure more meaningful emission reduction levels.

Letters:

Commenter	Document #
CARB	0682

Our Response:

Whether one considers ease of measurement, climate change, or matching the form of the standard with the available emission control technologies, the conclusion is that a total hydrocarbon standard is a sound basis for setting emission standards for Marine SI engines. We agree with the observation that methane emissions will decrease as a result of setting a THC standard. We are adopting emission standards in the form of total hydrocarbons, as proposed.

3.6 Averaging, banking, and trading

What Commenters Said:

NMMA and Mercury Marine supported the inclusion of an Averaging, Banking and Trading Program for OB/PWC engines and also for SD/I engines.

CARB encouraged EPA to rescind provisions for emission credit banking and trading for all recreational marine engines or to at least depreciate the value of banked credits over time. They expressed concern that it may be possible for manufacturers to certify their engines to emission levels that are considerably lower than required, even within proposed family emission limit (FEL) caps, which could delay the introduction of more stringent emission standards in the future for some manufacturers (if enough credits have been banked). CARB noted that the EPA makes a similar argument for disallowing the banking of CO credits from outboard/personal watercraft engines, and stated that the argument is applicable to the other regulated pollutants as well as sterndrive/inboard engines.

Letters:

Commenter	Document #
NMMA	0688
Mercury	0693
CARB	0682

Our Response:

EPA is retaining the ABT programs for Marine SI engines in the final rule. There will be one ABT program for OB/PWC engines and a separate ABT program for SD/I engines at or below 373 kW. The ABT program for OB/PWC engines will include averaging, banking and trading provisions for the HC+NOx standard and averaging provisions only for the CO standard. The ABT program for SD/I engines at or below 373 kW will include averaging, banking and trading provisions for both the HC+NOx standard and the CO standard. (As described in Section 3.4.1, EPA is finalizing a set of emission standards for high performance SD/I engines that do not include ABT provisions.) EPA believes ABT programs are an important element in setting emission standards that are appropriate under Clean Air Act section 213(a) with regard to technological feasibility, lead time, and cost, given the variety of engines covered by the Marine SI standards. Depending on their design, ABT programs can create an incentive for the early introduction of new technology, allowing certain engine families to act as trailblazers for new technology. This can help provide valuable information to manufacturers on the technology before they apply the technology throughout their product line.

EPA believes the banking and trading provisions are important parts of the ABT program for the HC+NOx and CO standards for SD/I engines at or below 373 kW and the HC+NOx standard for OB/PWC engines and we are retaining them for final rule. (As noted in the proposal, EPA does not believe banking and trading provisions are appropriate for the CO standards being applied to OB/PWC engines given the level of the CO standard.) Banking provisions, including early banking provisions (discussed below in Section 3.6.4), create an incentive for manufacturers to go beyond the requirements set by EPA and also create an incentive for early introduction of new technology. EPA believes this behavior should be encouraged because early introduction can also secure earlier emission benefits. With regard to trading, EPA believes that trading can help manufacturers that, for whatever reason, are struggling with meeting the standards. Trading has happened very infrequently under EPA's ABT programs, most likely due to cost and competitiveness issues. However, it could prove very useful to a company that is having short-term difficulty with complying with the standards, where other means of addressing the problem do not exist.

3.6.1 Credit life

What Commenters Said:

NMMA and Mercury Marine both supported the proposal to use an unlimited credit life for credits used in the ABT Programs for both OB/PWC engines and SD/I engines. In the event that EPA determines it is necessary to limit the credit life, NMMA and Mercury Marine

commented that EPA should apply the alternative approach suggested in the preamble, which would be to limit the credit life to the regulatory useful life of the engine. This would mean that the credits generated by a particular engine would be available while that particular engine is in the fleet. This would avoid concerns voiced by EPA in the preamble about credits being used years after the engine that generated the credits is no longer in the fleet. Moreover, NMMA and Mercury Marine noted that the ability to continue to carry over credits generated in the existing ABT program for OB/PWC engines into the new ABT program rewards manufacturers that have produced engines cleaner than the standards.

CARB commented that it would support the limitation of credits based on the useful life of the engine as proposed. Further, CARB recommended that previously banked credits not be applicable for use on models after a change in standards has occurred.

Letters:

Commenter	Document #
NMMA	0688
Mercury	0693
CARB	0682

Our Response:

We are retaining the unlimited lifetime for ABT credits under the Marine SI ABT program, as proposed. While EPA is retaining the unlimited lifetime, EPA notes that manufacturers should not assume that these credits will be available without any restrictions on their use if, and when, EPA should consider a new round of emission standards in the future. In revising emission standards, section 213(a)(3) of the CAA requires EPA to set standards which achieve the greatest degree of emission reduction that is technologically achievable, taking into consideration such items such as cost, safety and lead time. If manufacturers have a large pool of ABT credits available to them, EPA must consider ways to ensure that those credits do not result in an unnecessary delay of the standards. This can be done in a variety of ways, and has been done in other ABT programs by allowing only limited numbers of existing credits to be used for a limited period of time during the transition to the new standards.

EPA does not believe a limit on the life of the credits is needed for the Marine SI ABT program adopted with today's program. Credits are generated at a cost to manufacturers and thus they have a value to the manufacturers. Provisions which limit a manufacturer's ability to use credits, such as a limit on credit life, will reduce the incentive for manufacturers to invest in the development and introduction of new technology. As mentioned above, manufacturers should not assume that an unlimited life means the credits will be available without any restrictions on their use if, and when, EPA should consider a new round of emission standards in the future. EPA would expect to consider ways to ensure that existing credits would not result in an unnecessary delay of any future standards.

3.6.2 Averaging sets and other restrictions

What Commenters Said:

NMMA commented that the ability of engine manufacturers to use credits interchangeably between OB and PWC engines is important in ensuring compliance with the standards.

NMMA and Mercury Marine commented that it is critical that jet boats be allowed to average credits, both HC+NOx and CO, with OB/PWC engines to provide flexibility and to ensure that jet boats will be able to meet the SD/I emission standards. NMMA noted its support of the proposed approach discussed in the preamble and in the proposed regulatory text in §1045.701(d), provided CO averaging was included.

Bombardier commented that it supported the proposed corporate averaging provisions in §1045.701(d) which allows SD/I engines certified under §1045.660 for jet boats to use HC+NOx exhaust credits generated from OB/PWC engines, as long as the credit-using engine is the same model as an engine model from an OB/PWC family. However, for the corporate averaging provision of §1045.701(d) to be meaningful to a manufacturer, Bombardier commented that CO averaging is also essential for achieving compliance. In addition, Bombardier premised their comments on the feasibility of having their jet boat models comply with the SD/I standards beginning with MY2011 (see Section 3.2.3, above) on the basis that §1045.701(d) is expanded to allow CO averaging.

NMMA and Mercury Marine recommended that EPA remove the restriction regarding the ability of an engine to earn credits for one pollutant when using credits to comply with the emissions standard for another pollutant for both OB/PWC engines and SD/I engines. They commented that this restriction does not serve any useful purpose. From an emission reduction perspective, EPA will still see the pollution reduction across a manufacturer's fleet even with the restriction lifted. NMMA and Mercury marine noted that EPA's rationale for this restriction is that it has been imposed in other programs and is therefore justified for the marine engine category. They do not believe this is a sound basis for such a restriction. NMMA commented that U.S. Coast Guard (USCG) data demonstrates that an averaging approach to controlling emissions results in emission reductions. Thus, NMMA believes a restriction is unnecessary from an environmental perspective.

From a technical perspective, NMMA and Mercury Marine commented that this proposed restriction unduly penalizes certain engines in manufacturers' fleets. For example, for OB/PWC engines, some direct injection two-stroke engines have very low CO emissions but have higher HC+NOx emissions. Mercury Marine noted that many DI 2-Stroke Engines are borderline on meeting the standard for HC+NOx, but have extremely low CO emissions, usually under 100 g/kW-hr.) Thus, these engines would have to use HC+NOx credits for compliance but would be ineligible to generate CO credits. NMAA commented that the inability to earn CO credits for these engines will have a significant impact on certain manufacturer's product plans developed to assure compliance with the standards.

With regard to the proposed restriction for SD/I engines, Mercury Marine commented that GM will be launching a new base engine in 2010 (6.0 L S/C) that may be negatively impacted by this approach. The supercharged engine may need to run rich of stoichiometric at

Mode 2 and may be high on CO emissions at that point. Mercury Marine note they are forced to use GM base engines as they are the only ones that fit within the tight packaging requirements of the boat builders.

As noted earlier at the beginning of Section 3.6, CARB commented that EPA should rescind the provisions for credit banking and trading. Should EPA decide to keep the banking and trading provisions for marine engines, CARB encouraged EPA to depreciate the value of banked credits over time. CARB is concerned that it may be possible for manufacturers to certify engines to emission levels that are considerably lower than required, even within proposed family emission limit (FEL) caps, which could delay the introduction of more stringent emission standards in the future for some manufacturers (if enough credits have been banked). They noted that EPA made a similar argument for disallowing the banking of CO credits from OB/PWC engines, and CARB believes the argument is applicable to the other regulated pollutants as well as SD/I engines.

CARB also recommended that cross class trading not be allowed. Finally, CARB recommended that deficits not be carried over to future years without significant penalties.

Letters:

Commenter	Document #
NMMA	0688
Mercury	0693
CARB	0682
Bombardier (hearing)	0642
Bombardier	0674

Our Response:

With regard to the averaging sets for the Marine SI ABT program, EPA is adopting two averaging sets. OB/PWC engines will be in one averaging set. SD/I engines at or below 373 kW will be in another averaging set. (As discussed in Section 3.4.1, the final regulations for high-performance SD/I engines do not include ABT.) There will be no mixing of credits between the two sets of engines, except under certain conditions for jet boat engines. Jet boat engines are subject to the SD/I engine standards. Manufacturers will be able to use credits generated from OB/PWC engines to demonstrate that their jet boat engines meet the HC+NOx and CO standards for SD/I engines. Engine manufacturers can only use this provision if the majority of units sold in the United States from those related engine families are sold for use as OB/PWC engines. Finally, the manufacturer must certify these jet boat engines to an FEL at or below the applicable emission standards for a similarly-powered OB/PWC engine. While the preamble to the proposal noted manufacturers could use this special provision for jet boat engines for demonstrating compliance with both the HC+NOx standard and the CO standard, the proposed regulations failed to include a reference for CO. The reference to the CO standard has been included in the regulations for the final rule.

With regard to restriction regarding the ability of an engine to earn credits for one pollutant when using credits to comply with the emissions standard for another pollutant, EPA is

dropping that provision for the final rule. While EPA proposed such a restriction, it was modeled on similar requirements in other ABT programs where there was concern that a manufacturer could use technologies to reduce one pollutant while increasing another pollutant. In such cases, EPA did not want to allow manufacturers to both generate credits for one pollutant while using credits for another pollutant. In order to comply with the standards applicable to OB/PWC engines and SD/I engines at or below 373 kW, the types of technologies manufacturers are expected to use technologies such as direct-injection 2-stroke engines or 4-stroke engines for OB/PWC engines and catalysts along with engine improvements for SD/I engines. All of these technologies should result in reductions in both HC+NOx emissions and CO emissions compared to current designs. While the technologies are expected to reduce both HC+NOx emissions and CO emissions, there could be situations where these technologies are capable of meeting one of the emission standards but not the other. EPA does not want to preclude such engines from being able to certify using the provisions of the ABT program and is therefore dropping the proposed restriction from the final rule.

With regard to comments on discounting of emission credits, we are not adopting such provisions for the ABT program. Discounting emission credits is similar to limiting the lifetime of credits. Both provisions lower the value of a credit to a manufacturer. As noted earlier in the discussion on credit lifetime, EPA believes that emission credits are generated at a cost to manufacturers and thus they have a value to the manufacturers. Provisions which limit a manufacturer's ability to use credits, such as a "significant" discount, will reduce the incentive for manufacturers to invest in the development and introduction of new technology, which is a key goal of an ABT program.

In response to the comments on credits deficits, it can be noted that EPA did not propose to allow credits deficits under the Marine SI ABT program. EPA is not including any deficit provision in the final regulations for the Marine SI ABT program.

3.6.3 FEL caps

What Commenters Said:

Mercury Marine commented that the FEL cap for jet boat engines should be the same as the FEL cap for OB/PWC engines because jet boat engines are derived from these products.

Bombardier noted that it is supportive of the effort to develop alternative fuels to reduce petroleum-based fuels consumption. Bombardier commented that EPA has proposed maximum FEL caps for marine engines which may impede a manufacturer's effort to provide alternative fueled marine engines. Bombardier requested that engines using fuels other than gasoline, alcohol and natural gas be exempt from the HC+NOx maximum FEL proposed in 40 CFR 1045.103 (b)(1). Because these engine families would still be subject to the proposed corporate averaging requirements, any increase in HC+NOx emissions would be off-set by further HC+NOx reductions of other engine families. Bombardier reasoned that this change would be an emission neutral (or beneficial) change to the regulation, and would help support a manufacturer's efforts to develop alternatively fueled marine engines.

Letters:

Commenter	Document #
Mercury	0693
Bombardier	0674

Our Response:

As proposed, we are classifying jet boat engines as part of the SD/I engine category, subject to the SD/I standards. However, because many jet boats, today, use OB/PWC engines, we are providing additional regulatory flexibility in which limited jet boat engines may be certified using OB/PWC emission credits. To be eligible for this flexibility, the jet boat engines must meet the OB/PWC standards. We believe that this FEL cap is necessary to limit the degree to which manufacturers may take advantage of emission credits to produce engines that are emitting at higher levels than competitive SD/I engines.

The purpose of the FEL cap is to prevent the sale of very high-emitting engines. As discussed in Chapter 4 of the RIA, engine manufacturers already certify the majority of their engines using FELs well below the new FEL cap. This cap can be met through the use of simple four-stroke engines or direct-injection two-stroke engines. Bombardier did not comment on what alternative fuel they were referring to or why engines operating on this fuel could not meet the HC+NOx cap. In addition, Bombardier did not present a rationale why high-emitting engines using this fuel would be more acceptable than other high-emitting engines. Therefore, we are retaining the HC+NOx FEL cap for all OB/PWC Marine SI engines.

3.6.4 Early credits for SD/I engines

What Commenters Said:

NMMA and Mercury Marine supported the Early Credit Program because it encourages SD/I manufacturers to expedite the introduction of catalyst-equipped engines nationwide earlier than what would be required in the regulation, which results in an environmental benefit. Mercury Marine noted that it plans to offer only catalyst-equipped versions of its Towed Sports (Water Ski Boats) engines in 2009, as this market is sensitive to CO emissions. NMMA and Mercury Marine also recommended that EPA allow manufacturers to earn early credits for engines that meet either the HC+NOx standard or the CO standard.

NMMA and Mercury Marine commented that another important change that would need to be made to any Early Credit Program is to ensure that the timing for the program coincides with any adjustment to the implementation date for the standards. (In comments summarized in Section 3.2, NMMA and Mercury Marine commented that the 2009 model year implementation date for the SD/I exhaust standards was not realistic for the marine industry. NMMA and Mercury Marine recommended a 2010 compliance date for most of the SD/I engines, with a 2011 implementation date for the GM replacement engines. NMMA also recommended a 2011 implementation date for PWC engines installed in jet boats.) In order for an Early Credit

Program to be useful, NMMA and Mercury Marine commented that EPA would need to adjust the period to reflect any changes made to the implementation date.

CARB recommended against the adoption of early introduction multipliers for the generation of credits from SD/I engines.

Although CARB opposes the banking and trading of emission credits, CARB commented that the prohibition in 1045.145(b)(6) against the early banking of emission credits for SD/I engines sold in California before 2009 should be amended or rescinded altogether if EPA decides to implement the ABT program as proposed. CARB understands that EPA does not want to allow credits to be generated from engines that are already required to meet cleaner emission standards in California. However, the blanket prohibition creates a disincentive for manufacturers to sell cleaner engines in California beyond what is already required. Furthermore, CARB noted that it does not allow credit banking or trading for spark-ignition recreational marine engines sold in California. Therefore, any credits earned from the early introduction of cleaner engines in California would not be subject to double-counting under EPA's ABT program.

Letters:

Commenter	Document #
NMMA	0688
Mercury	0693
CARB	0682

Our Response:

With regard to the early credit provisions for SD/I engines, EPA is revising the program as a result of changes to the implementation dates for SD/I engines at or below 373 kW and changes to the emission standards for high-performance SD/I engines. As described in Section 3.2.2, EPA is delaying implementation of the new standards for SD/I engines at or below 373 kW until 2010 for most engines. This is a one year delay from the proposal and is in response to comments from manufacturers saying that additional lead time is needed to comply with the new standards. Because EPA has agreed that additional lead time is needed to comply with the new standards, we are revising the early credits provisions to allow manufacturers to earn early credits prior to 2010. However, given that manufacturers believe additional lead time is needed to comply, EPA does not believe that manufacturers should be able to earn bonus credits for certifying earlier than the 2010 timeframe. Therefore, EPA will allow manufacturers to earn early credits for SD/I engines below 373 kW that are certified before the applicable date in 2010 or 2011. However, manufacturers will not be eligible to earn bonus credits on those engines.

It should be noted that EPA is retaining a delayed implementation data of 2011 for small-volume engine manufacturers to comply with the new standards for SD/I engines at or below 373 kW, as proposed. Therefore, EPA is retaining the early credit provisions for small-volume engine manufacturers that certify earlier than 2011 to the new standards for SD/I engines at or below 373 kW, including the bonus factors that apply to the credit calculations. EPA believes it is appropriate to keep the bonus factors for small-volume engine manufacturers to encourage the

early introduction of new technologies from those manufacturers. Early credits, alone, may not be enough incentives for small businesses to certify early to the standards because they may run the risk of losing market share, during these early years, to lower cost product from competitors who choose not to certify early. Bonus credits help provide an additional incentive for the early introduction of low emission engines.

EPA is retaining the requirement that engines must comply with both the HC+NOx standard and CO standard to qualify for early credits. The main purpose of the early credit program is to encourage the early introduction of engines complying with the new standards. EPA does not believe it is appropriate to provide credits for engines that comply with only one of the new standards, because that engine would not be a fully compliant product. In most cases, this should not be an issue because the anticipated emission-control technology for these engines may be used to meet both the new HC+NOx and CO standards.

As described earlier in Section 3.4.1, EPA is finalizing a set of emission standards for high performance SD/I engines that do not include ABT provisions. As a result, the early credits provisions for high-performance SD/I engines have been deleted from the final regulations.

In response to the comment on credits for engines sold in California, EPA is retaining the prohibition to generate credits from such engines, as proposed. SD/I engines sold in California are subject to exhaust emission standards adopted by CARB. EPA's new exhaust standards will not apply to SD/I engines sold in California. Therefore, it is not appropriate to allow manufacturer to earn credits for engines subject to CARB standards, even if California does not allow credits from those engines to be banked.

3.7 Other requirements

3.7.1 Diagnostics

What Commenters Said:

NMMA and Mercury Marine commented that the proposed rule includes a requirement in § 1045.110 that SD/I engines be equipped with an onboard diagnostic (OBD) system that will diagnose malfunctions of the emission control system. As proposed, § 1045.110(b) requires the OBD system to have a malfunction-indicator light (MIL) that must be readily visible. 72 Fed. Reg. at 28,265. The proposed regulatory text also states that the manufacturer "may use sound in addition to the light signal." Id. (emphasis added). NMMA and Mercury do not oppose the requirement for an OBD system on SD/I engines to the extent that the requirement is not overly complex and is consistent with the California requirements. On the automotive side, OBD systems that meet California requirements are deemed to comply with the federal requirements. The OBD requirements in Part 86 provide "For light-duty vehicles, light-duty trucks, and heavy-duty vehicles weighting 14,000 pounds GVWR or less, demonstration of compliance with California OBD II requirements (Title 13 California Code 1968.2 (13 CCR 1968.2)), as modified pursuant to CARB Mail-Out MSCD #02-11 (internet posting date October 7, 2002), shall satisfy the requirements of this section, except that compliance with 13 CCR 1968.2(e)(4.2.2)(C), pertaining to 0.02 inch evaporative leak detection, and 13 CCR 1968.2(d)(1.4), pertaining to tampering protection, are not required to satisfy the requirements of this section." 40 C.F.R. §

86.1806-05(j) (emphasis added). This "deemed to comply" provision has reduced the certification burden for the automotive industry and a similar approach is appropriate for the recreational marine industry.

NMMA and Mercury continued to comment while proposed § 1045.110(a)(3) seems to include the "deemed to comply" concept discussed above by allowing for a diagnostic system approved by CARB for use with SD/I engines to "fully satisfy the requirements of [§ 1045.110]," the requirement in that section for the MIL is inconsistent with the CARB regulations. In the CARB regulations, the OBD system must have "the capability to activate an audio or visual alert device located on the marine vessel to inform vessel occupants in the event of a malfunction . . . ." See CAL. CODE REGS. tit. 13, § 2444.2(b)(4) (2007) (emphasis added). EPA's requirement of a MIL and possibly sound, if desired, is inconsistent with the CARB requirements and will impose an additional burden on manufacturers choosing the option of developing systems to meet both the California and future federal requirements. They recommend that § 1045.110(b) be revised as follows:

> (b) Use either a malfunction-indicator light (MIL) or sound. If a MIL is used, the MIL must be readily visible to the operator; it may be any color except red. When the MIL goes on, it must display ''Check Engine,'' ''Service Engine Soon,'' or a similar message that they approve. Instead of a MIL you may use sound. You may also use both a MIL and sound. In addition to the light signal. The MIL must go on or a sound must be made under each of these circumstances: 72 Fed. Reg. at 28,265.

Given that CARB's OBD requirements for SD/I engines commence in model year 2008, it is critical that EPA harmonize the federal OBD requirements with those that are already in place in California. Subsections 1045.110(g)(1) and (2) also require revision. As currently proposed, these two subsections incorporate by reference two separate ISO standards: "ISO 9141-2 Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information, February 1994;" and "ISO 14230-4 Road Vehicles—Diagnostic systems—Keyword Protocol 2000—Part 4: Requirements for emission-related systems, June 2000." 72 Fed. Reg. at 28,265. These standards are inappropriate for marine engines and should be replaced with a reference to an industry agreed to protocol developed by the American Boat and Yacht Council (ABYC).

Indmar commented that the final item Indmar Products believes needs clarification is the OBD-M system. CARB allows for a MIL or a sound device. They believe this option is necessary to stay common with CARB. This may appear to be a minor detail but would have significant cost and logistics impact if we have to develop and sell different OBD-M systems for EPA and CARB.

Volvo Penta opposes the use of ISO 9141-2 Road Vehicles and ISO 14230-4 Road Vehicles (1045.110g) for formats codes and connections. Volvo Penta has worked extensively with CARB, SAE and the other SD/I manufacturers to draft the new marine version of SAE J-1939 for marine onboard diagnostic purposes. Therefore, Volvo Penta supports and encourages the EPA to harmonize the OBD requirements with CARB. Two different systems of format codes and connections to provide one set of data is prohibitively expensive, overly burdensome and confusing to Volvo Penta and marine technicians in the field.

Yamaha commented that current PWC engines for Federal or California compliance do not require the addition of OBD currently or the near future. To add OBD both physically and electronically for a small percentage of engines will be challenging, time consuming and very costly due to small production quantities. These units are used in Yamaha produced Jet Boats exclusively. As this is a vertically integrated product, Yamaha requests exemption relief from unnecessary OBD requirements until a stand alone Jet Boat (SD/I) engine is produced and certified as a 5gr engine. Yamaha anticipates that this can be achieved by M/Y 2011.

Mercury Marine and NMMA commented that EPA states in § 1045.2, who is responsible for compliance, that [t]he requirements and prohibitions of this part apply to manufacturers of engines and fuel-system components as described in § 1045.1. The requirements of this part are generally addressed to manufacturers subject to this part's requirements. The term 'you' generally means the certifying manufacturer. For provisions related to exhaust emissions this generally means the engine manufacturer . . . . For provisions related to certification with respect to evaporative emissions, this generally means the manufacturer of fuel-system components. Vessel manufacturers must meet applicable requirements as described in § 1045.20. The difficulty with this provision is that the recreational marine industry is not vertically integrated. This means that the SD/I engine manufacturer will supply the engine, the OBD system, connectors and installation instructions to the boat builder but will have no further role in assuring compliance with the regulatory requirements. While § 1045.20 addresses the obligations of the boat builder, engine manufacturers cannot guarantee that these requirements will be followed. In particular, proposed § 1045.20(d) requires boat builders to "follow all emission-related installation instructions from the certifying manufacturers as described [in the rule]. If you do not follow the installation instructions, we may consider your vessel to be not covered by the certificates of conformity. Introduction of such vessels into U.S. commerce violates 40 CFR 1068.101." 72 Fed. Reg. at 28,262 (proposed § 1045.20(d)). While § 1045.20 makes it explicit that boat builders must comply with the regulatory requirements, neither § 1045.2 nor § 1045.20 provide a "safe harbor" for an engine manufacturer in the situations where the engine manufacturer complies with the regulations but the boat builder does not.

To remedy this situation, Mercury Marine and NMMA recommend that EPA include in the final rule additional language in § 1045.2 that would hold an engine manufacturer harmless in the event that a boat builder fails to follow the requirements of the rule. This provision should state that as long as the engine manufacturer applies the emission control label, the OBD system, connectors, and emission-related installation instructions, the manufacturer is deemed to be in compliance with the requirements of the rule. This additional language will avoid any future confusion as to the compliance obligations of the engine manufacturer.

NESCAUM commented that they support requiring engine diagnostics to ensure maintenance of stoichiometric control of air-to-fuel ratios.

Letters:

Commenter	Document #
NMMA	0688
NESCAUM	0641
Indmar	0667
Volvo Penta	0708
Yamaha	0721
Mercury	0693

Our Response:

The final diagnostic requirement focuses solely on maintaining stoichiometric control of air-fuel ratios. This kind of design detects problems such as broken oxygen sensors, leaking exhaust pipes, fuel deposits, and other things that require maintenance to keep the engine at the proper air-fuel ratio. California ARB has adopted diagnostic requirements for SD/I engines that involve a more extensive system for monitoring catalyst performance and other parameters. We will accept a California-approved system as meeting EPA requirements. The final regulations direct manufacturers to follow standard practices defined in documents adopted recently by the Society of Automotive Engineers in SAE J1939-5. We agree with commenters that the malfunction indicator may be either a visual or audible cue and have made the corresponding change in our final rule.

Jet boat engines that are certified using the emission-credit provisions of §1045.660 will not need a catalyst to meet emission standards. Because the proposed diagnostic requirements are geared toward closed-loop and catalyst-equipped engines, we agree that engines without these features should not need a diagnostic system. We have revised the regulation to apply the diagnostic requirement only to engines with catalysts. Jet-boat engines equipped with catalysts should be able to meet the proposed diagnostic requirements like any other SD/I engine.

As noted in the comment, the regulations clearly state that vessel manufacturers are in violation if they fail to properly install diagnostic systems or otherwise do not follow the certifying engine manufacturer's emission-related maintenance instructions. We believe the regulations do not need to go beyond this to create a safe harbor for engine manufacturers. Where an investigation establishes that the engine manufacturer has properly designed and produced an engine and communicated installation instructions to a vessel manufacturer, we would generally expect to enforce against the engine installer. On the other hand, there may be cases where the engine manufacturer has not properly designed or produced its engines or has not properly communicated installation instructions to vessel manufacturers (either by oversight or collusion). In these cases, we would not want to create an immunity for the engine manufacturer where we can in fact establish that the fault for misbuilt or otherwise noncompliant engines rests with the engine manufacturer.

3.7.2 Torque broadcasting

What Commenters Said:

Mercury Marine, NMMA and BRP commented that also related to the option for in-field testing is the requirement in proposed §1045.115(b), Torque Broadcasting, for electronically controlled engines to "broadcast" their speed and output shaft torque. 72 Fed. Reg. at 28,265. This section requires that engines "broadcast" engine parameters so that they can be read by a remote device or "broadcast" directly to controller area networks. The rationale provided in the proposed provision is that the information is necessary for testing in the field. Id. The term "broadcast" is also used in § 1045.205(s) in the provision related to the information required in the certification application. This term is not defined in the proposed regulations and it is unclear what this term means. They can only assume that "broadcast" is supposed to mean the transmission of a signal of some kind. EPA does not specify how far the signal must be sent, what form is acceptable, or what the design specifications are for the "receivers" for such broadcasts. Since the equipment does not exist, and there is no currently understood methodology to determine torque, given the nature of propeller cavitation and slip, Mercury Marine, NMMA, and BRP request that EPA delete this provision.

Volvo Penta opposes the need to broadcast engine torque. The proposal for manufacturers to broadcast engine torque is new, and has not been the subject of any discussion between EPA, NMMA and its member manufacturers. Volvo Penta has no experience with engine torque broadcast methods. Engine torque broadcast methodology is an emerging field without commonly accepted standards. Volvo Penta will require considerable time, resources and testing to create a robust and reliable method. If engine torque broadcast requirements are implemented through rulemaking, Volvo Penta will seek an exemption or postponement of implementation of the rule until after 2011.

Honda commented that they do not understand how these sections apply specifically to outboards and PWCs. They assume that EPA may have intended that some of these sections apply only to SDI vessels. Outboards and PWC do not necessarily include any sensors or controls in a basic 4-stroke carbureted engine so including them in this requirement, especially torque value broadcasting, would be a complete change in their configuration clearly not anticipated in either the regulatory implementation date nor in the cost analysis associated with the emission reductions. Without engine management, a simple air / fuel map of the engine in the operating range would be sufficient to demonstrate that the engine will provide proper emission performance and not introduce any form of "defeat device".

Letters:

Commenter	Document #
NMMA	0688
Honda	0705
Bombardier	0674
Volvo Penta	0708
Mercury	0693

Our Response:

As noted by Volvo, broadcasting for engines is an emerging field. For highway and nonroad diesel engines, we adopted requirements for engines to broadcast torque and speed

values several years ago. We also adopted this requirement for Large SI engines in 2002. These systems are in the early stages of deployment, but there is a growing body of experience in this technology. Broadcasting simply involves electronic monitoring of engine parameters such that the engine's electronic control unit can record values as needed to determine engine speed and torque at any given point in time. This is useful for performing field tests with portable analyzers. Speed measurements are straightforward. Since torque cannot be easily measured directly, manufacturers would need to do enough testing in the laboratory to establish relationships between torque and other measurable parameters such as throttle position and manifold absolute pressure. Once those relationships are established, the electronic control unit can be programmed with a look-up table to convert measured values to torque readings in real time.

While we believe it is not difficult to incorporate broadcasting, we are aware that some development time is required to establish the look-up tables for converting engine operating parameters to torque values. We are also aware that the value of broadcasting for performing field tests with portable analyzers becomes prominent only after the point at which Not-to-Exceed standards have started to apply. We are therefore revising the regulation to require broadcasting starting with the 2013 model year.

We believe it is not necessary to establish protocols for codes or other details for broadcasting. Manufacturers should be able to establish their own protocols for their engines. This development will be in tandem with the manufacturers' effort to create diagnostic systems. In both cases there is a need for the electronic control unit to store values that can be retrieved by plugging in a laptop computer or some other type of reader. We expect the broadcast protocols to be based on those for the associated diagnostic systems. We are clarifying in the regulation that broadcasting needs to be done in a manner that allows for emission testing. For example, we believe it is not necessary to specify a frequency for broadcasting engine parameters, since testing can't be performed if the broadcasting is not frequent enough to perform a valid test under the procedures specified in part 1065.

We specifically object to Mercury's reference to propeller cavitation and slip as an obstacle to proper torque broadcasting. Engine torque is determined by the load that is applied to (and the rotational force that is transmitted through) the crankshaft. Any vessel-based variables such as vessel speed, vessel direction (upstream or downstream), vessel load, or propeller cavitation or slip would not affect the internal engine relationships between output torque and the relevant parameters such as throttle position and manifold absolute pressure.

We are limiting the broadcast requirements to electronically controlled engines. We agree that carbureted engines cannot be modified to comply with broadcasting requirements without fundamental modifications that go beyond the intended effect of setting new emission standards. However, we believe delaying the broadcast requirement until 2013 allows sufficient time for manufacturers to incorporate this upgrade for electronically controlled outboard and personal watercraft engines. As for SD/I engines, broadcasting will allow for greater flexibility in performing emission tests in the future.

3.7.3 Crankcase emission controls

What Commenters Said:

NESCAUM commented that they support EPA's proposal to require positive crankcase ventilation controls on SD/I engines.

Letters:

Commenter	Document #
NESCAUM	0641

Our Response:

We are adopting the crankcase requirements as proposed.

3.8 Certification

The following sections describe various issues related to the certification process that are specific to Marine SI engines. A few additional certification issues of more general interest are described in Section 1.3.

3.8.1 Maintenance

What Commenters Said:

Volvo Penta opposes the proposal that prohibits manufacturers from scheduling critical emission related maintenance during useful life. Testing to date shows that there may be need to replace O2 sensors before the useful life period of the engine is reached. The O2 sensor manufacturer has made recommendations as to the type of O2 sensors to be used, but stated that marine applications are different and harsher than other applications where these sensors have been used successfully. On-going sensor durability testing has revealed significant numbers of O2 sensors out of specification before the engine's useful life, as defined by the proposed rule. Moreover, our O2 sensor manufacturer has informed Volvo Penta that there is currently nothing available that will work any better in this application.

Letters:

Commenter	Document #
Volvo Penta	0708

Our Response:

There is no reason that oxygen sensors should fail before 480 hours of engine operation during service accumulation in the laboratory. We understand that in-use operating conditions may be so harsh that oxygen sensors will in some cases not survive through the useful life, but we believe that diagnostic systems are best suited to addressing this concern. A properly functioning diagnostic system would readily detect a failed oxygen sensor; the malfunction indicator would alert the operator. Since a failed oxygen sensor would lead to a loss in available

power or increased fuel consumption or both, we believe owners would generally respond to the malfunction indicator by replacing the defective component.

3.8.2 Carryover data

What Commenters Said:

BRP supports NMMA proposal to have carry-over engine families from the existing marine regulation and early-certified engine families meeting the exhaust emission standards of the proposed regulation be exempt from the proposed NTE test requirements and maximum test speed definition change through MY2013. It is necessary for BRP to phase in engine families to the new testing requirements over the next few model years. It is infeasible to re-test every engine family within the next couple years to verify compliance with the NTE proposal. In addition, allowing carry-over data to be exempt from the NTE and maximum test speed provisions will create an incentive for BRP and other manufacturers to certify their engine families to the new emissions standards in an earlier model year.

Letters:

Commenter	Document #
Bombardier	0674

Our Response:

BRP's comments generally affirmed the rule as proposed. We have included these provisions in the final rule.

3.8.3 Warranty

What Commenters Said:

NMMA and Mercury Marine commented that EPA notes in the preamble that the Agency is proposing updated warranty periods for the new standards. 72 Fed. Reg. 28,132. The new proposed emission-related warranty periods for PWC and OB engines in § 1045.120 are shorter in terms of hours but longer in terms of calendar years (or months). 72 Fed. Reg. at 28,132. For OB engines, EPA is proposing 5 years or 175 hours of operation, whichever comes first. 72 Fed. Reg. at 28,132. For PWC engines, EPA proposes 30 months or 175 hours, whichever comes first. The new warranty provision also requires that an emission related warranty cannot be any shorter than any published warranty offered without charge for an engine or component. 72 Fed. Reg. 28,266 (proposed § 1045.120(b)). NMMA does not oppose the updated warranty periods for these engines nor does NMMA object to the requirement for the warranty period to track with any free, published warranty; however, § 1045.120(b) should be revised to clarify that "any published warranty" only applies to the particular engine and not the entire engine family. In addition, NMMA commented that EP A also needs to clarify that "any published warranty" does not include service contracts. Service contracts are those contracts that manufacturers offer for maintaining and repairing the engine beyond the warranty period. NMMA commented that while most service contracts require a fee, in some cases manufacturers may, as a promotion, offer

complimentary service contracts for a limited period of time to encourage the purchase of a new product or to clear inventory. A service contract, however, is not a warranty and should not be construed as such.

To make the language clear, NMMA recommends that EPA revise § 1045.120(b) as follows:

> (b) Warranty period. Your emission-related warranty must be valid during the periods specified in this paragraph (b). You may offer an emission related warranty more generous than we require. The emission-related warranty for the engine may not be shorter than any published warranty you offer without charge for the engine and would only apply to the engine and not the engine family. Similarly, the emission-related warranty for any component may not be shorter than any published warranty you offer without charge for that component. A service contract is not a warranty. If an engine has no hour meter, we base the warranty periods in this paragraph (b) only on the engine's age (in years). The warranty period begins when the engine is placed into service. These changes will help clarify that only the engine and not the engine family is affected by any published warranty and that service contracts are not to be confused with warranties.

Letters:

Commenter	Document #
NMMA	0688
Mercury	0693

Our Response:

We agree that extended warranties offered at no additional charge should be limited to those components or engines that are the subject of the extended warranty. We have revised the regulation to emphasize that the extended warranty does not apply more broadly than for the particular engines that are the subject of the extended warranty. We believe it is not helpful to introduce a distinction between no-cost service contracts and warranties because that would likely become a loophole that allows manufacturers to avoid warranty requirements. In particular, if a manufacturer offers a no-cost service contract, that represents an expectation that the engine will operate consistently over a certain period. We do not understand or accept the logical construct that would say the engine manufacturer should pay for defects that are not emission-related, but that they are not responsible for defects that are emission-related. We are therefore adopting these warranty requirements as proposed.

3.8.4 Family criteria

What Commenters Said:

NMMA and Mercury commented that for SD/I certification purposes, EPA is proposing in § 1045.230(b) to require manufacturers to group engines in the same family if they are the same in all the following respects: combustion cycle and fuel; cooling system (e.g., raw water, separate circuit cooling); method of air aspiration; number, location, volume and composition of catalytic converters; the number arrangement, and approximate bore diameter of cylinders;

method of control for engine operation; numerical level of the emission standards that apply to the engine. 72 Fed. Reg. 28,271. While this list is very similar to what is currently required for outboard and personal watercraft in § 91.115, the SD/I engine segment has unique characteristics and requires a more flexible approach that will prevent the creation of a large number of engine families and reduce the certification and administrative burdens placed on these manufacturers (e.g., double certification tests, durability tests, recordkeeping, etc.). To that end, in the final rule, NMMA and Mercury comment that EPA should revise §1045.230(b) to reduce the number of characteristics that must be identical for purposes of determining engine families.

In particular, NMMA and Mercury stated that the requirements for identical cooling systems and bore diameter should be removed because these are overly restrictive in practical effect and will not have an impact on exhaust emissions from SD/I engines. Exhaust emissions do not vary for thermostatically controlled engines regardless of whether the engine is cooled with raw or fresh water. Also of significance is that CARB does not require manufacturers to use the cooling system as a criterion for distinguishing among engine families. NMMA and Mercury commented as for the bore diameter, there are situations where similar engines of varying displacements should be included in the same engine family. For example, GM's 5.0L and 5.7L engines vary only in displacement and share common induction systems, number and arrangement of cylinders, cylinder heads, and external marinization components, including exhaust equipped catalysts. These engines have been classified historically in one engine family and have the same emissions characteristics. For these reasons, NMMA and Mercury believe that EPA must delete these criteria for SD/I engines from § 1045.230(b).

NMMA and Mercury Marine commented for PWC/OB, EPA proposes requirements for dividing product lines into engine families in § 1045.230. As discussed in the comments related to the requirements for SD/I engines, the list of characteristics contained in proposed § 1045.230(b) is similar to what is in § 91.115; however, there are several requirements, e.g., the bore diameter and cooling systems, that will require SD/I manufacturers to establish too many engine families as noted above and are not a meaningful criteria for PWC or OB engines either. There are also several differences between § 1045.230(b) and § 91.115 with regard to the inclusion of the numerical level of the emissions standards and method of control for engine operation in the characteristics that must be identical. 72 Fed. Reg. 28,271 (proposed § 1045.230(b)(6) and (7)). In light of these differences and the fact that OB and PWC engine manufacturers have been following § 91.115 for over a decade, NMMA and Mercury Marine recommend that EPA substitute portions of § 91.115(c) and (d) for the corresponding language in § 1045.230 with the changes recommended for SD/I. The following redline is provided by NMMA and Mercury to show how this provision should be revised.

§ 1045.230 How do I select engine families?

a. For purposes of certification, divide your product line into families of engines that are expected to have similar emission characteristics throughout the useful life as described in this section. Your engine family is limited to a single model year.

b. To be classed in the same engine family, engines must be identical in all of the following applicable respects:

(1) The combustion cycle;
(2) The cylinder configuration (inline, vee, opposed, and so forth);
(3) The number of cylinders;
(4) The number of catalytic converters, location; volume, and composition; and
(5) The thermal reactor characteristics.

Group engines in the same engine family if they are the same in all the following aspects:
(1) The combustion cycle and fuel.
(2) The cooling system (for example, raw-water vs. separate-circuit cooling).
(3) Method of air aspiration (for example, turbocharged vs. naturally aspirated).
(4) The number, location, volume, and composition of catalytic converters.
(5) The number, arrangement, and approximate bore diameter of cylinders.
(6) Method of control for engine operation, other than governing (i.e., mechanical or electronic).
(7) The numerical level of the emission standards that apply to the engine.

c. At the manufacturer's request, engines identical in all the respects listed in paragraph (b) of this section may be further divided into different engine families if the Administrator determines that they may be expected to have different emission characteristics. This determination is based upon the consideration of features such as:
(1) The bore and stroke;
(2) The combustion chamber configuration;
(3) The intake and exhaust timing method of actuation (poppet valve, reed valve, rotary valve, and so forth);
(4) The intake and exhaust valve or port sizes, as applicable;
(5) The fuel system;
(6) The exhaust system; and
(7) The method of air aspiration.

You may subdivide a group of engines that is identical under paragraph (b) of this section into different engine families if you show the expected emission characteristics are different during the useful life.

d. You may group engines that are not identical with respect to the things listed in paragraph (b) of this section in the same engine family, as follows:
(1) In unusual circumstances, you may group such engines in the same engine family if you show that their emission characteristics during the useful life will be similar.
(2) If you are a small-volume engine manufacturer, you may group all your high-performance engines into a single engine family.
(3) The provisions of this paragraph (ed) do not exempt any engines from meeting all the emission standards and requirements in subpart B of this part.

NMMA commented that these recommended revisions harmonize the existing requirements in § 91.115 with the newly proposed § 1045.230. This redline also reflects the recommendations discussed above related to SD/I engine families.

Honda commented regarding the Engine Family Determination for Outboard Engines and PWCs. Honda suggests that the criteria for engine family selection outlined in Section 1045.230(7) of the proposal be deleted from the final rule. Section 1045.230 of the proposal makes "the numerical level of the emission standard" a family determination criteria. The numerical standard level would mean that each engine horsepower would be a separate family. This is unlike 40 CFR Part 91 where two engine models (75 & 90 hp for example) are created from one engine (same displacement / block and head) and are in the same family. This change would be completely contrary to the intended purpose of the family concept (similar engine with similar emission characteristics). Perhaps this was incorrectly carried over from another regulation where different classes with different displacement categories meet numerically different standards.

Indmar commented in §1045.230 (b) 2 the cooling system (raw-water vs. separate-circuit cooling) could be a family discriminator. This would double the number of engine families for

them with no value added. Indmar offers most of their engines with raw-water or fresh-water cooling. The control temperature for both these applications is 165 degrees Fahrenheit. The exhaust manifolds are heated for both fresh and raw water systems so the exhaust gas feed stream to the catalyst is not impacted differently with either system. The emissions of the engine will not change with either cooling system. Also of significance is that CARB does not require manufacturers to use the cooling system as a criterion for distinguishing among engine families.

Suzuki commented that EPA has proposed to revise the requirements for how to group products into common engine families to include a new provision of "approximate bore diameter" as a requirement for engine family grouping. Suzuki is concerned that this new provision will inappropriately require the creation of additional engines families that otherwise could be grouped together if the existing engine family grouping criteria specified in §91 .115 were employed. They are also concerned that the judgment criteria could be confusing to implement from a certification-planning viewpoint. Suzuki requests that EPA reconsider the need to include this revision in the regulation. Should EPA decide to proceed with the proposed revision, Suzuki requests that the regulatory language be revised to allow the Agency to have discretion to approve the grouping of engines of dissimilar bore diameters if a manufacturer can show that the proposed grouping is in agreement with good engineering practices.

Volvo Penta opposes the family aspects (families) as outlined in the NPRM. Volvo Penta commented that the proposed NPRM aspects will create too many engine families requiring a multiplicity of certification testing and documentation with no resulting emissions reduction. The proposal, therefore, is unnecessarily burdensome. Volvo Penta is a custom marinizer of General Motors (GM) produced engine blocks. Traditionally, Volvo Penta arranged engine families for emissions classification by GM's engine block types and fuel intake systems. As the engines are catalyzed, the fuel intake systems become the same, thereby eliminating fuel intake type as a family discriminator. Volvo Penta's current engine families for emissions purposes are:

- 3.0 I4 Carbureted
- 4.3 V6 Carbureted
- 4.3 V6 EFI
- 5.0 V8 Carbureted
- 5.0 V8 EFI
- 5.7 V8 EFI (All models EFI)
- 8.1 V8 EFI (All models EFI)

Beginning with California in 2008 Volvo Penta will identify the following engine families:

- 3.0 I4 (EFI + Cat)
- 4.3 V6 (Carbureted)
- 4.3 V6 (EFI)
- 5.0 & 5.7 V8 (all models EFI + Cat)
- 8.1 (all models EFI + Cat)

They anticipate that by 2011 the Volvo Penta engine families will include:

- 3.0 I4 (EFI + Cat)
- 4.1 V6 (all models EFI + Cat)
- 5.0 & 5.7 V8 (all models EFI + Cat)
- 6.0 SC V8 (all models EFI + Cat)

Volvo Penta will continue to offer multiple horsepower and cooling system options within each family as they do today. The least compliant (i.e., "dirtiest") engine within each family is used for California and EU compliance certification purposes. That process ensures that all engines within a particular family (however defined) meet the emissions criteria required. Multiple families add expense without benefit.

Pleasurecraft Marine in a hearing commented that §1045.230 outlines the criteria for defining engine families. There are two areas that Pleasurecraft Marine commented need reconsideration. Those areas are:

- Line Item 2, the cooling system (§1045.230(b)(2)
- Line Item 5, the number, location, volume, and approximate bore diameter of the cylinders (§1045.230 (b)(5)).

Pleasurecraft Marine commented regarding Line Item 2, segregating engine families by their cooling system accomplishes nothing more than doubling the number of engine families. Emissions will not vary, for thermostatically controlled engines regardless of whether the engine is raw or fresh water-cooled, therefore, the cooling system should not be a factor in determining engine families.

Pleasurecraft Marine commented regarding Line Item 5, there are circumstances where similar engines of different displacements should be included in a common engine family. An example would be the General Motors 5.0 and 5.7 liter engines. These engines vary only in displacement and share common induction systems, number and arrangement of cylinders, cylinder heads, and external marinization components including exhaust equipped with catalyst. Historically General Motors, who designed these engines, has classified them as one family. If the larger displacement 5.7L will meet emissions standards it is safe to say that the 5.OL will do so as well. Classifying these engines as one family, as they should be, will save small businesses, such as theirs, tens of thousands of dollars in unnecessary certification cost.

Letters:

Commenter	Document #
NMMA	0688
NMMA	0688
Honda	0705
Indmar	0667
Volvo Penta	0708
Mercury	0693
Pleasurecraft Marine (hearing)	0642

Our Response:

We agree that engine families should not be differentiated based on the cooling system. The current regulations in part 91 include this specification, but it seems that the relative uniformity of designs for outboard and personal watercraft engines has prevented this from being an issue. We are revising the regulations to exclude the cooling system from §1045.230 for all Marine SI engines.

The intended effect of including the applicable emission standard to differentiate engine families was two-fold. First, this would prevent SD/I engines from being included in the same engine family with OB/PWC engines. Second, this would prevent engines certified to different Family Emission Limits from being in the same engine family. Selecting different Family Emission Limits for engines that are subject to identical standards inherently implies that the engines will not have similar emission characteristics throughout the useful life, which is the fundamental purpose of establishing engine families, as expressed in §1045.230(a). Contrary to the concern raised by Honda, the regulatory language does not prevent a manufacturer from including different power ratings in the same engine family. As specified in §1045.103, the applicable emission standard for an OB/PWC engine family is based on the maximum engine power for the engine family as described in §1045.140. Section §1045.140 acknowledges that an engine family may have multiple power ratings within the family by specifying that the maximum engine power for an engine family is the production-weighted average of each engine configuration within the engine family. Therefore, under the regulations for OB/PWC engines in part 1045, manufacturers will be able to include different power ratings in a given engine family just as they currently can do under the part 91 regulations.

We believe the regulation should require that engines in a single family have the same "approximate bore diameter." This lays out the general expectation that engines with substantially different displacement values cannot be assumed to have the same emission characteristics throughout the useful life. Basing family differentiation on approximate bore diameter also allows us the flexibility of including engine models in the same family if the difference in displacement is not so great. We have traditionally applied this principle by allowing combined families where the smaller engine has a displacement that is within 15 percent of the displacement of the larger engine. This would, for example, allow the 5.0 and 5.7 liter engines to be grouped into the same engine family. We would have the discretion to broaden this threshold if a manufacturer could demonstrate that two engine models would have similar emission characteristics throughout the useful life. Conversely, we would be able to narrow this threshold if necessary to prevent inappropriate groupings of engines.

3.9 Test procedures

3.9.1 Maximum test speed

What Commenters Said:

NMMA commented that EPA proposes a definition for "maximum test speed" as the "single point on an engine's maximum-power versus speed curve that lies farthest away from the zero-power, zero-speed point on a normalized maximum-power versus speed plot." 72 Fed. Reg. at 28,133. EPA claims that the definition for maximum test speed establishes objective procedures for determining this parameter. NMMA's concern with the proposed definition is that it fails to incorporate the SAE J1228 and the ISO 8665 standards that are currently used by industry. In addition, the new term would have the effect of overly complicating testing and certification. First, it will result in having to run different tests and data points for EPA, CARB and the EU. Second, it is important to note that the power curve is different for engines with different horsepower within an engine family. Thus, a manufacturer would have to run all these

different power curves, determine the test points for each engine model in the engine family, run an emissions test on each with unique test points to determine which is the highest emitting engine, and then certify that engine. Finally, another consideration is that manufacturers use, as the Mode 1 point, the speed at which the boat should be "propped." For these reasons, NMMA recommends that EPA use the current certification method of rated speed and rated power in the final rule.

Mercury Marine commented that EPA proposes a definition for "maximum test speed" as the "single point on an engine's maximum-power versus speed curve that lies farthest away from the zero-power, zero-speed point on a normalized maximum-power versus speed plot." 72 Fed. Reg. at 28,133. EPA claims that the definition for maximum test speed establishes objective procedures for determining this parameter. Mercury Marine's concern with the proposed definition is that it fails to incorporate SAE 1228 and ISO 8665 standards that are currently used by industry, which calls for using the midpoint of the maximum rpm range. This will mean that an EPA certification will no longer be the same as CARB's or the EU's. This is a major move away from harmonization of standards and will generate extra cost and work for no appreciable gain. In addition, on some engines, this will move the Mode 1 point to the maximum allowable rpm for the engine. Boat builder and customer practice is to prop the boat at the midpoint. Therefore, this makes the test less representative of real world operation. Propping the boat at the maximum allowable rpm would create a situation, under some operating conditions, where the engine would over-rev and bounce on and off of the rev limiter, which is set just slightly above the maximum allowable rpm.

Mercury Marine submitted an email stating that they are having great difficulty understanding the Max Test Speed Issue. The attached normalized speed and power graph are for the 75-90-115 Hp Optimax (DI 2 stroke). The engine has a maximum operating speed range of 5000 - 5750 rpm. If they are understanding this correctly, they would have to use 5750 rpm as the Mode 1 point for the 90 and 115. Is that correct? (Not sure about what point they use for the 75.) If so, they would be testing the engine in a way that no boatbuilder would ever prop it to, and no owner would ever use it that way. Their instructions are to prop the boat to the midpoint of the range and virtually everyone does that. To prop it to run 5750 rpm, you would have a situation where you could potentially be bouncing off the rev. limiter at WOT (it is set at 5850 rpm). (data and graph also added- see package).

Bombardier commented that EPA proposes a definition for "maximum test speed" as the "single point on an engine's maximum-power versus speed curve that lies farthest away from the zero-power, zero-speed point on a normalized maximum-power versus speed plot." EPA claims that the definition for maximum test speed establishes objective procedures for determining this parameter. BRP is concerned the proposed definition change fails to align with the SAE J1228 and the ISO 8665 standards that are currently used by industry.

BRP outboard engines are 'propped' around the wide open throttle point on the ICOMIA test cycle. This point optimizes the engine performance, and all boat builders are instructed to prop the engine within an RPM range of this test point. Since this point offers the greatest engine performance and flexibility, propping a boat outside of the recommended RPM range can void the warranty. Consequently boat builders will insure the engine is propped within the

recommended RPM range. By changing the definition of maximum test speed, EPA will be changing the wide open throttle point for many engine technologies. Since this point is utilized to calculate the other test points along the ICOMIA cycle, this will force a manufacturer to certify an outboard engine family using test points which will not represent the emissions of an in-use engine.

BRP continued that in addition, the new definition would force a manufacturer to run an additional power curve test prior to conducting any emission test to determine the applicable test points. This would have the effect of overly complicating testing and certification. The proposed maximum test speed definition change will result in having to run different tests and data points for EPA, CARB and the EU which increases a manufacturer's test burden and costs. For these reasons, BRP recommends that EPA maintain the current certification method of rated speed and rated power.

Volvo Penta disagrees with the need to establish a Maximum Test Speed. In reality, the proposed test is contrary to the EPA's stated goal of corresponding in use operation. Rated speed is determined by the point that that the engine makes maximum power. Most if not all manufacturers have a recommended engine speed range that typically is a band of about 400 RPM. The boat manufacturers will select the appropriate propeller to meet the midpoint of the RPM band (rated speed) which is the max boat speed point with a normal boat load. The boat may run 200 RPM higher with a light boat load but the boat speed will not necessarily be greater. With a heavy load, the boat will run 200 RPM lower and will lose some speed. Most engine manufacturers set RPM limiters approximately 100 RPM above the upper end value of the range to prevent engine damage due to over-trimming or propeller ventilation.

Suzuki commented that EPA is proposing to revise the definition of "maximum test speed" as the "single point on an engine's maximum-power versus speed curve that lies farthest away from the zero-power, zero speed point on a normalized maximum-power versus speed plot." This definition would deviate from currently accepted industry practice used in the US and internationally, which is to follow standards defined by SAE J1228 and ISO 8665.

Suzuki believes EPA's proposed revision is unnecessary and could require the creation of Federal specific test data points, with a separate set of test points for engines certified for in California and international markets . They request that EPA reconsider their proposed revision, and adopt the currently acceptable standards set by SAE J1228 and ISO 8665.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Mercury Marine	0717
Volvo Penta	0708
Mercury	0693
Suzuki	0698

Our Response:

The manufacturers express their interest in continuing to determine maximum test speed as specified in the current regulations and the relevant SAE and ISO standards. However, this is misleading, since the requirement under all these testing protocols is for manufacturers to declare the maximum test speed of an engine based on its rated power, without providing any objective criteria for establishing the point of rated power. We believe manufacturers generally choose a maximum test speed that is consistent with the way engines operate in use, but under the current program we would have little or no ability to insist that an engine's maximum test speed and rated power point be reasonably representative of an in-use configuration.

The importance for adopting objective criteria for selecting maximum test speed grows significantly with Not-to-Exceed standards. The upper end of the NTE zone is based on maximum test speed, so manufacturers would have a significant incentive to declare a maximum test speed as low as possible. It is very common for engine manufacturers to specify a prop range of 1000 rpm. This shows that there is considerable latitude in fitting propellers that would result in a wide range of expected speed and power values. Allowing manufacturers to declare lower values for maximum test speed would shift the whole NTE zone toward lower speeds, potentially causing large areas of common engine operation under the engine map to be "out of bounds" for testing.

The proposed approach from part 1065 is used for a wide range of engine categories to reliably locate maximum test speed at a point on the engine map such to maximize available power over a range of operating speeds. The current regulations specify that the value selected for maximum test speed must be within 2.5 percent of the calculated value. For Marine SI engines operating up to about 6000 rpm, this translates to a range of ±150 rpm. For many engines that are not used for marine propulsion, the calculated value of maximum test speed is the midpoint of a range of values the manufacturer could select for governing off of the power map. However, as noted in the comments, Marine SI engines need to be fitted with a propeller such that the nominal value for achieving maximum power needs to be away from the point at which the governor (or rev limiter) starts to cut engine power. We therefore believe it is appropriate to specify for Marine SI engines that the declared value for maximum test speed may be within 500 rpm of the calculated value. For example, if maximum test speed is calculated to be 6000 rpm based on an engine's power map, the manufacturer could declare a maximum test speed as low as 5500 rpm. Based on a range of power maps shared confidentially by multiple manufacturers, this approach would allow manufacturers in most or all cases to select a maximum test at the maximum power point or at the midpoint of the specified prop range.

In addition, we are adding a provision to the regulations to specify that the maximum speed of the NTE zone for in-field testing is based on the engine's actual maximum operating speed. As long as the engine is installed consistent with the engine manufacturer's instructions regarding prop specifications, we would be able to perform valid tests throughout the NTE zone based on the engine's actual maximum operating speed. This would address our concern that many owners and boat builders may not be so careful to install a propeller that targets the midpoint of the speed range specified by the manufacturer. This approach allows manufacturers

to design for the nominal value (and probably the most common in-use configuration) for certification without overlooking the range of in-use experiences.

If boat builders or owners install a propeller outside of the engine manufacturer's specified range, we would consider these engines to be "not properly maintained and used", which would make them ineligible for compliance testing in that configuration. Note that we would generally consider boat builders to be guilty of violating the tampering prohibition if they do not follow the engine manufacturer's specifications for propellers. If we wanted to test an engine and found that the propeller was outside of the manufacturer's specifications, we would arrange for replacing the propeller to be within the manufacturer's specified range. Similarly, if the propeller were worn or damaged such that the engine no longer operated within the manufacturer's specifications, we would replace the propeller before testing. We would also not consider a test to be valid if the vessel's characteristics had changed such that the engine no longer operated within the manufacturer's specifications (such as through wear, modification, or lack of cleaning).

We would expect manufacturers to declare this same value for maximum test speed for testing to demonstrate compliance with California or European standards, so we are not adopting a provision that would cause a need for duplicate testing for non-harmonized programs. It is true that manufacturers would need to run an engine map for each engine, but we expect that this is already common practice to establish the engine's power characteristics and determine the recommended prop range. Manufacturers may continue to use engineering judgment to establish the worst-case configuration in an engine family for selecting a test engine, as is done today.

3.9.2 Field-testing procedures

What Commenters Said:

NMMA and Mercury Marine commented that EPA proposes in § 1045.401(a) and § 1045.410(f)(2) in-use testing provisions to allow optional field testing instead of laboratory testing. This same option also is included in the provisions for certification testing in § 1045.515. As noted earlier in their comments above on the optional field-testing for SD/I engines, this option does not provide additional flexibility for PWC and OB engine manufacturers because it has no meaningful impact. The equipment needed to conduct field testing does not exist and there are no standardized requirements for ports in which to plug the devices. NMMA and Mercury recommend that EPA delete the references to field testing until such equipment is commercially available and has proven to be accurate and consistent.

Bombardier commented that EPA proposes in 40 CFR 1045.401(a) and 40 CFR 1045.410(f)(2) of the in-use testing provisions to allow optional field testing instead of laboratory testing. This same option also is included in the provisions for certification testing in 40 CFR 1045.515. The equipment needed to conduct field testing does not exist and there are no standardized requirements for ports in which to plug the devices.

Bombardier continued as discussed in the NMMA comments, adopting the field testing requirements of 40 CFR 1065 is not technically feasible for the marine industry. The equipment necessary to conduct accurate measurements has not been verified for use in marine products. BRP is concerned that less accurate field sampling equipment could be used to determine if an engine is in compliance with the proposed emission requirements. BRP believes any emission testing needs to be performed utilizing the test procedures and equipment required for certification.

BRP recommends that EPA delete the references to field testing until such equipment is commercially available and has proven to be accurate and consistent.

Volvo Penta opposes any alternate field test procedures. Volvo Penta has not undergone experience with, or consideration of, such procedures. Volvo Penta does not understand the purpose for this proposal. If the intention is to be able to measure emissions from a given engine, then we feel that the proposal is fraught with potential problems. Circumstances such as, varying exhaust back pressure changing engine loads (due to wind, current and tides), unknown fuel properties, and variation in portable analyzers can have an effect on the results. Moreover, the engine OBD effectively captures the emissions history for an engine without the need for additional testing procedures or methodology.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Volvo Penta	0708
Mercury	0693

Our Response:

Equipment is available today for measuring emissions from engines while they remain installed in a marine application. We believe it is important to be able to make these measurements and are adopting provisions broadly across our programs to allow for this. These measurements allow us to most effectively characterize the true emissions performance from in-use engines. Also, in the case of personal watercraft, manufacturers may be able to realize substantial savings by performing their required in-use testing using field-testing procedures so they don't have to destroy the vessel to remove the engine for testing.

Part 1065 describes the accuracy requirements for the portable analyzers associated with field-testing procedures. The requirements generally allow for somewhat less accuracy and precision. We understand that commercial fuels may also differ somewhat from certification fuels in a way that could affect emissions. We also agree that wind, current, and other factors can change the way the engine operates; this is fundamental to the NTE approach in which we require manufacturers to design for engine operation away from the discrete test modes for certification. We are not aware of the affect that tides have on engine operation. In any case, we are adopting NTE multipliers that take into account all these factors for potentially higher or more variable emissions associated with field-testing measurements. Manufacturers may choose

to perform tests with portable analyzers at certification to establish a correlation with conventional laboratory measurements.

Diagnostic systems are helpful for detecting defects and the need for engine maintenance. They are not effective for evaluating the performance or effectiveness of properly functioning engines. Measuring emissions from in-use engines is the best way to establish whether certified engines are achieving the intended level of reduced emissions.

We believe it is not necessary to specify a standardized access port for routing exhaust emissions to a portable analyzer. It should not be difficult to mate a range of access ports to a given analyzer with any necessary fittings. Also, over time we believe manufacturers will be able to communicate and cooperate as needed to establish a single protocol, or at least a small number of protocols, for mating analyzers with exhaust ports.

3.9.3 1065 issues for Marine

What Commenters Said:

Honda also recommends a review of the change in test procedure to determine if there is any measurement improvement or emission benefit that warrants the cost of the equipment upgrade that may be necessary to make these measurements according to Part 1065.

Letters:

Commenter	Document #
Honda	0705

Our Response:

As described in Section 2.5, we believe the test procedures specified in part 1065 have been reviewed very carefully to reflect a consensus regarding appropriate equipment specifications, calibrations, and procedures. Many manufacturers testing under part 91 today will have to make little or no change to meet the part 1065 requirements. Some manufacturers may find that they need to upgrade a measurement instrument or incorporate some changes to their current practice. We have included an estimate of the cost of making these changes in the Final Regulatory Impact Analysis.

3.9.4 Humidity correction

What Commenters Said:

Mercury Marine commented that the current rule allows for NOx correction for humidity, as it does for California. Therefore, they have not needed humidity control in their test cells. It appears that this provision has been eliminated in the proposed rule. This will require Mercury to add humidity controls to their test cells, at great expense. They therefore request that NOx correction for humidity be included in this rule.

Letters:

Commenter	Document #
Mercury	0693

Our Response:

We agree that the humidity corrections specified in part 1065 should be available for Marine SI engines. We have revised the regulations in part 1045 to specifically allow this.

3.10 Production-line testing

3.10.1 Need for PLT for SD/I engines

What Commenters Said:

NMMA commented that EPA, however, is proposing to require production line testing (PLT) for SD/I engines in § 1045.301. NMMA urges EPA to reconsider requiring SD/I engine manufacturers to perform PLT. The CARB regulations do not impose PLT requirements on SD/I engine manufacturers. It is critical for this industry that EPA makes the federal and California programs as seamless as possible to eliminate the additional burden and cost caused by inconsistent regulatory requirements. It is also important to note that above and beyond the actual costs of the tests themselves, the cost of an emissions bench assuming one is even available) and a dynamometer can average around $500,000. Furthermore, there are significant "brick and mortar" costs associated with the proposed PLT requirements that EPA's proposal fails to take into account. It is our understanding that NMMA members will provide in their separate comments additional detail on the extensive costs that will be imposed by the proposed PLT requirements.

NMMA continued that in addition, as noted above, the requirement to install an OBD system as specified in § 1045.110 will ensure that an owner is notified in the field of any problem with the emission control system. To that end, NMMA recommends that EPA insert a third provision in § 1045.301(a) as follows:

> **§ 1045.301 When must I test my production-line engines?**
> (a) If you produce engines that are subject to the requirements of this part, you must test them as described in this subpart, except as follows:
> > (1) Small-volume engine manufacturers may omit testing under this subpart.
> > (2) You may exempt engine families with a projected U.S.-directed production volume below 150 units from routine testing under this subpart. Request this exemption in the application for certification and include your basis for projecting a production volume below 150 units. You must promptly notify us if your actual production exceeds 150 units during the model year. If you exceed the production limit or if there is evidence of a nonconformity, we may require you to test production- line 12 engines under this subpart, or under 40 CFR part 1068, subpart E, even if we have approved an exemption under this paragraph (a)(2).

(3) Engines equipped with an on-board diagnostic system meeting the requirements in § 1045.110 of this subpart are exempt from the requirements of this section.

NMMA continued to comment that this additional language should be included in the rule to reduce the regulatory burden imposed on engine manufacturers by the rule.

Mercury Marine urges EPA to reconsider requiring SD/I engine manufacturers to perform PLT. The CARB regulations do not impose PLT requirements on SD/I engine manufacturers. It is critical for this industry that EPA makes the Federal and California programs as seamless as possible to eliminate the additional burden caused by inconsistent regulatory requirements.

To implement PLT, Mercury Marine would need to add one, or more, new emissions test cells, including instrumentation benches, and dynamometers. The equipment costs alone are in the $600,000 range, and building the facilities, including climate control, air handling, etc. could easily equal that figure. Therefore, they are looking at over $1M per test cell. Further, there will be impacts on plant emissions and permitting that will further drive up costs. If an engine was built incorrectly, the OBD system would detect the problem, so there is no emissions benefit to this extremely costly requirement.

Indmar commented that they would like to see End of Line testing not required for all SD/I engines. The OBDM system implemented for SD/I engines will catch and identify any engine operating problem that might result in non emission compliant engines. All emission components as well as the operation of the catalytic converter are monitored. Any engine with a problem will be caught at end of line run check and corrected before the engine is sold to commerce. This procedure would be common with CARB.

Volvo Penta opposes production line testing (PLT) for SD/I engines.

- All SD/I engines (except Hi-Performance) will be equipped with catalytic converters with feed back loop controls with on-board diagnostics (OBD) that constantly monitor the emission control systems of these engines as they run. In the event of an emission system malfunction, OBD will notify the operator of the malfunction and will log the event electronically. This electronic record is available after the event.
- Volvo Penta starts and runs each engine at the factory as a final quality control step. It can maintain OBD data for a reasonable period of time on each engine to prove compliance at the factory.
- PLT testing for SD/I is economically burdensome for no added benefit because information it provides is duplicative of the data collected in the OBD system. The capital investment cost to add the PLT equipment to Volvo Penta's production facility is over $**CBI**. This capital investment adds an annual financial burden of $__**CBI**____to $__**CBI**_____ for in- plant testing that will translate directly into increased costs for the consumers. In addition, the time to install the necessary equipment in the plant is approximately 18-24 months. This means that it is highly unlikely that Volvo Penta would be able to comply with a mandatory PLT rule unless the implementation is pushed back until 2 years after the final rule takes effect.

- Finally, Volvo Penta asks that the EPA be required to supply justification for this requirement especially after EPA staff concurred in a public forum that if OBD was added to the rule.

Pleasurecraft Marine commented in a hearing that Section 1045.301 outlines the method for testing production line engines. Pleasurecraft would like to see the elimination of this requirement since the On Board Diagnostic system will detect any malfunctions or abnormalities and will prevent the engine from being introduced into commerce until proper corrections are implemented. Additionally this process will harmonize with CARB procedures.

NMMA submitted information from Pleasurecraft Marine to support their position that PLT is not required. Currently, every engine at Pleasurecraft Marine is 100% tested and validated on engine run cells at the end of the production line. This validation process consists of starting and running every engine, and allowing the engine to cycle through the warm-up and come to complete operating temperature. The engine is then run up to an elevated RPM to insure that ALL computer-sensed comprehensive component diagnostics are run and pass. Every engine is checked and monitored for any type of leaks, including exhaust. Fuel pressure of every system is validated. Pleasurecraft Marine uses a bar code system that insures that the correct calibration is being downloaded into each engine. A manual validation is also recorded using the ECM checksum number. During the run cycle, engine data is recorded and filed according to engine serial number and build date to insure that every engine that gets released from production has valid, passing data on the emission control system. Serial numbers are associated with GM "hot stamp" numbers in the event of any service bulletins and/or recalls from PCM and/or any vendor, the engines can be fully tracked.

With the addition of OBDM, Pleasurecraft Marine's control and diagnostic systems follow the same logic as the automotive industry's OBDII. They now have closed-loop fuel control, misfire diagnostics and catalyst monitoring. Every engine with OBDM will go through a run cycle at the end of the production line the same as we currently do. In addition, all emission-related diagnostics are being run 100% to validate the integrity of the catalyst system. Further to that, these engines are always running an "end-of-line" test for us in the field, hence the development of OBDM.

With the fact that the industry has worked so diligently toward a common system that meets the requirements of reducing emissions, and constantly monitors that system for any fault or deterioration; Pleasurecraft Marine and NMMA believe that production line testing imposes a significant burden with little or no additional benefit.

Letters:

Commenter	Document #
NMMA	0688
Indmar	0667
Mercury	0693
Pleasurecraft Marine (hearing)	0642
Volvo	0708
NMMA/Pleasurecraft Marine	0748

Our Response:

We are skeptical that diagnostic systems alone are adequate for confirming that production engines routinely meet emission standards. Diagnostic systems are designed to detect defects and are not effective tools for quantifying the emission effects resulting from production variability from properly functioning engines. However, there are several factors that lead us to conclude that we should not require production-line testing for SD/I engines in this rulemaking. First, California has not yet adopted production-line testing requirements for these engines. Second, the companies producing these engines are predominantly small businesses. Third, the relatively short useful life and small sales volumes limit the overall emissions effect from these engines. Fourth, we are aware that marine engines may need additional setup time for testing to simulate the marine configuration. We do not consider any of these issues to be fundamental, but we believe it is best to defer consideration of a requirement for production-line testing until a later rulemaking. This would allow us to better understand the degree of compliance with emission standards, the effectiveness of diagnostic controls, and California's interest in requiring production-line testing. Note that we may continue to use selective enforcement auditing to evaluate the performance of production engines if we have reason to believe that this testing is necessary.

3.10.2 Other PLT issues for OB/PWC engines

This section includes additional comments related to production-line testing for Marine SI engines. See Section 1.3 for further discussion of broader issues related to production-line testing.

What Commenters Said:

Honda commented that in the interest of potentially reducing the testing burden, we suggest that a manufacturer be allowed the alternative of ramp modal testing for PLT even if the engine has been certified using the modal test.

Referring to Section 1045.301(e) in the proposal, Honda supports the option of reduced PLT but they suggest it should not be limited to carryover engines nor require two years of test results for qualification. PLT is intended to validate both factory production methodology and control (production in many cases of more than one engine family) and the production of the subject engine family. When introducing a new engine or engine family a factory with a history of producing engines that pass production line testing should be allowed to qualify an engine family for reduced testing after one quarter of passing tests. Further, the reduced testing rate

should not be one per year as written in the proposal but zero until an emission related change is made to the engine family.

ECO commented that EPA should allow small-volume engine manufacturers to utilize the use of alternative testing methods (portable emissions analyzers) to demonstrate in-use field testing compliance for production units.

Letters:

Commenter	Document #
Honda	0705
ECO	0712

Our Response:

We consider ramped-modal testing and discrete-mode testing to be equivalent for a given duty cycle. Manufacturers may perform either type of cycle for certification. However, to ensure consistency, manufacturers must use the same method used for certification for any production-line testing or in-use testing. Similarly, any EPA testing would be based on the same type of cycle the manufacturer used for certification for that engine family. If manufacturers would certify based on discrete-mode testing and would want to do ramped-modal testing for production-line engines, they would need to submit test results from ramped-modal procedures as part of a revised application for certification.

Production-line testing with the CumSum statistical procedures to establish sampling rates involves relatively low levels of testing to establish that engine family meets emission standards taking into account the variability associated with production tolerances and other assembly variables. After new emission standards take effect is an especially important time for testing to confirm that engines are meeting emission standards. We believe two years of testing with a given engine family is necessary to gain enough confidence to reduce the testing rate to a token level. Test results demonstrating compliance with previous standards or test results from different engine families do not provide a sufficient assurance that the production variability of a given engine family is adequately understood and controlled to demonstrate that production engines will uniformly comply with emission standards. This is especially important for engine families that generate or use emission credits, since manufacturers should take production variability into account when they establish a family emission limit.

We note that we would make an exception for outboard or personal watercraft engines certified with a family emission limit under the current standards if manufacturers certify the same engine model under the new standards using the same family emission limit. In this case, we could consider two years of data showing consistent compliance with emission standards to establish a lower testing rate for further production, even if that testing occurred before the effective date of the new emission standards.

It is important to continue testing at least one engine from each engine family even after we agree that less testing is required. Manufacturers often make minor changes over time that should be reflected in ongoing measurement, if only occasionally. For example, manufacturers

may make several running changes to their certified configuration over time based on engineering developments, changed suppliers of emission-related components, updated assembly procedures, or simply turnover in production workers. We believe it is reasonable for manufacturers to test one engine per year as a minimal step to confirm that the engines being produced continue to meet emission standards. We would want to be able to require manufacturers to restart the normal regimen for production-line testing if a problem arises. We would have no easy way of making this determination if manufacturers would completely discontinue testing of production engines.

We agree that the regulations should allow for simpler measurement methods for production-line testing, as described in Section 1.3.4.

3.11 In-use testing

3.11.1 In-use testing for SD/I engines

What Commenters Said:

NMMA and Mercury Marine commented that EPA proposes to exempt SD/I engines from in- use testing in the proposed rule in § 1045.401(a). NMMA agrees with EPA that in- use testing is not feasible for SD/I engine manufacturers given that SD/I engines are installed in vessels and these engines would need to be removed for laboratory testing. Such testing would practically destroy the vessel—a consequence that boat owners would want to prevent.

NMMA and Mercury continued that EPA also asks for comments on other approaches that could be used for accumulating operating hours with SD/I engines to make in- use testing possible. 72 Fed. Reg. at 28,124. EPA's suggestion that SD/I engine manufacturers could perform in-use tests on boats maintained for research and development or for company use is impractical and contrary to the intended purposes of these boats. Boats used for research and development may not represent the configurations that are actually in the field or they may not have a representative service accumulation. As for company fleets used for recreation, such fleets also would not likely include all of a company's products and/or the vessels may not have sufficient in-use service accumulation. Another important consideration is that OBD systems will be installed with SD/I engines. The OBD system will notify the owner and operator of any problems with the emission control system and parts that need to be repaired. For these reasons, EPA's determination that SD/I engines be exempt from in- use testing requirements makes sense.

NESCAUM commented that it is essential that the engines affected by this rulemaking meet the applicable standards for the entire useful life of the equipment into which they are installed. Consequently, they contend that the proposed requirements for verifying durability of emissions controls, as they pertain to SD/I engines and [vessels], are inadequate, principally because there are no requirements for in-use emissions testing. ... Consistent with the durability requirements pertaining to OB/PWC engines, they urge EPA to incorporate similar requirements for manufacturers of land-based SI and SD/I engines and equipment, including a robust in-use testing program.

Letters:

Commenter	Document #
NMMA	0688
NESCAUM	0641
Mercury	0693

Our Response:

The industry comments generally reinforce the reasons we gave in the proposal to suggest that in-use testing would not be appropriate for SD/I engines. We believe the best approach for ensuring proper in-use control is to explore the viability of collecting data from installed marine engines using portable analyzers. The requirements related to torque broadcasting and access ports in exhaust systems make this possible. This will be especially relevant for evaluating compliance with Not-to-Exceed standards. Rather than requiring manufacturers to perform this testing after accumulating some specified degree of service hours, we intend to perform our own testing as needed to gain experience with the measurement technology and sampling and testing protocols.

3.11.2 In-use testing for OB/PWC engines

What Commenters Said:

NMMA commented for OB and PWC engines, EPA is proposing to continue to require in-use testing of field-aged engines to determine whether they continue to meet the emissions standards. 72 Fed. Reg. at 28,134. Proposed subpart E contains the provisions related to the manufacturer-run in-use testing program. PWC and OB engine manufacturers have had to comply with in-use testing requirements for almost a decade. What NMMA members have seen over the years is that the in- use program is a highly resource intensive program with very little, if any, environmental benefit. The costs to manufacturers for locating and obtaining the engines, extracting the engines in the case of PWCs (sometimes practically destroying the product), and dedicating personnel to conducting the tests are significant. Also adding to the cost of these tests has been the lack of adequate notification to manufacturers of the particular engines that must be tested. In some cases, in-use test orders have been received by manufacturers after the start of the following model year, which has significantly increased the burden on manufacturers to obtain engines and conduct testing in a timely manner. With all of these costs, NMMA members have not seen a single engine family fail the in-use test requirements in the past ten years. From a cost-benefit perspective, therefore, there is no justification for retaining the in-use testing program for PWC and OB engines in this new rule. Any concerns about backsliding with the removal of this program from final rule are unfounded given that other enforcement programs, e.g., EPA's Selective Enforcement Audit Program, will ensure continued compliance with the emissions standards. NMMA fails to see how the continued application of the in- use program to PWC and OB engine manufacturers is justified from a cost-benefit perspective.

NMMA continued to comment that the in- use testing program was included in the final 1996 rule for PWC and OB engines in order to "provide information regarding the in- use emission performance of engines in relation to the expected in- use performance to which the

engines were designed and built." See Control of Air Pollution; Final Rule for New Gasoline Spark 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, Final Rule, 61 Fed. Reg. 52,087, 52,094 (Oct. 4, 1996). EPA also explained that such a program was "advantageous because it is an innovative method of gaining acceptable knowledge of in-use engine emission performance." Id. With the experiences gained in implementing this program and the lack of any engine family failure, the in-use program has served its intended purpose. Continuing a regulatory program merely for the sake of the program is poor policy and ignores the considerable costs and resource burden associated with the in- use testing program.

NMMA commented that another important consideration is that the requirement to install an OBD system as specified in § 1045.110 will ensure that an owner is notified in the field of any problems with the emission control system. For all these reasons, NMMA believes the best approach is to amend § 1045.401(a) to include the following provision: "Engines equipped with an on-board diagnostic system meeting the requirements in § 1045.110 of this subpart are exempt from the requirements of this section."

NMMA continued that if EPA elects to retain the in- use testing program, despite the lack of any environmental benefit and the considerable costs, there are several revisions to §1045.405 that must be included in the final rule. While NMMA appreciates EPA's efforts to set out a schedule in § 1045.405(b)(1) for EPA to notify the manufacturer as to which engine families must be tested, the proposed text of § 1045.405(b)(2) is burdensome and requires revision. To that end, NMMA recommends several changes to proposed § 1045.405(b)(2) to ensure that manufacturers are not penalized for certification applications that are received after December 31 of a given calendar year for engines that are early production models. NMMA also suggests that the in- use testing burden be reduced for carryover engines and for engines that have not experienced any in-use testing failures for the past two years. The recommended revisions are included below in redline.

§ 1045.405 How does this program work?
* * * *
(b) The provisions of this paragraph (b) describe how test families are selected, depending on when we receive the application for certification.
(1) If we receive the application or a letter of intent with a list of all engine families you will be certifying and the estimated dates of production by December 31 of a given calendar year for the following model year (for example, by December 31, 2009 for model year 2010), we would expect to select engine families for testing by February 28 of the model year. If we have not completed the selection of engine families by February 28, you may select your own engine families for in- use testing. In this case, you must make your selections and notify us which engine families you have selected by March 31. You should consider the following factors in selecting engine families, in priority order:
(i) Select an engine family that has not recently been tested in an in-use testing regimen (and passed) under the provisions of this subpart. This should generally involve engine families that have not been selected in the previous two model years. If design changes have required new testing for certification, we would consider that this engine family has not been selected for in-use testing.
(ii) Select an engine family if we have approved an alternative approach to establishing a deterioration factor under § 1045.245(b)(7).
(iii) Select the engine family with the highest projected U.S.-directed production volume.
(2) If we receive an application for a given model year after December 31 of the previous calendar year, you must conduct in-use testing with that engine family without regard to the limitations specified in paragraph (a) of this section, unless the engine family is a carryover or we waive this requirement. We will generally waive

> testing under this paragraph (b)(2) only for small volume engine manufacturers or in the case where similar testing was recently completed for a related engine family or the engine family has not failed an in- use test in the past two years.

In addition to these revisions, NMMA recommends that EPA reduce the annual quantity of engine families required for testing to two engine families per year given the compliance history of these engines. These changes will help reduce the burden of the in-use testing program for OB and PWC engine manufacturers while meeting the basic objectives of that program. Lastly, NMMA recommends adding a new paragraph (e) to § 1045.405 as follows:

> (e) In appropriate extreme and unusual circumstances that are clearly outside the control of the manufacturer and could not have been avoided by the exercise of prudence, diligence, and due care, we may waive the in-use testing requirement for an engine family.

Suzuki commented that unlike similar programs conducted with on-highway vehicles, outboard engines used for in-use testing are not procured from privately owned sources for a variety of reasons, and are basically engines operated for the sole purpose of service accumulation needed for compliance with the in-use testing program. This testing is extremely resource intensive, and requires the sacrifice of numerous expensive outboard engines each year. Additionally, because the engines used for in-use testing are operated solely for the purpose of engine age accumulation for the EPA program, literally hundreds of hours of engine operation occur for each engine test group selected for in-use testing for the single purpose of service accumulation for in-use testing.

Suzuki continued to comment that it is arguable that this program had merit in the initial years of outboard engine certification, during which time new technologies were being introduced to replace long established technologies and EPA needed to ensure that proper emissions system durability existed for this then-newly regulated engine category. What has been demonstrated in the years since that time is that the outboard engine industry is building a very robust product. As evidence, Suzuki is not aware of a single case of failure of an outboard engine family selected for in-use testing from any manufacturer.

Considering this exemplary performance from the entire industry, Suzuki does not believe continuation of the in-use testing program for outboard engines can be justified at this time. Suzuki requests that the program be suspended until such time that EPA can demonstrate a compelling need to reinstate the program.

BRP has been subject to the in-use testing requirements of 40 CFR Part 90 since their inception. The EPA proposal maintains the current in-use requirements and provides some relief from the in-use order timing issues BRP and other manufacturers have experienced. While BRP appreciates EPA's efforts to streamline the implementation of this program, it is a program which as outlived its usefulness. To date, BRP has not had a single engine family fail this in-use program. This program costs BRP approximately $200,000 US dollars annually, and does not provide any emission reduction or benefit to the environment.

BRP is requesting EPA to remove the in-use program from the proposed regulation. Alternatively, BRP request to have in-use testing apply only to engine families which have failed the production line testing requirements.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Mercury	0693
Suzuki	0698

Our Response:

In-use testing can provide very valuable information to confirm that engines are complying with emission standards after many hours of operation under in-use conditions. We believe this is especially relevant in the context of Not-to-Exceed standards. Manufacturers may also choose to do their in-use testing with portable analyzers with engines that remain installed on a vessel. This would be the best way of characterizing the effectiveness of an engine's emission controls. This would also allow for nondestructive testing with personal watercraft engines. We understand there have been very low failure rates on OB/PWC engine families previously selected for in-use testing, nevertheless, there remains a need for on-going oversight. We do not believe that the beginning of a new emissions program is a good time to reduce oversight. We will continue to monitor results and may adjust testing rates as appropriate if the results consistently meet the standards.

At the same time, we understand the concerns related to the burden of service accumulation with in-use engines and repeat measurements within an engine model in successive years. While we believe the specified sampling rate of 25 percent of engine families is appropriate to ensure that we can adequately cover the range of engine families that should be tested, we do not intend to require in-use testing for any engines that have already demonstrated compliance under an in-use testing program. This would apply if an engine family's certification is based on carryover of emission data from an earlier engine family for which in-use testing results were adequate to establish compliance with emission standards. We would nevertheless be able to select such an engine family for testing if we had a reason to believe that this testing was necessary, such as a changed family emission limit, increased variability from testing with production-line engines, or reported emission-related defects.

As noted in the proposal, we are committing to a schedule for selecting engine families in time for manufacturers to be able to establish a fleet for in-use testing. The proposed approach depends on holding manufacturers responsible for products they produce after the scheduled time for selecting engine families. Also as noted in the proposal, if manufacturers do not want to be subject to automatic in-use testing obligations, they can simply assign the engine family to the following model year. This would then put that engine family into the pool of available families for us to select for the upcoming model year. It is not necessary to specify that carryover engines are exempt from this scheduling requirement, since we will generally not be selecting carryover engine families for testing if they have already passed under the in-use testing program, as described above. If such an engine family were not yet tested, or it were tested without passing, we would not want to exempt it from the provisions related to timely certification with respect to in-use testing requirements.

There is no requirement to use diagnostic systems for outboard or personal watercraft engines, so it would not be appropriate for us to tie in-use testing requirements to such a system. Moreover, diagnostic systems are intended to find defects and are not effective at evaluating the emission levels relative to an emission standard (or a family emission limit).

We agree with the manufacturers' suggestion that the regulations should include "force majeure" provisions that would allow for revising the plan for performing in-use testing if circumstances outside manufacturers' control prevent them from completing the necessary service accumulation.

3.12 Compliance provisions

3.12.1 Competition exemption

What Commenters Said:

Mercury Marine and NMMA commented that Mercury Racing manufactures engines, both for the recreational market and for competition racing. In some cases, engines used in competitive events are the same as the recreational engines and would be certified engines. However, Mercury Racing also produces engines that are strictly for racing and would be inappropriate for recreational use.

Mercury and NMMA continued to comment that in addition to the exemptions provided in 40 C.F.R. Part 1068, EPA is proposing to include an exemption for engines used for competition similar to other off-road programs. To qualify for the proposed exemption in § 1045.620, a Marine SI engine would have to meet all four criteria, which include restricted display, sales and use as well as superior performance characteristics. While several of these criteria are similar to those required for other programs, such as the competition exemption in 40 C.F.R. § 1051.620 exemption for snowmobiles and ATVs, there are several differences which are problematic and need to be resolved before EPA finalizes this provision. Namely, the first criterion in § 1045.620(c)(1) requires that "neither the engine nor any vessels containing the engine may be displayed for sale in public dealerships or otherwise offered for sale to the general public." 72 Fed. Reg. at 28,282 (proposed § 1045.620(c)(1)) (emphasis added). The italicized language is not only additional to what is required for other programs but it also would make boat show displays of the racing engine or vessel impossible. The public dealership restriction also is not workable with this industry as it is common practice for a dealership to sponsor a racing team and display the boat used for competition on the sales floor. This type of display is not intended as a sale of the vessel and instead is a promotional effort to sell other boats, however, CARB's interpretation is that if a boat is displayed at a dealership or boat show, it is deemed to be "For Sale" unless it is clearly labeled as not being for sale. Mercury Marine recommends that the first criterion be eliminated.

The third criterion, which requires that the engine have performance characteristics that are substantially superior to noncompetitive models also is a concern. There are some engines in a competition class that may not have performance characteristics that are "superior." For example, some racing classes of engines have engine displacement or horsepower restrictions to

equalize the field. Mercury Marine suggests that this criterion be revised as set forth in the redline below.

In addition, the requirement in proposed § 1045.620(c)(4) and (e) regarding the restricted use of the competition engines places an undue burden on Marine SI engine manufacturers. There is no such restriction included in the competition exemption for other programs. While manufacturers of marine engines may have control over whether the competition engines are sold to racing teams and other qualified racers, once the sale occurs to the appropriate entity, the manufacturer has no way of restricting the use of the engine. To address this situation, Mercury Marine recommends that EPA delete § 1045.620(c)(4) and rephrase (e) so that the types of events listed are provided as examples.

The following redline of § 1045.620 is provided to illustrate our recommended revisions to the section:

§ 1045.620 What are the provisions for exempting engines used solely for competition?

The provisions of this section apply for new engines and vessels built on or after January 1, 2009.

(a) We may grant you an exemption from the standards and requirements of this part for a new engine on the grounds that it is to be used solely for competition. The requirements of this part, other than those in this section, do not apply to engines that we exempt for use solely for competition.

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(b) We will exempt engines that we determine will be used solely for competition. The basis of our determination is described in paragraphs (c) and (d) of this section. Exemptions granted under this section are good for only one model year and you must request renewal for each subsequent model year. We will not approve your renewal request if we determine the engine will not be used solely for competition.

(c) Engines meeting all the following criteria are considered to be used solely for competition:

(2) Sale of the vessel in which the engine is installed must be limited to professional racers or other qualified racers.

(3) The engine must have characteristics that are substantially different from noncompetitive models rendering them unsuitable for recreational use, e.g., a transmission that cannot be engaged/disengaged while the engine is running.

(d) You may ask us to approve an exemption for engines not meeting the criteria listed in paragraph (c) of this section as long as you have clear and convincing evidence that the engines will be used solely for competition.

(e) Engines are considered to be used solely for competition if their use is limited to competition events sanctioned by the U.S. Coast Guard or another public organization. Operation of such engines may include racing events, speed record attempts, official time trials and test/trial runs in preparation for racing events. Use of exempt engines in any recreational events, such as poker runs and lobster boat races, is a violation by the boat owner of 40 CFR 1068.101(b)(4).

(f) You must permanently label engines exempted under this section to clearly indicate that they are to be used only for competition. Failure to properly label an engine will void the exemption for that engine.

(g) If we request it, you must provide us any information we need to determine whether the engines are used solely for competition. This would

include documentation regarding the number of engines and the ultimate purchaser of each engine as well as any documentation showing a vessel manufacturer's request for an exempted engine. Keep these records for five years.

Mercury stated that these recommended changes will ensure that the competition exemption achieves its intended purpose while reflecting how these engines are distinct from conventional Marine SI engines and how they are actually marketed. Mercury supplied the issues they have with the Competition Use Exemption 1045.620. They stated that they do not think anything they are suggesting changes the intent, they just do not want to see enforcement actions taken due to wording.

(c) In the meeting, Alan Stout said that companies needed to meet one or more of the criteria. This says they must meet all of the criteria.

(1) These boats are often displayed at dealerships. While they are not for sale to the public, dealers may not be aware that they would have to make it clear on the display that they are not for sale. Mercury feels it should say that they can be displayed, but not sold to, the general public.

(2) OK

(3) Many classes of racing limit engine size or Hp so this statement may not always be true. A statement that these engines "may have characteristics the are different from non-competitive engines" would be more accurate. Some have very short gearcases (OB), some are start in gear (no neutral), some require leaded fuel, etc. Also, some are standard old 2-strokes that certain racing classes standardized on (APBA has a class that can only run Mercury 25 Hp 2-strokes on very small hydroplane boats.)

(e) Use should also include practice for a sanctioned racing event.

Mercury concluded that everything else is OK.

Letters:

Commenter	Document #
NMMA	0688
Mercury	0693
Mercury	

Our Response:

The commenters object to the proposed provision disallowing competition models from being "displayed for sale" on the basis that the competition models are displayed merely to promote noncompetition models. However, the proposed provision clearly would prohibit displaying competition models "for sale" while not prohibiting their display for other purposes, such as promoting noncompetition models. This clarification should be sufficient to address the commenters' concerns. Furthermore, our regulation has no bearing on California's enforcement of their own regulations. We believe there is no need to change the provision in question. In fact, making the recommended change would amount to permission to display the engines for sale to the general public, which would completely undermine any assurance that the exemption would not be abused.

We contemplated the situation in which engines would be used only for competition without meeting all the criteria proposed under §1045.620(c). To address this possibility, we proposed §1045.620(d), which allows us to approve an exemption in cases where the manufacturer can provide clear and convincing evidence that an engine will be used solely for competition. We believe this provision addresses the commenters' concerns and that the proposed regulations do not need to be changed.

We believe it is entirely appropriate for the regulations to prohibit the use of exempted competition engines for noncompetition purposes. This has been identified in §1068.101 as a prohibited act since 2002. We have referenced this prohibition in §1039.620 for nonroad diesel engines and in §1048.630 for Large SI engines. Furthermore, aside from Marine SI engines, we have proposed language referencing this prohibition in §1054.620 for Small SI engines and in §1045.620 for marine diesel engines. We believe the specific language in the regulation is appropriate for delineating the type of operation that we would consider appropriate for exempted engines. We have stated that operation of competitive engines may include only racing events, trials to qualify for racing events, and practice associated with racing events in §1045.620(e) as a clarification of what is considered to be competition, rather than as an additional prohibition. Finally, we believe that Mercury's concern results from a mistaken interpretation of §1045.620(e) that we would void the exemption for the engine manufacturer based on the inappropriate use of the engine for which the manufacturer was not reasonably responsible. These clarifications should be sufficient to address the commenters' concerns. We believe there is no need to change the provision in question.

3.12.2 Personal use exemption

What Commenters Said:

N. Leggett (0603) commented that the proposed rules allow individuals to build vessels for their own personal use without regulation. This is a wise idea that supports the American tradition of do-it-yourself and it allows inventors and other creative technologists to build vessels that are totally their own design. However, part (c) "No individual may manufacture more than one vessel in any ten-year period under this exemption" has a major problem. If a person is building small vessels, he or she will probably be interested in building more than one vehicle in a ten year period. The commenter built a small (one-man) hovercraft and the project certainly did not keep him busy for 10 years. However, if a person is building a large yacht, he or she will probably build only one yacht in ten years. The commenter stated that we need an exemption that is related to the size of the boat being built. A person who is building little runabouts should be allowed to build several of them in ten years. A person building a very large boat will probably not be inhibited by a one boat in ten year limit. At least three size thresholds are needed to make this exemption realistically meet the needs of individuals building vessels for their own personal use.

N. Leggett (0612) commented that individuals who build boats for their own personal use should be allowed to build up to three small boats (under 20 feet overall length), or two medium size boats (under 35 feet overall length) or one larger boat in a 10-year period. These boats would be exempted from the regulations. This is a change from the proposed limit of one boat in

a 10-year period. People building a mix of smaller and larger boats would be limited to a total of two boats. This exemption would apply to hovercraft, hydrofoils, and airboats as well as to conventional boats.

Letters:

Commenter	Document #
N. Leggett	0603
N. Leggett	0612

Our Response:

We intended the personal-use exemption more to allow someone to build a boat for his own personal use rather than creating a path for hobbyists to continuously produce new homemade vessels. On the other hand, we believe it is appropriate to consider that five years (rather than the proposed ten years) is an appropriate period for expecting someone to use a homemade boat. Circumstances might change over that time such that a different size or type of vessel would meet an individual's needs. We are therefore changing the proposed regulation to specify that a person may make one exempt vessel over any five-year period. We believe this is preferable to allowing some number of vessels to avoid creating an expectation or an allowance for continuous production of homemade vessels. The five-year period aligns with the proposed restriction against selling an exempted vessel for five years after construction. Any more frequent construction would only put a personal boat builder in a position of owning multiple boats at one time for his personal use. We believe it is not necessary to accommodate this concern.

3.12.3 Allowance to use Small SI engines

What Commenters Said:

Ingenium commented that they are writing in response to the April 17, 2007 announcement by the EPA to create new legislation that would regulate emissions from Inboard marine engines. The proposed regulations propose to place particularly stringent emissions controls on Stern Drive and Inboard engines, more stringent than either outboard engines or personal watercraft engines. This appears to be a decision made because the preponderance of Stern Drive and Inboard engines are automotive based and so those engines can benefit from a vast array of emissions technology developed in the automotive world. In addition, the large marine manufacturers like Mercury Marine and others, have the R&D and other financial resources to develop other emissions capabilities such as water cooled three way catalysts, on their own. Since they produce the vast majority of marine specific engines and they are manufacturers.

Ingenium continued to comment that it appears, based on the second paragraph of page 42 of 40 CFR that the EPA recognizes that there may be smaller Inboard engines in use that EPA is not currently aware of and EPA makes the assumption that these smaller engines would have similar emissions control capabilities as their larger Inboard counterparts. The EPA also "requests comment on the need for adjusting these proposed standards to accommodate any

technical constraints related to their unique designs." So they are writing in response to this request for comment.

Ingenium Product Development, Inc. has spent the last three years developing a new type of marine propulsion system for very small boats that uses V-twin air cooled engines from the lawn and garden industry to propel the boat. Their product can be seen at: http://www.ventboats.com. At the current time their plans are to use engines between about 10 hp and 36 hp which are manufactured by Briggs and Stratton and other companies. They are air cooled, carbureted four-cycle engines. These engines are very low in cost and so they hope to be able to reduce the cost of the final product to the consumer. To their knowledge they are the only manufacturer in the USA that is using these types of engines in an inboard configuration. There are some other manufacturers like Mudbuddy using these same engines in an Outboard configuration. The volumes they anticipate are always going to be low, perhaps 1,500 - 2,500 per year after five more years of growth. So they are a miniscule contribution to the world's emissions problem.

Ingenium commented that these engines are not on the same developmental timeline as automobile engines as far as emissions. In fact the small engine regulations that are being proposed for the lawn and garden industry lag behind the marine standards by several years. Large manufacturers of air cooled L&G engines produce millions of these engines per year. There is simply no way they will modify our tiny fraction of engines that are used for the marine markets to accommodate special emissions capabilities. Put another way if they cannot use these engines as they are they will have to go out of business. Ingenium sees that EPA has some type of waiver language in the proposal if the total number of engines used from other industries is less than 5% of a manufacturer's total. They would fall under that comfortably because again, Briggs and Stratton makes millions of these engines for their primary intended market, riding lawnmowers.

Ingenium commented that it seems that they need some type of waiver or allowance to use these engines or maybe the proposal already covers their situation and they just cannot find it. At this time they are requesting that EPA respectfully consider their request for special allowance to use 4-cycle carbureted engines from the Lawn and Garden engine manufacturers, in a limited volume marine application, with the emissions controls that are in place on the engine as purchased from the manufacturer.

ARB does not support using certified small spark-ignition engines in marine applications without certifying to the marine spark-ignition emission standards. ARB's recreational marine engine programs have additional important requirements such as consumer "Star" labels, different useful life periods, and issues specific to use in a marine environment. As an alternative, ARB recommends that carry-over of certification data and DFs should be allowed where appropriate, thereby reducing the certification burden.

Honda has concerns with the proposal for extraordinary labeling and reporting for one specific application of general purpose engines. In §1045.605(d)(5), small volume products that use these engines, such as mud/swamp boats, have been singled out for the addition of a supplemental label. While the engines will have small engine emission labels confirming regulatory compliance, the Proposal has clearly carved a niche for these unique engine

applications. This requirement will inherently present added burden to the very small business entities producing these products and we do not understand its purpose or benefit expected from it.

EMA commented that engine manufacturers do not have the ability to control their customer's novel use of engines that are designed and intended for utility (i.e., a wide variety of product) applications. To the extent that the engines involved are not marinized, EPA should not differentiate utility engines from any other product application. Engines that are either Small SI or certified to the Small SI requirements defined in 40 CFR Part 1054/1060 by provisions allowed in 40 CFR Part 1048 should not be required to be certified to the Marine SI emission standards found in 40 CFR Part 1045. If such engines are required to be tested under the Part 1045 procedures, the benefits associated with not having to certify to Part 1045 would be eliminated.

EMA continued to state that the provisions of §91.1013 EXEMPTION FOR CERTIFIED SMALL SI ENGINES allow manufacturers to use marine engines that have been certified to emission standards for non-road spark-ignition engines below 19 kW without recertifying those engines under part 91. This proposed language should be revised in a fashion similar to §1045.605. Specifically, this section also should include references to engines certified to either 40 CFR Part 90 or 40 CFR Part 1054 in order to avoid confusion and ensure that engines <=1000 cc displacement and <=30 kW certified to either 40 CFR 90 or 40 CFR Part 1054 are acceptable.

EMA commented that this section (§91.1013) also includes a reference to §1045.605, which requires SORE engines used as marine propulsion engines to comply with special labeling and record keeping requirements. The requirements specified in §1045.605(d)(2), and (5) - (7) only should be applicable to vessel manufacturers. The engine manufacturer does not have the ability to ensure that these requirements are fulfilled. To satisfy the requirements of §1045.605(d)(3), the engine manufacturer should only be required to submit a statement of compliance that indicates that the majority of the applicable engine family's sales are not used for marine propulsion.

Marine propulsion engines are generally regulated per 40 CFR Part 91 and 1045 as identified. However, per §1045.605 engines that are certified to the requirements of 40 CFR Part 1054 are also considered valid without separate application for certification under Part 1045. We recommend that the language of §1054.5(c) "Which nonroad engines are excluded from this part's requirements?" be revised to read: (c) Propulsion marine engines. See 40 CFR parts 91 and 1045. Note that engines certified for compliance with Part 1054 may be utilized for marine propulsion as described in §1045.605. Note that the evaporative emission standards....."

Letters:

Commenter	Document #
Ingenium	0616
CARB	0682
Honda	0705
EMA	0691

Our Response:

We appreciate the informative comment from Ingenium, pointing out that there are very small inboard engines that are not based on automotive technology. We believe it is appropriate to expand the provision for using engines certified to Small SI standards to sterndrive and inboard engines rather than limiting this to outboard and personal watercraft engines. This is appropriate for Small SI engines certified under the Phase 2 standards in part 90 or the Phase 3 standards in part 1054.

We believe the allowance to use marine engines that have been certified to standards for land-based products is an important provision to address concerns for small businesses and for niche products. By limiting the numbers of these cross-certified engines to a small fraction of their total sales, we are able to address these concerns without undermining the marine regulations in which we have developed a unique set of requirements with respect to engine operation, useful life, engine maintenance, and other important parameters. Requiring even a streamlined certification, as California ARB suggests, would still pose a burden that we believe is not appropriate for small numbers of engines that have already been certified to EPA standards.

We proposed to allow conversion of land-based engines for marine applications under the provisions of §1045.605. This applied for engines certified to the Small SI standards only if they were used in outboard or personal watercraft applications. The provisions of 1045.605 included labeling and reporting requirements to document the changes involved in installing the engine in a vessel. However, we are adopting a provision allowing broader use of small numbers of certified Small SI engines for marine propulsion (see §1045.610). As long as these engines are installed without modification in a vessel, we will accept the Small SI certification, with no additional testing required, as valid for the marine installation. This is similar to the approach we have taken for constant-speed diesel engines that may be used in land-based or marine auxiliary applications (see §1042.610). This simpler approach is appropriate for these engines because they are typically "drop-in" models that operate very similar to the way they would for any number of land-based applications. The sales volumes are also very small relative to the total sales in the engine families, and the marine installation is often performed by the owner of the engine.

The regulations include language in §91.1013 that simply references §1045.610. All the provisions in §1045.610, including the changes we make for the final rule, apply automatically for engines subject to emission standards under part 91. The final version of §1045.610 will include language including engines certified under either the Phase 2 standards in part 90 or the Phase 3 standards in part 1054.

Engines that are certified under part 1054 and eventually used in a marine application under the provisions of §1045.610 are still subject to all the requirements and prohibitions that apply under part 1054. It is therefore not appropriate to include a reference to §1045.605 or §1045.610 in §1054.5 where we describe which engines are excluded from the requirements of part 1054. At point of sale, Small SI engines should meet the Small SI exhaust standards, as

noted above. However, once the engine is installed in a recreational marine vessel, then the vessel is subject to the OB/PWC or SD/I evaporative standards.

3.12.4 Replacement engines

What Commenters Said:

NMMA and Mercury Marine commented that in certain situations SD/I engines must be repowered due to problems associated with normal "wear and tear" or damage to the existing engine block. For these cases, the marine engine manufacturer would need to be able to replace the original engine block with a comparable engine that would allow the boat owner to use many of the existing components from the original engine. Since the new engine block is dropped into the existing vessel in the exact location, it is imperative that the replacement engine fit into the space allotted for the engine block. New engines that will be built to meet the standards proposed in this rulemaking will not, in most cases, be able to fit in the space allotted to existing engines. For these reasons, NMMA and Mercury support the flexibility provided by the proposed revisions to the exemptions in § 1068.240, which address the situations where the engine being replaced is not subject to the emissions standards or is subject to less stringent emissions standards than those that would apply to a new engine. 72 Fed. Reg. at 28,378. The proposed revisions would permit a manufacturer to produce and sell a replacement engine identical in all respects to the engine being replaced without violating the prohibited acts in § 1068.101. These revisions are necessary to allow marine engine manufacturers to continue to provide customers with replacements for existing engines.

Indmar commented that in certain situations SD/I engines must be replaced due to problems associated with normal "wear and tear" or damage to the existing engine block. New catalyst equipped engines may not package in the space allotted for non-catalyst equipped engines. Also the boat wiring would not match the electronics of the new engines. The replacement of engines in old boats as defined in 1068.240 is supported by Indmar. This allows us to keep customers who have engine problems with old boats satisfied and still meet the intent of clean air.

Letters:

Commenter	Document #
NMMA	0688
Indmar	0667
Mercury	0693

Our Response:

We are adopting the proposed replacement-engine provisions, as supported by the comments. Note that we are revising the replacement-engine provisions as described in Section 1.5. The modified §1068.240 nevertheless continues to address the concerns expressed by the commenters.

3.12.5 Defect reporting

What Commenters Said:

NMMA and Mercury Marine commented that EPA is proposing to apply the defect reporting requirements in § 1068.501 to marine engines in place of the requirements in 40 C.F.R. Part 85, which are currently applicable to only PWC and OB engines. 72 Fed. Reg. at 28,203. For the investigation threshold, EPA's proposal would require 10 percent of total production up to a total production of 50,000 engines but never fewer than 50 for any single engine family in one model year. 72 Fed. Reg. at 28,203. For production between 50,000 and 550,000 units, the investigation threshold would increase at a marginal rate of 4 percent. With regard to defect reporting requirements, EPA would require a manufacturer to report all occurrences of the same defect in all engine families and all model years that use the same part. Id. EPA proposes that the threshold reporting for a defect would be 2 percent of total production for any single engine family for production up to 50,000 units, but never fewer than 20 for any single engine family in one model year. Id. For production between 50,000 and 550,000 units, the reporting threshold would increase at a marginal rate of 1 percent. For all production above 550,000, a threshold of 6,000 engines would apply.

NMMA and Mercury commented that the new proposed defect reporting requirements would cover defects for emission-related components or systems containing the following components: "electronic control units, aftertreatment devices, fuel metering components, EGR-system components, crankcase- ventilation valves, all components related to charge-air compression and cooling, and all sensors associated with any of these components." 72 Fed. Reg. at 28,388 (proposed § 1068.501(a)(1)(i)). Defects related to engines and equipment subject to the evaporative emission standards also would be covered, including defects related to fuel tanks, fuel caps, and fuel lines and connectors. 72 Fed. Reg. at 28,388 (proposed § 1068.501(a)(1)(ii)).

NMMA and Mercury commented that EPA's proposed requirements in § 1068.501 are different from the defect reporting requirements that SD/I engine manufacturers will have to comply with in California. See CAL. CODE REGS. tit. 13, § 2144 (2007). Given that many of the SD/I engine manufacturers are small businesses, NMMA and Mercury recommend that EPA allow SD/I engine manufacturers to comply with the California program as a substitute for the federal program. The California program requires a manufacturer to file an emission warranty information report for each quarter when the cumulative number of unscreened warranty claims for a specific emission related component or repair represent at least 1 percent or 25, whichever is greater, of the engines of a California-certified test group. Id. By giving SD/I manufacturers the option to comply with the California program for defect reporting, EPA would reduce the administrative burden that would be imposed on these companies by having to comply with two different defect reporting schemes.

NMMA and Mercury commented for the PWC and OB engine manufacturers, the new proposed defect reporting program differs from Part 85 in several respects, both in the investigation threshold and the reporting threshold. Part 85 requires a defect report to be filed when the manufacturer determines that a specific emission-related defect exists in 25 or more engines of the same model year. 40 C.F.R. § 85.1903(a). The current program is well-known

across the OB and PWC industry, and NMMA fails to see the utility in changing the existing defect reporting requirements that will merely serve to increase the regulatory burden with no perceived environmental benefit. To that end, NMMA and Mercury recommend that EPA retain the current defect reporting program for PWC and OB engine manufacturers.

NMMA and Mercury commented that for boat builders and component manufacturers, the expanded scope of the defect reporting requirements to include components subject to the evaporative emissions standards may overwhelm this industry. A major concern held by NMMA members is the ability of small business boat builders and component manufacturers to track the requisite information in an industry that is not vertically integrated. A large number of the boat builders and component manufacturers are small businesses and do not have the staff or sophisticated systems to track warranty claims. In addition, recreational marine dealerships are not as sophisticated or as organized as those for light-duty vehicles or for Recreational Vehicles. There are many small dealerships that do not have the resources or capabilities to track the information required by EPA's proposed defect reporting program. This makes determining whether the investigation and reporting thresholds are triggered particularly difficult and burdensome. As stated in the NMMA testimony, there are a number of boat builders that do not understand the requirements in this proposed rule or are even aware that a rule exists. Significant outreach is needed by EPA and industry to make certain that these companies are aware of the requirements and receive the necessary training. To address this problem, NMMA suggests that EPA consider delaying the defect reporting requirements and perform a technical review in model year 2011 for evaporative emission-related parts. This should provide EPA and NMMA with enough time to conduct outreach and training.

Bombardier commented that BRP has been complying with EPA's defect reporting requirements for PWC and outboard engines for the past ten years. BRP has dedicated resources to ensure compliance with these requirements. Switching to a new defect reporting system will be a burdensome transition requiring significant revisions to BRP's current marine warranty reporting process, the implementation of new tracking software and employee training.

Pleasurecraft Marine commented in a hearing that Section 1068.501 is a lengthy section detailing an elaborate method of reporting and correcting emission related defects. This section appears more applicable to the automobile industry than the marine industry. Pleasurecraft recognizes and agrees with the need for proper and timely problem resolution as well as the associated documentation required. However, this method of defect and recall reporting represents an extreme burden for small businesses. Therefore they advocate for harmonization with the methods outlined in the California Air Resource Board procedures for defect and recall protocols.

Letters:

Commenter	Document #
NMMA	0688
Bombardier	0674
Mercury	0693
Pleasurecraft Marine (hearing)	0642

Our Response:

We are moving to apply the defect-reporting requirements broadly across all our nonroad engine programs. For Marine SI engines and for most other engine categories, this moves us away from current requirements, which are based on a simple numerical threshold of 25 defects regardless of the size of the engine family. We believe this threshold should be scaled to the size of the engine family to avoid the burden for manufacturers and EPA to generate and review defect reports where the defect rate might be minuscule. Another aspect of the new provisions is that they require manufacturers to monitor warranty claims and other available information to determine whether they exceed the specified defect thresholds. Under the current regulations, there is no clear requirement to monitor available information. We are concerned that manufacturers are not taking reasonable steps to get or process available information for making these evaluations.

Since the reporting thresholds are substantially higher than under part 91, the concern for increased burden under the new approach is only reinforcing our concern that manufacturers are not taking adequate steps today to monitor available information for potential emission-related defects. In particular, the commenters' concern about an overwhelming burden for small businesses that are not familiar with regulatory requirements is misplaced. Dealers have no new obligations under the defect-reporting requirements. In fact, we would expect dealers to be motivated for financial reasons to pass along to the certifying manufacturer detailed information about warranty claims or other indications of emission-related defects. Compliance with defect-reporting requirements falls entirely on the certifying manufacturer. The certifying manufacturer is responsible to keep track of the information coming in from dealers, owners, service personnel, and others. When potential emission-related defects exceed the specified thresholds, then the certifying manufacturer must investigate further to determine whether there is a need to report the emission-related defect to EPA.

We understand that the evaporative emissions control systems are not susceptible to emissions failure because they primarily consist of material solutions rather than moving parts. However, manufacturers should be monitoring warranty claims as good business practice, therefore the incremental monitoring for evaporative emissions systems is minimal.

We acknowledge that there would be an unreasonable burden for manufacturers to simultaneously follow EPA's defect-reporting methodology and a different methodology for California ARB. We agree that the California ARB defect reporting approach is as protective of the environment as the EPA requirement, therefore we will accept their defect reporting program as a compliance option under §1068.501(a)(6).

3.12.6 National security exemption

What Commenters Said:

Bombardier commented that BRP is supportive of the US armed forces, and is proud to offer specially designed marine spark-ignited engines for their use. Unfortunately, the proposed national security exemption requirement of 40 CFR 1068.225 (b) makes it difficult to support

our military's need in a timely manner. Under 40 CFR 1068.225 (b), EPA is proposing to only issue an exemption without a request, "if it will be used or owned by an agency of the federal government responsible for national defense, where the equipment has armor, permanently attached weaponry, or other substantial features typical of military combat." The requirement "where the equipment has armor, permanently attached weaponry, or other substantial features typical of military combat" is unnecessary and burdensome. The final disposition of the engines BRP has specially designed and manufactured for military use is often classified information. Often, BRP has no way of verifying they will be used on a vessel or equipment that has armor, weaponry, or other features of combat craft. As a result, BRP will need to seek a national security exemption under the proposed 40 CFR 1068.225 (c).

BRP commented that 40 CFR 1068.225 (c) allows a manufacturer to request a national security exemption with an endorsement by an agency of the federal government responsible for national defense. This requirement is in essence identical to the current national security exemption of 40 CFR 91.1008 (2). While it is possible to meet this requirement, the current 40 CFR 91.1008 (2) can result in substantial and unnecessary delays in providing engines for our military's use. BRP feels it is imperative the US military receive their engines when they are needed without undue delay. BRP supports EPA's efforts to limit national security exemptions to agencies of the federal government responsible for national defense. However, the requirement to ensure the exempted engine will be used on equipment with armor, weaponry, or other attributes associated with combat creates a burdensome and unnecessary step in providing support to the US military.

BRP respectfully requests EPA to revise 40 CFR 1068.225 (b) to state, "Your engine/equipment is exempt without a request if it will be used or owned by an agency of the federal government responsible for national defense."

Letters:

Commenter	Document #
Bombardier	0674

Our Response:

The provisions for the national security exemption are unchanged from what currently applies under the current regulations in §91.1008. The national security exemption broadly applies across programs and has changed little since the inception of EPA’s emission control requirements. Defense agencies are very familiar with the distinction between combat and tactical applications and their need to request the exemption for tactical applications. We would expect engine manufacturers to largely be in a position of responding to orders placed by defense agencies. The burden falls on the defense agency to take care of administrative approvals associated with national security exemptions. We therefore believe the provisions of §1068.225, which have applied for other marine engines for some time, should appropriately be extended to apply equally to SD/I engines, as proposed.

3.13 Small-business issues

What Commenters Said:

NMMA noted that for small businesses, EPA is proposing to provide additional lead time for compliance with the SD/I engine exhaust standards. NMMA is very supportive of the additional compliance flexibility provided for in the rule for small businesses; however, EPA's eligibility criteria as to what constitutes a small business is problematic and is different than the Small Business Administration (SBA) definition of what is a "small business." EPA states in the preamble that "[f]or purposes of determining which engine manufacturers are eligible for the small business provisions . . . , we are proposing criteria based on a production cut-off of 5,000 SD/I engines per year." This same requirement is included in the first part of the proposed definition for "small-volume engine manufacturer" in §1045.801. The second part of the proposed definition for "small-volume engine manufacturer" in §1045.801 would allow manufacturers that exceed the production cut-off to request to be treated as a small business if they have fewer than the number of employees defined by the SBA in Title 13 CFR §121.201. According to the SBA regulations, this would mean 500 employees for businesses under the engine manufacturing NAICS. Notably, these regulations do not refer to a production volume as a prerequisite for a business in the particular industry to be classified as a "small business." Furthermore, a production cut-off was not used by EPA to determine which businesses participated on the Small Business Advocacy Review Panel on the rule, which served to provide advice and recommendations on how to address small business concerns. Two NMMA members, Marine Power and PCM, both have well under 500 employees but may occasionally produce over 5,000 engines, depending on the year. EPA's proposal would force these manufacturers to request that EPA designate them as a "small-volume engine manufacturer" under §1045.635(b) with no guarantee that they would receive the regulatory relief intended for small businesses. For these reasons, NMMA commented that EPA should revise §1045.635 so that the default is the 500 employee threshold for small-business with the option to qualify as a small-volume manufacturer if the 5,000 unit level is not exceeded. NMMA recommended specific changes to the regulatory language of §1045.635 to address their concerns.

NMMA commented that these revisions will preserve the long-standing small business threshold for this industry, as established by the SBA, while still preserving EPA's concept of the small-volume manufacturer. If EPA would like to change the small business 500 employee threshold to a lower number, NMMA commented that the Agency needs to raise this issue with the SBA and Congress.

Indmar noted that they employ approximately 100 people and produce 10,000 marine engines per year. Indmar commented that they would like the definition of small business clarified for the purpose of SD/I engines. Section III.F.1 of the preamble discusses the Small Business Advocacy involvement with the rule making and includes their definition of a small business. Section III.F.2 goes on to define small volume engine manufacturer as 5,000 SD/I engines per year but also will consider any manufacturer that meets the SBA definition. There are three inboard marine engine manufacturers that are around the 5,000 unit volume definition (Indmar included). All of these manufacturers compete for the same boat builders and an unfair competitive financial advantage could be gained by a small volume manufacturer. Also a boat

builder might switch engine supplier causing a small volume manufacturer (by 5,000 definition) to no longer be small volume. Indmar commented that the 5,000 unit cutoff should be removed from the definition of small volume engine manufacturer and be replaced with the SBA definition of small business. The use of one common definition by SBA should result in less confusion down the road.

Ilmor commented that it is not in favor of using production volume of 5,000 SD/I engines per year as the cut-off criteria for determining which manufacturers are eligible for any small business provisions within this new rule. Ilmor noted that it favors the industry position that EPA should follow the Small Business Administration (SBA) guidelines for defining "small-volume engine manufacturers," which is based on number of employees. According to the SBA regulations, this would mean a cut-off based 500 employees for businesses under the engine manufacturing NAICS. The high-performance sector is the one sector of the marine industry that has been exempt from emissions compliance standards by both EPA and CARB. Every engine manufacturer within the high-performance sector is effectively a "small volume manufacturer."

Pleasurecraft Marine noted that they are a small business as defined by the Small Business Administration. Pleasurecraft commented that they recommend adoption of the universal size standards as used by the Small Business Administration under the North American Industry Classification System (NAICS) for EPA's small volume engine manufacturer definition. There are several classifications that could be used to define small businesses, all based on the number of employees, rather than units produced. From their perspective, the definition is of concern because their business has found itself falling above and below that production number that is in the rule. One year it could be applicable and not the following year again. They believe that down the line that can create a lot of confusion especially for their company.

Marine Power noted that they originally built engines for the Gulf coast shrimping and fishing industry as early as the 1960s. Today we employ about 35 people. There appears to be some ambiguity which has been discussed about the definition of a small business. Marine Power requested that EPA retain the customary definition of a small business being one less than 500 employees. They noted that they would possibly fall from one category to another in regard to the proposed 5,000 annual production limit. However, in their 32 years of history, they would always be a small business based on the SBA criteria.

Congresswoman Velazquez, Chairwoman of the Committee which oversees the Regulatory Flexibility Act (RFA), expressed concerns about the proposed rule issued by EPA regarding standards for marine spark ignition engines.) Specifically, she expressed concerns about the proposed burden reduction for small business sterndrive and inboard (SD/I) engine manufacturers. She noted the agency has chosen not to utilize the size standards established by the Small Business Administration (SBA) for small business marine engine and equipment manufacturers of 1,000 and 500 employees respectively as a basis for providing small businesses with regulatory relief. Instead, the agency is setting a threshold at a production level of 5,000 engines per year. Although EPA is proposing to allow businesses that exceed the production level but fall within the SBA size standards to request treatment as small businesses, the uncertainty of this case-by-case approach causes concern. She commented that the proposed unit

production threshold will not provide relief for the small businesses in this industry. The proposed rule requires a dramatic reengineering of SD/I engines and small businesses need relief so federal regulation will not place them at a competitive disadvantage to their larger counterparts.

Congresswoman Velazquez commented that it is important to consider that the disparity between large and small businesses in the SD/I market sector is significant. The leading large businesses in this sector have tens of thousands of employees. The smaller businesses in this sector have less than 100 employees; however, some of them may not be eligible for relief based on the proposed production level criteria. She noted that EPA has completed the Small Business Advocacy Review Panel process for this rulemaking and during that process the Agency invited small marine engine businesses to discuss the flexibilities they require so as not to be placed at a competitive disadvantage by the proposed rule. Based on these good faith discussions and the disparity between large and small companies in the SD/I market segment, she strongly urges the EPA to utilize SBA size standards as the basis of providing burden reduction for small businesses. She recommended that the final rule implement the 1,000 and 500 employee threshold as the basis for small business burden reduction rather than on a unit production level. She commented that if EPA continued to believe the threshold for providing small businesses with burden reduction should be based on an annual engine production level, EPA should advise the Committee of the necessity for this.

ECO commented that they agree that small businesses require additional lead time and flexibility to comply with the proposed rules. However, using the threshold 500 employees or 5,000 SD/I engines per year is overly inclusive, providing regulatory flexibility for entities that are not truly small businesses. This action, in turn, will cause harm to those companies that truly are small businesses. Instead of the current proposal, ECO and recommended that EPA consider adopting the definition proposed in 40 CFR 1048.801 for large spark-ignition engines, which identifies a small volume engine manufacturer as one with 200 or fewer employees, or less than 2,000 subject engines produced annually.

Tohatsu commented that it is quite a tough job for a small manufacturer like itself who has total employees of less than 500 people to redevelop and set calibration fuel, ignition timing, etc. and also comply with evaporation requirements. And naturally these changes will also require a new batch of deterioration testing at 350 hours for all models. Although Tohatsu understands that these requirements are necessary, they noted that it is a very time consuming, and expensive, process for a small company to meet. Tohatsu commented that the time frame should be extended as much as possible to give small manufacturers a realistic chance to comply with the new regulations. Unlike many of their competitors that have other divisions in cars and motorcycles, Tohatsu produces only outboards. Because of this, Tohatsu commented that it does not have the same resources to be able to comply with new regulations as quickly as other companies.

ECO commented that the proposed provisions for small volume engine manufacturers to rely on assigned deterioration factors for demonstrating useful life emissions compliance (ref 40 CFR 1045.240(c)) are critical to the small businesses which produce SD/I engines. ECO encouraged EPA to retain this provision in the final rule.

Letters:

Commenter	Document #
NMMA	0688
Indmar	0667
Ilmor	0658
Pleasurecraft Marine (hearing)	0642
Marine Power (hearing)	0642
Congresswoman Velazquez	0702
ECO	0712
Tohatsu (hearing)	0642

Our Response:

With regard to the comments on use of a small-volume threshold to provide SD/I engines manufacturers with regulatory flexibility, EPA had additional discussions with NMMA on this issue after the close of the comment period. ("November 19, 2007 Meeting with National Marine Manufacturers Association" EPA memo from Alan Stout to Docket EPA-HQ-OAR-2004-0008, November 20, 2007. See docket item EPA-HQ-OAR-2004-0008-0757.) NMMA continued to support using a business's number of employees rather than production volume as a basis for determining eligibility for regulatory relief. EPA notes that the SBA's size standards at 13 CFR part 121 define small businesses as those that have 1,000 employees or less (for NAICS code of 333618), not 500 employees or less as cited by NMMA in its comments. EPA's concern with using the NMMA's recommended employee cut-off level for marine engine manufacturers as the primary criteria for determining eligibility for the rule's hardship provisions is that manufacturers with such high numbers of employees generally should have ample resources to devote to complying with EPA's program, and it would therefore be unnecessary to provide regulatory relief for such manufacturers. In addition, manufacturers with around 1,000 employees would easily be able to produce significantly more than the 5,000 unit limit included in the proposed definition. Based on current employment levels for the biggest of the existing small business SD/I engine manufacturers, EPA believes it is possible to use an employee limit of 250 for the small-volume engine manufacturer definition and still include all small businesses as defined under SBA definition. EPA believes a 250 employee limit should be roughly consistent with the production level we targeted in our proposal, although some manufacturers would likely be able to produce more than 5,000 units. Therefore, EPA is adopting a small-volume engine manufacturer definition of 250 employees or less for the final rule. Under the small-volume engine manufacturer definition being adopted, there will be no option to consider the production volume instead of the 250 employee count.

All of the small business SD/I engine manufacturers identified by EPA have significantly fewer employees than the small business size standard established by SBA. As noted above, EPA believes that a business with close to 1,000 employees should have the resources available to comply with the new requirement without the need for the flexibilities proposed for small volume SD/I engine manufacturers. For this reason, we are adopting a 250 employee limit. EPA believes this limit will cover all of the existing small business SD/I engine manufacturers (as defined by SBA), but places a reasonable limit on how large a company could grow before they are no longer eligible for EPA's flexibilities for small volume engine manufacturers.

EPA has the authority and discretion to select the criteria for determining which "small" manufacturers are eligible for the flexibilities being offered under a regulatory program. EPA's selection of eligibility criteria for purposes of establishing regulatory thresholds is not governed by the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA). The RFA is a purely procedural statute. *United States Cellular v. Federal Communications Comm'n*, 254 F.3d 78 (D.C. Cir. 2001). Under the RFA, EPA is required to use SBA's size standards to define "small businesses" for purposes of complying with the RFA's requirements, unless it adopts an alternative definition. EPA used the SBA definitions for purposes of its compliance with the requirements of the RFA, including for the identification of Small Entity Representatives (SERs) for the Small Business Advocacy Review Panel convened pursuant to section 609(b) of the RFA and for analyzing the impacts of the proposed rule on small businesses in the Initial Regulatory Flexibility Analysis (IRFA) which was included in Chapter 10 of the Draft RIA.

EPA believes that its adoption of flexibilities for small-volume manufacturers does not amount to establishing a size standard for a "small business concern." The regulatory flexibilities simply identify options available to manufacturers to aid in the transition to new emission standards. Even if EPA's adoption of these regulatory flexibilities could be characterized as a size standard, EPA shared this approach during the SBREFA Panel process and provided SERs with the criteria we ultimately proposed. Additionally, EPA's proposal included flexibility eligibility criteria based on the annual production volume, but also included the option to request treatment as a small-volume engine manufacturer if they demonstrated they met the SBA size standards. Finally, SBA is part of the inter-agency review process and has reviewed and cleared the final rulemaking package.

For OB/PWC engines, EPA is also revising the definition of small volume engine manufacturer. EPA originally proposed a definition based on a production level of 5,000 units per year. The revised definition is the same as that being adopted for small volume SD/I engine manufacturers noted above and is based on number of employees rather than production. EPA believes a 250 employee limit should be roughly consistent with the 5,000 unit production level we targeted in our proposal. To qualify for the flexibilities for small volume OB/PWC engine manufacturers, a manufacturer would need to have no more than 250 employees.

With respect to Tohatsu's comments on additional time for small OB/PWC engine manufacturers to meet the exhaust standards, it can be noted that EPA is delaying implementation of the standards for all OB/PWC engine manufacturers. EPA is delaying the exhaust standards for OB/PWC engines from 2009 to 2010. Tohatsu had nine OB/PWC engine families certified with EPA in the 2007 model year. Of these nine families, four of them have Family Emission Levels (FELs) below the new HC+NOx standards. In addition, all of the engine families have CO levels below the new CO standards, although three of the families are close to the standard. Given that we will continue the ABT program for HC+NOx, given that we will allow averaging for CO emissions, and given the extra year of leadtime, we believe Tohatsu (and other small volume OB/PWC engine manufacturers) should have sufficient time to comply with the new exhaust emission standards by 2010. (See Section 4.10 of this document for further

discussion of Tohatsu's comment with regard to the evaporative emission standards for Marine SI engines and vessels.)

With regard to the comment on the use of assigned DFs for small volume engine manufacturers, EPA is retaining the provision for the final rule as proposed.