ATTACHMENT B

NOTE: This document is printed in a style to indicate changes from the existing provisions. The originally proposed amendments are shown in ~~single strikeout~~ to indicate deletions and single underline to indicate additions to existing regulatory language. The modifications to the ARB staff's original proposal are shown in ~~double strikeout~~ to indicate deletions and double underline to indicate additions. The feature "* * * * *" indicates existing language remains unchanged.

1. Amend section 2111, Title 13, California Code of Regulations, to read as follows:

§ 2111. Applicability.

(a) * * * * *

(2) California-certified motor vehicle engines used in such vehicles~~,~~ and

(3) California-certified 2000 and subsequent model-year off-road compression-ignition engines~~.~~, and

(4) California-certified 2009 and subsequent model-year spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines.

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NOTE: Authority cited: Sections 39600, 39601, 43013, 43018 and 43105, Health and Safety Code.
Reference: Sections 43000, 43009.5, 43013, 43018, 43101, 43104, 43105, 43106, 43107, and 43204-43205.5, Health and Safety Code.

2. Amend section 2112, Title 13, California Code of Regulations, to read as follows:

§ 2112. Definitions.

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(l) “Useful life” means, for the purposes of this article:

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(23) For 2009 and subsequent model year spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines, a period of ten years or 480 hours, whichever first occurs.

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3. Amend Appendix A to Article 2.1, Title 13, California Code of Regulations, to read as follows:

Appendix A
to Article 2.1

California In-Use Vehicle Emission-Related Recall Procedures, Enforcement Test Procedures, and Failure Reporting Procedures for 1982 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, Heavy-Duty Vehicles and Engines, Motorcycles, 1997 and Subsequent Model-Year Off-Road Motorcycles and All-Terrain Vehicles, ~~and~~ 2000 and Subsequent Model-Year Off-Road Compression-Ignition Engines, and 2009 and Subsequent Model-Year Spark-Ignition ~~Sterndrive and~~ Inboard and Sterndrive Marine Engines.

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I. Passenger Car, Light-Duty Truck, Medium-Duty Vehicle, ~~and~~ Motorcycle, and ~~Sterndrive and~~ Inboard and Sterndrive Parameters and Specifications.

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NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43104, and 43105, Health and Safety Code.
Reference: Sections 39002, 39003, 43000, 43009.5, 43013, 43018, 43100, 43101, 43101.5, 43102, 43104, 43105, 43106, 43107, and 43204-43205.5, Health and Safety Code.

4. Amend section 2139, Title 13, California Code of Regulations, to read as follows:

§ 2139. Testing.

* * * * *

(h) For spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines, in-use compliance tests shall be performed pursuant to section 2442, Title 13, California Code of Regulations. The in-use compliance testing shall use the same test procedure utilized for the specific engine's original certification testing.

* * * * *

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43104 and 43105, Health and Safety Code.
Reference: Sections 39002, 39003, 43000, 43009.5, 43013, 43018, 43100, 43101, 43101.5, 43102, 43103, 43104, 43105, 43106, 43107, 43204-43205.5 and 43211-43213 Health and Safety Code.

5. Amend section 2440, Title 13, California Code of Regulations, to read as follows:

§ 2440. Applicability.

(a) * * * * *

(3) Spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines produced by the engine manufacturer ~~specifically~~to be used solely for competition are exempt from the requirements of this article, except section 2443.1, provided that the marine watercraft in which the engine is installed is designed, built, and used solely for competition. Marine watercraft not registered with a nationally-recognized organization that sanctions professional competitive events or used for amateur or occasional competition do not meet the competition exemption criteria.

* * * * *

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

6. Amend section 2441, Title 13, California Code of Regulations, to read as follows:

§ 2441. Definitions.

(a) * * * * *

~~(5) "Calculated load value" (CLV) refers to an indication of the current airflow divided by peak airflow, where peak airflow is corrected for altitude, if available. This definition provides a unitless number that is not engine specific, and provides the service technician with an indication of the percent engine capacity that is being used (with wide open throttle as 100%). See equation below:~~

~~$$CLV = \frac{\text{Current airflow}}{\text{Peak airflow (at sea level)}} \times \frac{\text{Atmospheric pressure (at sea level)}}{\text{Barometric pressure}}$$~~

~~(4)~~(6)(5) "Capture rate" means the percentage of in-use engines subject to recall which must be corrected to bring the class of engines into compliance. The number of engines subject to recall shall be based on the actual number of engines in use as verified by engine registration records compiled and prepared by industry, or a comparable source as determined by the Executive Officer at the time a recall is initiated.

~~(5)~~(7)(6) "Carryover engine family" means an engine family that undergoes certification using carryover test data from previous model years.

~~(6)~~(8)(7) "Certification" means, with respect to new spark-ignition marine engines, obtaining an Executive Order for an engine family complying with the spark-ignition marine engine exhaust emission standards and requirements specified in Title 13, California Code of Regulations, sections 2442 and 2447.

~~(7)~~(9)(8) "Complete engine assembly" or "complete engine configuration" means an assembly of a basic engine and all of the specific applicable components (e.g., air inlet, fuel and exhaust systems, etc.) and calibrations (e.g., carburetor jet size, valve timing, etc.) required for the assembly to be installed in a new unit of equipment.

~~(10)~~(9) "Continuous monitoring" means sampling at a rate no less than two samples per second. If for engine control purposes, a computer input component is sampled less frequently, the value of the component may instead be evaluated each time sampling occurs.

~~(8)~~~~(11)~~(10) “Emission control system” means any device, system, or element of design that controls or reduces the emission of substances from an engine.

~~(9)~~~~(12)~~(11) “Enforcement test results” means data or information gathered through enforcement programs conducted by the Air Resources Board. These programs include, but are not limited to, field inspections, in-use compliance testing, assembly-line testing.

~~(10)~~~~(13)~~(12) “Engine family” means a subclass of a basic engine based on similar emission characteristics. The engine family is the grouping of engines that is used for the purposes of certification.

~~(11)~~~~(14)~~(13) “Engine identification number” means a unique specification (for example, model number/serial number combination) that allows each spark-ignition marine engine to be distinguished from other similar engines.

(14) “Engine manufacturer” means the manufacturer granted certification.

(15) “Engine misfire” means lack of combustion in the cylinder due to absence of spark, poor fuel metering, poor compression, or any other cause.

(16) “Engine start” is defined as the point at which normal, synchronized spark and fuel control is obtained or when the engine reaches a speed 150 revolutions per minute (rpm) below the normal, warmed-up idle speed.

~~(12)~~(17) “Exhaust emissions” means matter emitted into the environment from any opening downstream from the exhaust port of a spark-ignition marine engine.

~~(13)~~(18) “Executive Officer” means the Executive Officer of the Air Resources Board or his or her authorized representative.

~~(14)~~(19) “Executive Order” means an order issued by the Executive Officer certifying engines for sale in California.

~~(15)~~(20) “Family Emission Limit” means an emission value assigned by a marine engine manufacturer to an engine family for the purpose of complying with a corporate average exhaust emission standard. The Family Emission Limit (FEL) must not exceed the limit specified in this Article.

~~(16)~~(21) “Fuel system” means all components involved in the transport, metering, and mixture of the fuel from the fuel tank to the combustion chamber(s) including, but not limited to the following: fuel tank, fuel tank cap, fuel pump, fuel lines, oil injection metering system, carburetor or fuel injection components, and all fuel system vents.

(22) “Fuel trim” refers to feedback adjustments to the base fuel schedule. Short-term fuel trim refers to dynamic or instantaneous adjustments. Long-term fuel trim refers to much more gradual adjustments to the fuel calibration schedule than short-term trim adjustments. These long-term adjustments compensate for engine differences and gradual changes that occur over time.

(23) “Functional check” for an output component means verification of proper response to a computer command. For an input component, functional check means verification of the input signal being in the range of normal operation, including evaluation of the signal's rationality in comparison to all available information.

~~(17)~~(24) “Inboard Engine” means a ~~four-stroke~~ four-stroke spark-ignition marine engine not used in a personal watercraft that is designed such that the propeller shaft penetrates the hull of the marine watercraft while the engine and the remainder of the drive unit is internal to the hull of the marine watercraft.

~~(18)~~(25) “Inspection criteria” means the pass and fail numbers associated with a particular sampling plan.

(26) “Malfunction” means the inability of an emission-related component or system to remain within design specifications. Further, malfunction refers to the deterioration of any of the above components or systems to a degree that would likely cause the emissions of an aged engine with the deteriorated components or systems present at the beginning of the applicable certification emission test to exceed the $HC+NO_x$ emission standard by more than 50 percent, unless otherwise specified, as applicable pursuant to Subchapter 1 (commencing with Section 1900), Chapter 3 of Title 13.

~~(19)~~(27) “Marine engine manufacturer” means any person engaged in the manufacturing or assembling of new spark-ignition marine engines or the importing of such engines for resale, or who acts for and is under the control of any such person in connection with the distribution of such engines. A spark-ignition marine engine manufacturer does not include any dealer with respect to new spark-ignition marine engines received by such person in commerce.

(28) “Marine warm-up cycle” means sufficient engine operation such that the coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of at least 140 degrees Fahrenheit.

~~(20)~~~~(28)~~(29) “Marine watercraft” means every description of boat, ship or other artificial contrivance used, or capable of being operated on water.

~~(21)~~~~(29)~~(30) “Model year” means the engine manufacturer’s annual new model production period which includes January 1 of the calendar year for which the model year is named, ends no later than December 31 of the calendar year, and does not begin earlier than January 2 of the previous calendar year. Where an engine manufacturer has no annual new model production period, model year means the calendar year.

~~(22)~~~~(30)~~(31) “New”, for purposes of this Article, means a spark-ignition marine engine or watercraft the equitable or legal title to which has never been transferred to an ultimate purchaser. Where the equitable or legal title to the engine or watercraft is not transferred to an ultimate purchaser until after the engine or watercraft is placed into service, then the engine or watercraft will no longer be new after it is placed into service. A spark-ignition marine engine or watercraft is placed into service when it is used for its functional purposes. With respect to imported spark-ignition marine engines or watercraft, the term ~~A~~“new” means an engine or watercraft that is not covered by an Executive Order issued under this Article at the time of importation, and that is manufactured after the effective date of a section in this Article which is applicable to such engine or watercraft, or which would be applicable to such engine or watercraft had it been manufactured for importation into the United States.

~~(23)~~~~(31)~~(32) “Nonconformity” or “Noncompliance”, for purposes of Title 13, California Code of Regulations, section 2444.1, means that:

> (A) a significant number, determined by the Executive Officer, of a class of engines, although properly maintained and used, experience a failure of the same emission-related component(s) within their useful lives which, if uncorrected, results in the engines’ failure to comply with the emission standards prescribed under section 2442 which are applicable to the model year of such engines; or
>
> (B) a class of engines that at any time within their useful lives, although properly maintained and used, on average does not comply with the emission standards prescribed under section 2442 which are applicable to the model year of such engines.

~~(32)~~(33) “Operating cycle” consists of engine startup, engine run, and engine shutoff.

~~(24)~~~~(33)~~(34) “Original equipment manufacturer” means a manufacturer who purchases engines for installation in its equipment for sale to ultimate purchasers.

~~(25)~~~~(34)~~(35) “Outboard engine” means a spark-ignition marine engine that, when properly mounted on a marine watercraft in the position to operate, houses the engine and drive unit external to the hull of the marine watercraft.

~~(26)~~~~(35)~~(36) “Personal watercraft engine” means a spark-ignition marine engine that does not meet the definition of outboard engine, inboard engine or sterndrive engine, except that the Executive Officer may, in his or her discretion, ~~may~~ classify a personal watercraft engine as an inboard or sterndrive engine if it is comparable in technology and emissions to an inboard or sterndrive engine.

~~(27)~~~~(36)~~(37) “Production-line tests” are emission tests performed on a sample of production engines produced for sale in California and conducted in accordance with Title 13, California Code of Regulations, section 2446(a).

~~(37)~~(38) “Redline engine speed” means the engine manufacturer recommended maximum engine speed as normally displayed on instrument panel tachometers, or the engine speed at which fuel shutoff occurs.

~~(38)~~(39) “Response rate,” with regards to oxygen sensors, refers to the delay (measured in milliseconds) between a switch of the sensor from lean to rich or vice versa in response to a change in fuel/air ratio above and below stoichiometric.

~~(28)~~~~(39)~~(40) “Sales” or “Eligible sales” means the actual or calculated sales of an engine family in California for the purposes of corporate averaging and production-line testing. Upon Executive Officer approval, an engine manufacturer may calculate its eligible sales through market analysis of actual federal production or sales volumes.

~~(29)~~~~(40)~~(41) “Scheduled maintenance” means any adjustment, repair, removal, disassembly, cleaning, or replacement of components or systems required by the engine manufacturer to be performed on a periodic basis to prevent part failure or marine watercraft or engine malfunction, or those actions anticipated as necessary to correct an overt indication of malfunction or failure for which periodic maintenance is not appropriate.

~~(41) "Small volume manufacturer" means a marine engine manufacturer with spark-ignition marine engine sales less than 2,000 per year in the United States. It is the responsibility of the manufacturer to document the sales rate to the Executive Officer.~~

~~(30)~~(42) "Spark-ignition marine engine" means any engine used to propel a marine watercraft, and which utilizes the spark-ignition combustion cycle; including, but not limited to personal watercraft, outboard, inboard and sterndrive engines.

~~(31)~~(43) "Sterndrive engine" means a ~~four-stroke~~ four-stroke spark-ignition marine engine not used in a personal watercraft that is designed such that the drive unit is external to the hull of the marine watercraft, while the engine is internal to the hull of the marine watercraft.

~~(32)~~(44) "Test engine" means the engine or group of engines that an engine manufacturer uses during certification, production-line and in-use testing to determine compliance with emission standards.

(45) "Test Procedures" means the document entitled "California Exhaust Emission Standards and Test Procedures for 2001 Model Year and Later Spark-Ignition Marine Engines," which includes the standards and test procedures applicable to 2001 and later spark-ignition personal watercraft, outboard, inboard and sterndrive marine engines, as adopted October 21, 1999 and as amended (**insert date of amendment**). This document is incorporated by reference herein.

~~(33)~~(46) "Ultimate purchaser" means, with respect to any new spark-ignition marine engine, the first person who in good faith purchases such new spark-ignition marine engine for purposes other than resale.

~~(34)~~(47) "U.S.C." means United States Code.

(48) "Used solely for competition" means exhibiting features that are not easily removed and that would render its use other than in competition unsafe, impractical, or highly unlikely.

~~(35)~~(49) "Useful life" for spark-ignition marine engines means nine years for personal watercraft engines and sixteen years for ~~an~~ outboard, ~~engine sterndrive, and~~ inboard and sterndrive engines.

~~(50) "Warm-up cycle" means sufficient engine operation such that the coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of at least 160 degrees Fahrenheit.~~

~~(36)~~~~(51)~~(50) “Warranty period” means the period of time the engine or part is covered by the warranty provisions.

~~(37)~~~~(52)~~(51) “Warranty station” means any dealer, service center or other agent that is authorized by the engine manufacturer to perform diagnostic labor, repairs or replacements of warranted engine components.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

7. Amend section 2442, Title 13, California Code of Regulations, to read as follows:

§ 2442. Emission Standards.

* * * * *

(b) Exhaust emissions from new model year 2003 and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines must not exceed the exhaust emission standards listed in Table 2 ~~or Table 3, as applicable,~~ for the designated emission durability test period.

Table 2.

Inboard and Sterndrive Exhaust Emission Standards (by Implementation Date)		
Model Year	**$HC+NO_x$** (grams per kilowatt-hour)	**Durability Test Period** (hours)
2003-2008[1]	~~15.0~~16.0[2]	—
2007 and Later[3,~~4~~]	5.0	480

1. Engines with a maximum rated power exceeding 373 kilowatts (500 horsepower) are not required to comply with these standards.
2. Compliance ~~to~~with the $HC+NO_x$ standard may be averaged on a sales-weighted basis, across the engine manufacturers' California production, based on projected California sales or the projected California percentage of national sales.
3. For model year 2007, engine manufacturers shall certify a minimum of ~~10~~45% of their California production (projected California sales or projected California percentage of national sales) to the ~~2009 model year emission~~ standard, ~~s and other requirements.4.~~ For model year 2008, engine manufacturers shall certify a minimum of ~~50~~75% of their California production (projected California sales or projected California percentage of national sales) to the ~~2009 model year emission~~ standard, ~~s and other requirements.~~

~~Table 3.~~

~~Small Volume Manufacturers Inboard and Sterndrive Exhaust Emission Standards~~		
~~Model Year~~	**~~$HC+NO_x$~~** ~~(grams per kilowatt-hour)~~	**~~Durability Test Period~~** ~~(hours)~~
~~2009 and Later~~	~~5.0~~	~~480~~

(1) No crankcase emissions shall be discharged into the ambient atmosphere from 2003 and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines.

* * * * *

(3) For each engine family, the engine manufacturer shall submit the total number of engines produced for sale in California, ~~sales data~~ or the total number of engines produced for sale nationally, ninety (90) days after the end of the model year.

* * * * *

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

8. Amend section 2443.1, Title 13, California Code of Regulations, to read as follows:

§ 2443.1. Emission Control Labels – Model Year 2001 and Later Spark-Ignition Marine Engines.

* * * * *

(b) Applicability. This section applies to:

(1) Model year 2001 and later spark-ignition personal watercraft and outboard marine engines and model year 2003 and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines, which have been certified to the applicable emission standards pursuant to Health and Safety Code section 43013;

* * * * *

(c) Engine Label and Location.

(1) A legible label must be welded, riveted or otherwise permanently attached by the engine manufacturer to an area of the engine (e.g., block or crankcase) in such a way that it will be readily visible to the average person after installation of the engine in the watercraft. If such an attachment is not feasible, the Executive ~~o~~Officer may allow the label to be attached on components of the engine or watercraft assembly (as applicable) that satisfy the requirements of Subsection (c)(2)(A) or (c)(2)(B) below, as applicable. Such labels must be attached on all complete engine assemblies that are produced by an engine manufacturer.

(2) (A) Personal Watercraft and Outboard Engines. In selecting an acceptable location, the engine manufacturer must consider the possibility of accidental damage (e.g., possibility of tools or sharp instruments coming in contact with the label). Each engine label must be affixed in such a manner that it cannot be removed without destroying or defacing the label, and must not be affixed to any engine (or watercraft, as applicable) part that is likely to be replaced during the engine's (or watercraft's, as applicable) useful life or that is not integral to the engine's operation. The engine label must not be affixed to any engine (or watercraft as applicable) component that is easily detached from the engine. If the engine manufacturer claims there is inadequate space to attach the label, the Executive Officer will determine a suitable location.

(B) Inboard and Sterndrive Engines. In selecting an acceptable location, the engine manufacturer must consider visibility and the possibility of accidental damage (e.g., possibility of tools or sharp instruments coming in contact with the label). The engine label must be affixed in such a manner that it cannot be removed without destroying or defacing the label. The engine label must contain the unique identification number that has been assigned to the engine, pursuant to subsection (a) of this section. If the engine manufacturer claims there is inadequate space to attach the label, the Executive Officer will determine a suitable location.

* * * * *

(d) For ~~Sterndrive and~~ Inboard and Sterndrive Engines used solely for Competition.

* * * * *

(1) A legible label must be welded, riveted or otherwise permanently attached by the engine manufacturer to an area of the engine ~~(e.g., block or crankcase)~~ in such a way that it will be readily visible to the average person after installation of the engine in the watercraft. If such an attachment is not feasible, the Executive Officer may allow the label to be attached on components of the engine ~~or watercraft assembly (as applicable)~~ that satisfy the requirements of Subsection (d)(2). Such labels must be attached on all complete engine assemblies that are produced by an engine manufacturer.

(2) In selecting an acceptable location, the engine manufacturer must consider visibility and the possibility of accidental damage (e.g., possibility of tools or sharp instruments coming in contact with the label). ~~Each~~The engine label must be affixed in such a manner that it cannot be removed without destroying or defacing the label~~, and must not be affixed to any engine (or watercraft, as applicable) part that is likely to be replaced during the engine's (or watercraft's, as applicable) useful life or that is not integral to the engine's operation~~. The engine label must ~~not be affixed to any engine (or watercraft as applicable) component that is easily detached from the engine~~contain the unique identification number that has been assigned to the engine, pursuant to subsection (a) of this section. If the engine manufacturer claims there is inadequate space to attach the label, the Executive Officer will determine a suitable location.

* * * * *

(~~f~~g) Supplemental Engine Label Content and Location for Personal Watercraft and Outboard Engines only.

* * * * *

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

9. Amend section 2443.2, Title 13, California Code of Regulations, to read as follows:

§ 2443.2. Consumer/Environmental Label Requirements.

(a) * * * * *

(b) Applicability. This section applies to:

(1) Model year 2001 and later spark-ignition personal watercraft and outboard marine engines and model year 2003 and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines, which have been certified to the applicable emission standards pursuant to Health and Safety Code section 43013;

* * * * *

(c) * * * * *

(2) Label location. For outboard engines, a single label must be permanently affixed to the back of the engine cover or cowling. For personal watercraft, ~~sterndrives and inboards,~~ a single label must be affixed two or three inches to the right of the required location of the California Assigned Vessel Number displayed on the port side of the hull. For inboard and sterndrive engines, labels must be affixed to the engine and to the port side of the hull, either to the right or left and in close proximity to the required location of the California Assigned Vessel Number. Each label must be manufactured and permanently affixed so that it cannot be removed without destroying or defacing the label, must be readily visible and must not be affixed to any location that is likely to be replaced during the engine's useful life. For the purposes of this paragraph, readily visible means that the label's shape and number of stars are discernable from a distance of 100 feet.

* * * * *

(4) For Personal Watercraft and Outboard Marine Engines:

* * * * *

(5) For Inboard and Sterndrive Marine Engines:

(A) Labels on Engines. Labels must be affixed to new engines by the engine manufacturer. The engine manufacturer is responsible for ensuring that appropriate environmental labels are properly applied to its engines. Improper labeling or distributing of labels will

subject the engine manufacturer to penalties as described in paragraph (h) of this section.

(B) Labels on Watercraft. Labels must be affixed to the port side of watercraft by the watercraft/original equipment manufacturer. The watercraft/original equipment manufacturer is responsible for ensuring that appropriate labels are properly applied to its watercraft. Improper labeling or distributing of hull environmental labels will subject the watercraft/original equipment manufacturer to penalties as described in paragraph (h).

Engine manufacturers are responsible for providing labels that correspond with the engine for all engines supplied to watercraft/original equipment manufacturers. Engine manufacturers also are responsible for providing to the watercraft/original equipment manufacturers instructions regarding label selection and placement. Failure to provide appropriate labels and instructions to the watercraft/original equipment manufacturer will subject the engine manufacturer to penalties as described in paragraph (h) of this section.

* * * * *

(h) If the Executive Officer finds any engine manufacturer using labels for which it has responsibility for attaching that are different from those approved or that do not substantially comply with the discernibility or durability requirements set forth in these specifications, the engine manufacturer will be subject to being enjoined from any further sales or distribution~~,~~ of applicable equipment product line that uses noncompliant labels in the State of California pursuant to section 43017 of the Health and Safety Code. If the Executive Officer finds any engines or watercraft with labels that are not affixed in accordance with paragraph (c)(1)(B), the engine manufacturer or watercraft/original equipment manufacturer that was responsible for label placement must remove the labels from all affected watercraft and engines and will be subject to being enjoined from any further sales or distribution, of applicable equipment product line that uses noncompliant labels in the State of California pursuant to section 43017 of the Health and Safety Code. Additional penalties may be assessed to the extent permissible under Part 5, Division 26 of the Health and Safety Code. Before seeking remedial action against the engine or equipment manufacturer, the Executive Officer will consider any information provided by the engine or equipment manufacturer.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

10. Amend section 2443.3, Title 13, California Code of Regulations, to read as follows:

§ 2443.3. Environmental Label/Consumer Notification Requirements.

(a) Applicability. This section applies to model year 2001 and later spark-ignition personal watercraft and outboard marine engines and model year 2003 and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines, which have been certified to the applicable emission standard pursuant to Health and Safety Code section 43013.

(b) A nonpermanent label (i.e., hang tag) must be attached to each personal watercraft or outboard engine ~~or watercraft~~, as applicable, at time of sale. A nonpermanent label (i.e., hang tag) produced and supplied by the engine manufacturer must be attached, by the seller, to each inboard and sterndrive engine or watercraft, as applicable, when introduced for sale to ultimate purchasers. ~~that~~ Environmental labels pursuant to this section shall include~~s~~ a copy of the following:

* * * * *

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

11. Amend section 2444, Title 13, California Code of Regulations, to read as follows:

§ 2444.1. In-Use Compliance Testing and Recall Regulations – Model Year 2001 and Later Spark-Ignition Marine Engines.

(a) Applicability. This section applies to model year 2001 and later spark-ignition personal watercraft and outboard marine engines, which have been certified to the applicable emission standards pursuant to Health and Safety Code section 43013. Spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines shall comply with the in-use compliance testing and recall requirements found in ~~t~~Title 13, California Code of Regulations, ~~s~~Sections 2111~~, et seq~~ through 2140 and 2147.

* * * * *

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

12. Adopt section 2444.2, Title 13, California Code of Regulation, to read as follows:

§ 2444.2. On-Board Engine Malfunction Detection System Requirements – Model Year 2007 and Later Spark-Ignition ~~Sterndrive and~~ Inboard and Sterndrive Marine Engines.

~~Beginning with~~All 2007 and 2008 model year spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines certified to the 5.0 grams per kilowatt-hour HC+NO_x standard~~,~~ shall comply with the requirements for subsections (a) through ~~(k)~~(h) below, except as noted ~~shall be implemented as follows~~. For all 2009 model year and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines, the requirements in **bold type** ~~will~~shall also apply.

~~Diagnostic systems shall, at a minimum, comply with the requirements of Title 13, section1968, "Malfunction and Diagnostic System for 1988 and Subsequent Model Year Passenger Cars, Light Duty Trucks, and Medium-Duty Vehicles with Three-Way Catalyst Systems and Feedback Control," California Code of Regulations, except as otherwise stipulated below.~~

This section shall be implemented according to the provisions of the following subsections or by means determined by the Executive Officer to be equivalent in meeting the requirements of this section.

(a) General requirements.

(1) Spark-ignition sterndrive and inboard marine engines sold as new shall be equipped with an integrated malfunction detection and notification system, hereinafter known as ~~o~~On-board ~~d~~Diagnostics-~~m~~Marine (OBD-M) system, to identify emission-related malfunctions of the catalyst, fuel system, primary oxygen sensors used for feedback fuel control, secondary oxygen sensors (if equipped) used for catalyst monitoring, computer-sensed comprehensive components, and the on-board computer itself, by means of diagnostic trouble codes stored in non-volatile computer memory. For this section, a computer-sensed comprehensive component is any electronic device that:

(A) provides information to the on-board computer and significantly impacts emissions when malfunctioning; or

(B) is used to enable or disable any other OBD-M monitoring strategy.

~~Emission-related malfunctions are not limited to emission control components and systems only, but to any other electronic component or system that can affect emissions including the on-board computer itself.~~

(2) The OBD-M system shall not be required to identify engine misfire unless such monitoring is determined necessary by the Executive Officer to preserve or protect the catalyst system. The Executive Officer shall (as part of the in-water testing and development program to be conducted in conjunction with U.S. EPA, the U.S. Coast Guard, the marine industry, and catalyst manufacturers) identify whether, and to what extent, misfire in spark-ignition inboard and sterndrive marine engines may affect catalyst durability and performance. If the Executive Officer determines that engine misfire is a significant factor in reducing the durability and/or performance of marine catalysts, engine manufacturers shall be required to incorporate appropriate misfire detection diagnostics into the OBD-M system. In that case, the provisions in subsection (b)(5) shall be considered sufficient for satisfying the obligation to monitor misfire. Alternate misfire monitoring strategies shall be considered by the Executive Officer and may be implemented in lieu of subsection (b)(5) if demonstrated by the engine manufacturer to provide an equivalent degree of catalyst protection. Otherwise the provisions of that subsection shall be voluntary. In making a determination, the Executive Officer shall consider the cost effectiveness of requiring additional monitoring to address the concerns identified by the test program in addition to the leadtime necessary to modify existing hardware and software, to add misfire detection hardware (e.g., sensors) if necessary, and to develop engine-specific calibrations to accommodate misfire monitoring. Notwithstanding, misfire monitoring shall not be required prior to the 2009 model year, and may be delayed beyond that date pending Executive Officer discretion.

(3) The OBD-M system shall not be required to detect any emissions-related malfunction that prevents the engine from starting. The OBD-M system shall not be required to monitor any emissions-related component or system if the only reliable way to accomplish such monitoring would either significantly impair engine/vessel operability or decrease the safety involved with operating the engine/vessel.

(4)~~Additionally,~~ OBD-M systems shall have the capability to activate an audio or visual alert device located on the marine vessel to inform vessel occupants in the event of ~~emission-related~~a malfunction~~s~~, and to transmit diagnostic information locally via a standardized data link connector.

~~(2)~~(5) Spark-ignition sterndrive and inboard marine vessels shall be equipped with an audio alert device and/or visual alert device that is compatible with the activation function of the OBD-M system on the installed engine.

(A) If equipped, the audio alert device shall provide sufficient volume and intensity to be readily perceptible to vessel occupants during ~~virtually any~~normal modes of vessel operation and occupant activity, but shall not exceed applicable maximum noise levels as set by authorized federal or State agencies. Further, the audio alert device shall in no way impede the function of required sound-signaling devices, or other safety-related devices, already present on the vessel. The audio alert device shall sound briefly ~~at reduced volume~~ in the engine-run key position ~~during~~before engine cranking to indicate that the audio alert device is functional~~ and shall, when activated, emit a periodic series of five full-volume bursts separated by no more than a two-second interval between bursts and fifteen minutes between series.~~ **~~Notwithstanding, the audio alert device shall emit a pulsating full-volume burst at one-second intervals during the detection of severe misfire that can cause damage to the catalytic converter.~~**

(B) If equipped, the visual alert device shall provide sufficient activation and be located such that it is readily visible under ~~all~~normal lighting conditions, but shall in no way impede the function of any visual distress-signaling device, fog signal, or navigational light. The visual alert device shall activate in the engine-run key position before engine cranking to indicate that the visual alert device is functional and shall, when activated, display the phrase "Service Required~~.~~" or an equivalent standardized phrase or symbol to be determined as specified in Subsection (g). ~~Alternatively, the International Standards Organization (ISO) engine symbol may be substituted for the phrase.~~ **~~Notwithstanding, the visual alert device shall blink at one-second intervals during the detection of severe misfire that can cause damage to the catalytic converter.~~**

~~(3)~~(6) Malfunction thresholds for catalyst, ~~**misfire,**~~ fuel system, oxygen sensor, and ~~oxygen sensor heater~~computer-sensed comprehensive component diagnostics shall be determined by the engine manufacturer~~, such that emissions do not exceed applicable emission certification standards, based on the Spark-Ignition Marine Engine test cycle, by more than 50 percent before the malfunction thresholds have been reached. Malfunction thresholds for other monitored components and systems shall not be limited to a percent increase above the standards, but shall be determined by the engine manufacturer to indicate when components or systems are no longer operating within design tolerances.~~ However, the engine manufacturer must demonstrate that the determination of these thresholds is sufficient for detecting emission-related malfunctions in a timely and meaningful manner subject to Executive Officer approval (see Subsection (e)(2)).

~~(4)~~(7) Regarding diagnostic system monitoring and audio/visual alert device activation requirements, engine manufacturers are required to define monitoring conditions that are representative of typical in-use operation, and which will result in the routine execution and completion of all ~~IMDN~~OBD-M diagnostics in-use~~. With the exception of **misfire,** fuel system, and comprehensive component monitoring, these conditions shall occur within a steady-state window of operation defined by throttle position, delta throttle, engine load, and temperature. Within this window, monitors are required to execute, at least once per operating cycle, regardless of other operating conditions. A monitor must be enabled continuously while operating within the window; however, operation over the entire window shall not be permitted as a condition for monitoring completion. Further, all steady-state monitoring conditions must be designed such that they will be encountered below eighty-five percent of full throttle. Subject to Executive Officer approval, engine manufacturers may request the inclusion of other monitoring conditions to define the window of operation in the event a suitable environment to reliably diagnose a particular monitoring strategy has not been provided. In approval of the request, the Executive Officer shall consider the extent to which the use of additional conditions provide for more effective and frequent in-use monitoring during normal operation. **Misfire,** fuel system, and comprehensive component monitors shall not be limited to steady-state windows of operation, but shall function continuously throughout the operating cycle. Upon detection of a malfunction, except as noted in paragraphs (a)(2)(A) and (a)(2)(B) above, the audio/visual alert device is to be activated and a diagnostic trouble code stored no later than the end of the next operating cycle during which monitoring occurs provided the malfunction is again detected.~~

~~(5)~~(8) For model years 2007-2008, activation of the audio/visual alert device upon detection of a catalyst, fuel system, or oxygen sensor ~~or heater~~ malfunction shall be optional. ~~The audio/visual alert device activation for these model years shall be mandatory for other monitoring requirements. The audio/visual alert device shall be activated during these model years for lack of function for electronic components/systems otherwise approved for audio/visual alert device suppression. Furthermore~~ However, there are no exemptions from storing diagnostic trouble codes in non-volatile computer memory during these model years for any malfunction. The OBD-M must be capable of fully communicating stored information to a generic scan tool via the standardized data link connector.

~~(6)~~(9) Engine manufacturers may employ alternate statistical audio/visual alert device activation and diagnostic trouble code storage protocols to those specified in these requirements, subject to Executive Officer

approval, based on comparable timeliness in detecting a malfunction and evaluating system performance. ~~For strategies requiring, on average, between three and six operating cycles for audio/visual alert device activation, the engine manufacturer shall provide data and/or an engineering evaluation which adequately demonstrate that the monitoring system is equally effective and timely in detecting deterioration. Strategies requiring on average more than six operating cycles for audio/visual alert device activation shall not be accepted.~~

~~(7)~~(10) Should emission control devices/strategies be introduced on the engine in addition to those identified herein as requiring monitoring (e.g., exhaust gas recirculation), the engine manufacturers shall ~~submit a plan for~~notify the Executive Officer ~~approval of the~~and submit a plan for monitoring the new device/strategy ~~and malfunction thresholds~~ prior to its incorporation into the OBD-M system. ~~Executive Officer approval shall be based on the effectiveness of the monitoring strategy, the malfunction criteria utilized, and the frequency at which the monitoring conditions required by the diagnostic occur while in use.~~

~~(8)~~(11) Engine manufacturers may request Executive Officer approval to disable any diagnostic strategy at ambient engine starting temperatures below ~~twenty~~forty (40) degrees Fahrenheit (low ambient temperature conditions may be determined based on intake air or engine coolant temperature at engine starting), and at elevations above ~~eight~~six thousand five hundred (6,500) feet above sea level provided the engine manufacturer submits data and/or an engineering evaluation which adequately demonstrate that monitoring would be unreliable when such conditions exist. Notwithstanding, diagnostic system disablement may be requested at other ambient engine starting temperatures if the engine manufacturer adequately demonstrates with data and/or an engineering evaluation that misdiagnosis would occur due to the impact of such ambient temperatures on the performance of the component itself ~~(e.g., component freezing)~~.

~~(9)~~(12) Engine manufacturers may disable ~~monitoring systems~~individual monitors that can be affected by running out of fuel ~~(e.g., misfire detection) when the fuel level is low~~, provided disablement will not occur when the fuel level is above fifteen percent of the nominal capacity of the fuel tank.

~~(10) Engine manufacturers shall not be required to individually monitor the positive crankcase ventilation system or the engine thermostat unless these devices are specifically used to enable the execution of other IMDN diagnostics.~~

(13) The Executive Officer may grant an extension for compliance with the requirements of this section, with respect to an engine model or engine family, if the engine manufacturer demonstrates that a present electronic control system cannot be modified in time for the 2007 model year because major design changes, not consistent with the engine manufacturer's projected changeover schedule, would be needed to comply with the provisions of the regulation. The period of extension shall not exceed that period of time necessary to enable modification of the electronic control system in accordance with the engine manufacturer's projected changeover schedule, or a period of two years, whichever first occurs. Engine manufacturers requesting an extension shall, no later than six months prior to the applicable model year, submit to the Executive Officer a written request for exemption, setting forth the required demonstration and specifying the period for which the extension is requested.

(b) Monitoring requirements.

(1) Catalyst monitoring.

(A) Purpose and scope:

(i) The diagnostic system shall monitor the catalyst system on spark-ignited marine engines ~~for proper combined conversion efficiency of hydrocarbons and oxides of nitrogen ($HC+NO_x$)~~to ensure that the performance of the catalyst has not been compromised due to engine misfire or other factors that can decrease catalyst durability.

* * * * *

(B) Malfunctioning criteria:

(i) The catalyst system shall be considered malfunctioning when ~~its conversion efficiency decreases to the point that $HC+NO_x$ tailpipe emissions exceed the applicable $HC+NO_x$ certification standard by more than 50 percent, adjusted upward by the $HC+NO_x$ emissions from a representative 20 hour catalyst system (i.e., $[HC+NO_x]_{tailpipe} > 150\% \times [HC+NO_x]_{standard} + [HC+NO_x]_{20hour}$). All emissions measurements and standards are in reference to the spark-ignition marine engine test cycle~~the temperature of the measured catalyst(s) exceeds a threshold value, as determined by the engine manufacturer, indicating abnormally high operating temperature; or when the catalyst temperature fails to reach a minimum value, as determined by the engine manufacturer, indicating "light-off" of the catalyst after a manufacturer-specified time interval has elapsed.

~~(ii) Through the 2008 model year, as an option to setting malfunction thresholds by relating tailpipe emissions to a percent increase over applicable standards, engine manufacturers may specify relative malfunction thresholds based on a percent reduction of post-catalyst $HC+NO_x$ concentration compared to pre-catalyst $HC+NO_x$ concentration. In accordance with this provision, manufacturers may monitor the front catalyst independently of, or in combination with, the next catalyst downstream. Each monitored catalyst or catalyst combination shall be considered malfunctioning when total $HC+NO_x$ conversion efficiency falls below 60 percent while in normal closed-loop operation. As a guideline, the catalyst(s) should not be considered malfunctioning when its efficiency is greater than 80 percent. The efficiency determination shall be based on a steady-state test, wherein a malfunction is noted when the total $HC+NO_x$ emission concentration measured at the outlet of the monitored catalyst(s) is more than 20 to 40 percent of the cumulative total engine-out emissions measured at the inlet of the catalyst(s).~~

(ii) Subject to executive officer approval, alternate malfunction criteria (e.g., correlating oxygen sensor frequencies to catalyst conversion efficiency) may be employed by the engine manufacturer if the alternate criteria are appropriate and would provide for enhanced monitoring capability.

~~(iii) For artificially heated catalyst systems (electric, heat exchanger, etc.), the heating mechanism shall be considered malfunctioning when the catalyst does not reach its designated heating temperature within a requisite time period after engine starting. The time period is to be determined by the manufacturer subject to the conditions that it is representative of typical in-use operation and that it is sufficient to detect a heating system malfunction causing emissions to exceed the applicable $HC+NO_x$ certification standard by more than 50 percent.~~

(C) Monitoring conditions:

(i) The engine manufacturer shall ~~choose a steady-state window of operation defined by throttle position, delta throttle, engine load, and temperature~~define conditions for monitoring the catalyst with the constraints that the check shall:

~~a. occur within a ± 15 percent throttle position window between 25 percent and 85 percent of full throttle, or at idle~~

~~should a catalyst warm-up temperature profile strategy be employed,~~

a. be conducted at the earliest acceptable opportunity encountered after the beginning of each operating cycle; and

~~b. be tolerant of throttle position fluctuations or changes less than 1 percent per second over any two second interval within the throttle position window,~~

~~c. take no more than a 40 second interval to determine both that the engine is operating in a proper window to perform the check and to actually perform the check, and~~

~~d. be conducted at the earliest acceptable opportunity encountered after the beginning of each operating cycle.~~

~~Performance of the check may be delayed after engine startup until stabilized coolant temperature is achieved and/or a suitable cumulative time interval of non-closed throttle engine operation has elapsed to ensure the catalyst is warmed up for properly performing the monitoring check. The specified cumulative time interval shall begin from the first non-closed throttle operation either after achieving a stabilized coolant temperature or after engine starting and shall not exceed 180 seconds. These monitoring constraints and conditions may be altered, subject to Executive Officer approval. Such approval shall be granted if the engine manufacturer submits data and an engineering evaluation that, together, justify the need for the exception and demonstrate that the requested alteration would yield improved catalyst monitoring.~~

~~(ii)~~ b. ~~T~~the monitoring system shall operate at least once per in-use operating cycle during which the engine manufacturer-defined monitoring conditions are met.

* * * * *

~~(2) Misfire monitoring.~~

~~(A) Purpose and scope: The diagnostic system shall monitor for engine misfire. The diagnostic system does not have to identify the misfiring cylinder(s), however misfire must be identified regardless of whether it occurs in a single or multiple number of cylinders.~~

~~(B) Malfunctioning criteria: The diagnostic system shall identify a malfunction when the total number of misfires exceeds a percentage of the total number of firing events necessary for satisfying the conditions listed below. These threshold percentages shall be determined by the engine manufacturer and provided in the certification documentation.~~

~~(i) The percent misfire evaluated in 200 crankshaft-revolution increments for each engine speed and load condition that would result in catalyst damage. Subject to Executive Officer approval, a longer interval may be employed (but only for determining, on a given operating cycle, the first misfire exceedance in paragraph (b)(2)(D)(i)(a) below) provided the engine manufacturer submits data and/or an engineering evaluation which adequately demonstrate that catalyst damage would not occur due to unacceptably high catalyst temperatures before the interval has elapsed. The engine manufacturer shall submit in the certification documentation catalyst temperature data versus percent misfire over the full range of engine speed and load conditions. The data shall be obtained from a representative cross section of an engine manufacturer's engine offerings from small to large displacements. Up to three such engine evaluations shall be documented per engine manufacturer, though an engine manufacturer may submit more data if desired. An engineering evaluation shall be provided for establishing malfunction criteria for the remainder of engine families in the engine manufacturer's product line. The Executive Officer shall waive the evaluation requirement each year if, in the judgment of the Executive Officer, technological changes do not affect the previously determined malfunction criteria;~~

~~(ii) The percent misfire evaluated in 1000 crankshaft-revolution increments that would cause emissions from an aged engine (480 hours) to exceed any of the spark-ignition marine engine test cycle-based standards by more than 50 percent if the degree of misfire were present from the beginning of the test. Subject to Executive Officer approval, an engine manufacturer may employ other crankshaft-revolution increments if the engine manufacturer adequately demonstrates that the strategy is equally effective and timely in detecting misfire. For the purpose of establishing the percent misfire, the engine manufacturer shall conduct the demonstration test(s) with the misfire events occurring at equally spaced complete engine cycle intervals, across randomly selected cylinders throughout each 1000 crankshaft-revolution increment. However, the~~

~~percent misfire established shall be applicable for any misfire condition (e.g., random, continuous, equally-spaced, etc.) for the purpose of identifying a malfunction. This criterion may be used for all engines containing the same number of cylinders as the aged engine. The number of misfires in 1000 crankshaft-revolution increments that was determined for the aged engine malfunction criterion may be used to establish the corresponding percent misfire malfunction criteria for engines with other numbers of cylinders. The malfunction criteria for an engine manufacturer's product line shall be updated when an aged engine is tested and subsequently indicates that more stringent criteria are necessary than previously established to remain within the above emission limit.~~

~~*(C)* Monitoring conditions:~~

~~(i) Except as provided for in paragraph (ii) below, monitoring for misfire shall be continuous from engine starting under all positive torque engine speeds and load conditions.~~

~~(ii) As an exception to monitoring misfire during all positive torque operating conditions, engine manufacturers may disable misfire monitoring in the engine operating region bound by the positive torque line (i.e., engine load with the transmission in neutral), and the two following engine operating points:~~

~~a. an engine speed of 3000 rpm with the engine load at the positive torque line; and~~

~~b. the redline engine speed (defined in section 2441) with the engine's manifold vacuum at four inches of mercury lower than that at the positive torque line.~~

~~Misfire detection systems unable to detect all misfire patterns under all required conditions shall be evaluated for compliance by the Executive Officer based on, but not limited to, the following factors:~~

~~c. the magnitude of the region(s) in which misfire detection is limited,~~

~~d. the degree to which misfire detection is limited in the region(s) (i.e., the probability of detection of misfire events),~~

~~e. the frequency with which said region(s) are expected to be encountered in-use,~~

~~f. the type of misfire patterns for which misfire detection is troublesome, and~~

~~g. demonstration that the monitoring technology employed is not inherently incapable of detecting misfire under required conditions (i.e., compliance can be achieved on other engines).~~

~~The evaluation shall be based on the following misfire patterns:~~

~~h. equally spaced misfire occurring on randomly selected cylinders,~~

~~i. single cylinder continuous misfire; and~~

~~j. paired cylinder (cylinders firing at the same crank angle) continuous misfire.~~

~~Further, with Executive Officer approval, the engine manufacturer may disable misfire monitoring or employ higher malfunction criteria when misfire cannot be distinguished from other effects (e.g., ocean bounce) when using the best available monitoring technology. The engine manufacturer shall present data and/or an engineering evaluation to the Executive Officer to justify the proposed action. Executive Officer approval shall be based on the extent to which monitoring is expected to be disabled in relation to the capabilities of the best available monitoring technologies as applied to other engines. However, any such disablement occurring within the first 5 seconds after engine starting shall not require Executive Officer approval. Additionally, for engines with greater than eight cylinders, the Executive Officer shall waive the requirements of this section provided the engine manufacturer submits data and/or an engineering evaluation which adequately demonstrates that misfire detection throughout the required operating region cannot be achieved when employing proven monitoring technology (i.e., a technology that provides for compliance with these requirements on other engines) and provided misfire is detected to the fullest extent permitted by the technology.~~

~~(D) Malfunction notification and diagnostic trouble code storage:~~

~~(i) Upon detection of the level of misfire specified in paragraph (b)(2)(B)(i), the following criteria shall apply for audio/visual alert device activation and diagnostic trouble code storage:~~

~~a. A temporary diagnostic trouble code shall be stored and the audio/visual alert device shall activate once-per-second during actual misfire conditions no later than after the third exceedance of the specified misfire level when operating in the region bound by modes 2 through 5 of the spark-ignition marine engine test cycle and no later than after the first exceedance of the specified misfire level when operating at any other engine speed and load condition during a single operating cycle. While a temporary diagnostic trouble code is stored, the audio/visual alert device shall activate during every subsequent exceedance during the operating cycle but may remain inactive when misfire is not present. If the level of misfire is exceeded again (a single exceedance) during the following operating cycle or the next operating cycle in which similar conditions are encountered (as defined in paragraph (b)(3)(D)(iii)) or while a temporary diagnostic trouble code for the level of misfire specified in paragraph (b)(2)(B)(ii) is present, the audio/visual alert device shall activate as specified above, a diagnostic trouble code shall be stored, and the audio/visual alert device shall remain continuously activated, even if the misfire ceases. The initial temporary code and stored conditions may be erased if misfire is not detected during the following operating cycle and similar conditions have been encountered without an exceedance of the specified misfire level. The code and conditions may also be erased if similar driving conditions are not encountered during 80 operating cycles subsequent to the initial detection of a malfunction.~~

~~b. Notwithstanding, in engines that provide fuel shutoff and default fuel control to prevent over fueling during misfire conditions, the audio/visual alert device need not activate at one-second intervals. Instead, the audio/visual alert device may activate continuously upon detection of misfire, in accordance with the requirements for continuous audio/visual alert device~~

~~activation in paragraph (a) above, provided that the fuel shutoff and default control shall be activated as soon as misfire is detected. Fuel shutoff and default fuel control may be deactivated only to permit fueling outside of the misfire range.~~

~~(ii) Upon detection of the misfire level specified in paragraph (b)(2)(B)(ii), the following criteria shall apply for audio/visual alert device activation and diagnostic trouble code storage:~~

~~a. A temporary diagnostic trouble code shall be stored no later than after the fourth exceedance of the specified misfire level during a single operating cycle and the audio/visual alert device shall be activated and a diagnostic trouble code stored no later than the end of the following operating cycle or the next operating cycle in which similar conditions are encountered (as defined in paragraph (b)(2)(D)(iii)) if the level of misfire is again exceeded four times. The initial temporary code and stored conditions may be erased if misfire is not detected during the following operating cycle and similar conditions have been encountered without an exceedance of the specified misfire level. The code and conditions may also be erased if similar driving conditions are not encountered during 80 operating cycles subsequent to the initial detection of a malfunction.~~

~~b. Notwithstanding, a temporary diagnostic trouble code shall be stored no later than after the first exceedance of the specified misfire level during a single operating cycle if the exceedance occurs within the first 1000 crankshaft revolutions from engine start (defined in the glossary) during which misfire detection is active. The audio/visual alert device shall be activated and a diagnostic trouble code stored no later than the end of any subsequent operating cycle if misfire is again detected in the first 1000 crankcase revolutions. If similar conditions are encountered during a subsequent operating cycle without an exceedance of the specified misfire level, the initial temporary code and stored conditions may be erased. Furthermore, if similar driving conditions are not encountered during 80 operating cycles subsequent to the initial detection of a malfunction, the initial temporary code and stored conditions may be erased.~~

~~(iii) Upon detection of misfire, engine manufacturers shall store the engine speed, load, and warm-up status (i.e., cold or warmed-up) under which the first misfire event was detected that resulted in the storage of a temporary diagnostic trouble code. An operating cycle shall be considered to have similar conditions if the stored engine speed conditions are encountered within 375 rpm, load conditions within 20 percent, and the same warm-up status is present. With Executive Officer approval, other strategies for determining if similar conditions have been encountered may be employed. Approval shall be based on comparable timeliness and reliability in detecting similar conditions.~~

~~(3)~~(2) Fuel system monitoring.

(A) Purpose and scope: The diagnostic system shall monitor the fuel delivery system for its ability to ~~provide compliance with emission standards~~dynamically adjust fuel delivery.

(B) Malfunction criteria: The engine manufacturer shall establish malfunction criteria to monitor the fuel delivery system ~~such that an engine's emissions would not exceed the applicable HC+NO_x certification standard by more than 50 percent before a fault is detected~~. If the engine is equipped with fuel trim circuitry, the engine manufacturer shall include as one of the malfunction criteria the condition where the trim circuitry has used up all of the trim adjustment allowed within the engine manufacturer's selected limit(s). Engine manufacturers may compensate the criteria limit(s) appropriately for changes in altitude or for other similar identifiable operating conditions when they occur.

(C) Monitoring conditions: The fuel system shall be monitored continuously for the presence of a malfunction.

(D) Malfunction notification and diagnostic trouble code storage:

(i) For fuel systems with short-term trim only capability, the diagnostic system shall store a diagnostic trouble code after the fuel system has attained the criteria limit for an engine manufacturer-defined time interval sufficient to determine a malfunction. If the malfunction criteria limit and time interval are exceeded, the audio/visual alert device shall be activated and a diagnostic trouble code stored no later than the end of the next operating cycle in which the criteria and interval are again exceeded; unless ~~driving~~operating conditions similar to those under

which the problem was originally detected (manufacturer-defined conditions) have been encountered ~~(see paragraph (iii) below)~~ without such an exceedance, in which case the initial temporary code and stored conditions may be erased. Furthermore, if similar ~~driving~~operating conditions are not encountered during ~~80~~forty (40) operating cycles subsequent to the initial detection of a malfunction, the initial temporary code and stored conditions may be erased.

(ii) For fuel systems with long-term fuel trim capability, upon attaining a long-term based malfunction criteria limit independent of, or in combination with, the short-term trim system status, the audio/visual alert device shall be activated and a diagnostic trouble code stored no later than the end of the next operating cycle if the malfunction is again detected. If the malfunction is not detected during the second operating cycle, the audio/visual alert device shall be activated and a diagnostic trouble code stored no later than the next operating cycle in which the malfunction is again detected; unless ~~driving~~operating conditions similar to those under which the problem was originally detected ~~have been encountered (see paragraph (iii) below)~~(manufacturer-defined conditions) have been encountered without an indication of a malfunction, in which case the initial temporary code and stored conditions may be erased. Furthermore, if similar ~~driving~~operating conditions are not encountered during ~~80~~forty (40) operating cycles subsequent to the initial detection of a malfunction, the initial temporary code and stored conditions may be erased.

~~(iii) Upon detection of a fuel system malfunction, engine manufacturers shall store the engine speed, load and warm-up status (i.e., cold or warmed-up) under which the malfunction was detected. An operating cycle shall be considered to have similar conditions if the stored engine speed is encountered within 375 rpm, load conditions within 20 percent, and the same warm-up status is present. With Executive Officer approval, other strategies for determining if similar conditions have been encountered may be employed. Approval shall be based on comparable timeliness and reliability in detecting similar conditions.~~

~~(4)~~(3) Oxygen sensor monitoring.

(A) Purpose and scope:

(i) The diagnostic system shall monitor the output voltage~~,~~ and response rate~~, and any other parameter which can affect emissions,~~ of all primary (fuel control) oxygen (lambda) sensors for malfunction. It shall also monitor ~~all~~ secondary oxygen sensors

~~(fuel trim control or use as a monitoring device)~~when used as a monitoring device for proper output voltage and/or response rate. Response rate is the time required for the oxygen sensor to switch from lean-to-rich once it is exposed to a richer than stoichiometric exhaust gas mixture or ~~vice versa~~from rich-to-lean when exposed to a leaner than stoichiometric exhaust gas mixture. As a precaution, ~~(~~measuring oxygen sensor switching frequency may not be an adequate indicator of oxygen sensor response rate, particularly at low speeds~~)~~.

* * * * *

~~(iv) For engines equipped with heated oxygen sensors, the heater circuit shall be monitored for proper current and voltage drop (note: a continuity check of oxygen sensors is not required). Other heater circuit monitoring strategies would require approval by the Executive Officer based on equally reliable and timely indication of malfunction as current or voltage based monitoring.~~

(B) Malfunction criteria:

~~(i)~~ An oxygen sensor shall be considered malfunctioning when the voltage, response rate, or other criteria, as determined by the engine manufacturer, are exceeded ~~and causes emissions from an engine equipped with the sensor(s) to exceed the applicable $HC+NO_x$ standard by more than 50 percent~~, or when sensor output characteristics are no longer sufficient (e.g., lack of sensor switching) for use as a diagnostic system monitoring device (e.g., for catalyst efficiency monitoring).

~~(ii) For heated oxygen sensors, the heater circuit shall be considered malfunctioning when the current or voltage drop in the circuit is no longer within the engine manufacturer's specified limits for normal operation (i.e., within the criteria required to be met by the component vendor for heater circuit performance at high mileage). Subject to Executive Officer approval, other monitoring strategy malfunction criteria for detection of heater circuit malfunctions may be used provided the engine manufacturer submits data and/or an engineering evaluation adequately showing monitoring reliability and timeliness to be equivalent to the stated criteria in this paragraph.~~

(C) Monitoring conditions:

~~(i) For primary oxygen sensor(s) used for fuel control, the response rate and output voltage shall be monitored for malfunction after the~~

~~engine has commenced closed-loop operation. If the oxygen sensor(s) is used as part of the monitoring strategy for the catalyst, the oxygen sensor(s) diagnostics should be scheduled to execute before the catalyst diagnostics begin. The engine manufacturer shall choose a steady-state window of operation defined by throttle position, delta throttle, engine load, and temperature for monitoring the oxygen sensor with the constraints that the check shall:~~

(i) The engine manufacturer shall define conditions for monitoring the oxygen sensor(s) with the constraints that the check shall:

~~a. occur within a ± 10 percent throttle position window between 35 percent and 85 percent of full throttle,~~

a. be conducted at the earliest acceptable opportunity encountered after the beginning of each operating cycle; and

~~b. be tolerant of throttle position fluctuations or changes less than 1 percent per second over any two second interval within the throttle position window,~~

b. operate at least once per in-use operating cycle during which the engine manufacturer-defined monitoring conditions are met.

~~c. take no more than a 30 second interval to determine both that the engine is operating in a proper window to perform the check and to actually perform the check, and~~

~~d. be conducted at the earliest such condition encountered after the beginning of closed-loop operation for each operating cycle.~~

~~Performance of the check may be delayed after engine startup until stabilized coolant temperature is achieved and/or a suitable cumulative time interval of non-closed throttle engine operation has elapsed to ensure the oxygen sensor is warmed up for properly performing the monitoring check. The specified cumulative time interval shall begin from the first non-closed throttle operation either after achieving a stabilized coolant temperature or after engine starting and shall not exceed 180 seconds. These monitoring constraints and conditions may be altered, subject to Executive Officer approval. Such approval shall be granted if the engine manufacturer submits data and an engineering evaluation that, together, justify the need for the exception and demonstrate that the~~

~~requested alteration would yield improved oxygen sensor monitoring.~~

~~(ii) The monitoring system shall operate at least once per in-use operating cycle during which the engine manufacturer-defined monitoring conditions are met.~~

(ii) For primary oxygen sensors(s) used for fuel control, the response rate and output voltage shall be monitored for malfunction after the engine has commenced closed-loop operation. If the oxygen sensor(s) is used as part of the monitoring strategy for the catalyst, the oxygen sensor(s) diagnostics should be scheduled to execute before the catalyst diagnostics begin.

~~(iii) For secondary oxygen sensors used for catalyst monitoring and/or fuel system trim, the engine manufacturer shall define steady state operating conditions for response rate and/or output voltage malfunction monitoring that are representative of typical in-use operation, and which will result in the routine execution and completion of the diagnostics in-use. The monitoring system shall operate at least once per operating cycle during which the engine manufacturer-defined monitoring conditions are met.~~

~~(iv) For heated oxygen sensors, the engine manufacturer shall define appropriate operating conditions for malfunction monitoring of the heater circuit that are representative of typical in-use operation, and which will result in the routine execution and completion of the diagnostic in-use. The monitoring system shall operate at least once per operating cycle during which the engine manufacturer-defined monitoring conditions are met.~~

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~~(E) Other (non-Lambda) oxygen sensors:~~

~~(i) For engines equipped with universal exhaust gas oxygen sensors (i.e., sensors which provide an output proportional to exhaust gas oxygen concentration), the engine manufacturer shall define steady state operating conditions as in paragraph (b)(4)(C)(i) above for the diagnostic system to perform a response rate check (the time required to respond to a specific change in fuel/air ratio) that are representative of typical in-use operation, and which will result in the routine execution and completion of all IMDN diagnostics in-use. The monitoring system shall operate at least once per operating cycle during which the engine manufacturer-defined monitoring conditions are met. The diagnostic system shall~~

~~also perform an out-of-range check for which monitoring shall be continuous. For malfunctions, audio/visual alert device activation and diagnostic trouble code storage shall be as in paragraph (b)(4)(D).~~

~~(ii) If an engine manufacturer utilizes other types of oxygen sensors, the engine manufacturer shall submit a monitoring plan to the Executive Officer for approval based on equivalent monitoring with conventional sensors.~~

~~(5)~~(4) Computer-sensed ~~C~~comprehensive component monitoring.

(A) Purpose and scope: The diagnostic system shall monitor for malfunction any computer-sensed electronic engine component~~s/system~~ not otherwise described in this subsection ~~above which either~~that provide~~s~~ input to (directly or indirectly) ~~, or receives commands from~~ the on-board computer, and ~~which~~that: ~~(~~1) can affect emissions during any reasonable in-use ~~driving~~operating condition, or ~~(~~2) ~~is~~are used as part of the diagnostic strategy for any other monitored system or component.

~~(i) Input components:~~

(i) ~~a.~~ The monitoring system shall have the capability of detecting**, at a minimum,** lack of circuit continuity **and out of range values to ensure proper operation of the input device**. **The determination of out of range values shall include logic evaluation of available information to determine if a component is operating within its normal range (e.g., a low throttle position sensor voltage would not be reasonable at a high engine speed with a high mass airflow sensor reading). To the extent feasible, said logic evaluation shall be "two-sided" (i.e., verify a sensor output is not inappropriately high or low).**

(ii) ~~b. Input~~Computer-sensed comprehensive components may include, but are not limited to, the engine speed sensor, crank angle sensor, knock sensor, throttle position sensor, coolant temperature sensor, cam position sensor, and other electronic components such as sensors~~, modules, and solenoids which provide signals to the engine control system (see paragraph (b)(5)(E))~~and fuel injectors.

(iii) ~~c.~~ **The coolant temperature sensor shall be monitored for achieving a stabilized minimum temperature level that is needed to achieve closed-loop operation within**

an engine manufacturer-specified time interval after starting the engine. The time interval shall be a function of starting engine coolant temperature and/or a function of intake air temperature. Engine manufacturers may suspend or delay the diagnostic if the engine is subjected to conditions which could lead to false diagnosis (e.g., engine operation at idle for more than 50 to 75 percent of the warm-up time). ~~**Engine manufacturers shall provide data to support specified times. The Executive Officer shall allow disablement of this check under extremely low ambient temperature conditions (below 20 degrees Fahrenheit) provided an engine manufacturer submits data and/or an engineering evaluation that adequately demonstrate non-attainment of a stabilized minimum temperature.**~~

~~(ii) Output components:~~

~~a. The diagnostic system shall monitor output components~~ **~~for proper functional response to computer commands.~~**

~~b. Components~~ **~~for which functional monitoring is not feasible~~** ~~shall be monitored,~~ **~~at a minimum,~~** ~~for proper circuit continuity and out of range values, if applicable.~~

~~c. Output components may include, but are not limited to, the automatic idle speed motor, emission related electronic solenoids, heated fuel preparation systems, and a warm-up catalyst bypass valve (see paragraph (b)(5)(E)).~~

(B) Malfunction criteria:

~~(i) Input components: Input components/systems~~Computer-sensed comprehensive components shall be considered malfunctioning when**, at a minimum,** lack of circuit continuity **or engine manufacturer-specified out-of-range values** occur.

~~(ii) Output components:~~

~~a.~~ ~~**Output components/systems shall be considered malfunctioning when proper functional response to computer commands does not occur. Should a functional check for malfunction not be feasible, then**~~ an ~~output component/system shall be considered malfunctioning when, at a minimum, lack of circuit continuity~~

~~or engine manufacturer-specified out-of-range values~~ ~~occurs.~~

~~b. **The idle speed control motor/valve shall be monitored for proper functional response to computer commands. For strategies based on deviation from target idle speed, a fault shall be indicated when the idle speed control system cannot achieve the target idle speed within an engine manufacturer specified time and engine speed tolerance. In general, the engine speed tolerances shall not exceed 200 rpm above the target speed or 100 rpm below the target speed. The Executive Officer shall allow larger engine speed tolerances provided an engine manufacturer submits data and/or an engineering evaluation which adequately demonstrate that the tolerances can be exceeded without a malfunction present.**~~

(C) Monitoring conditions:

~~(i) Input components: Input~~Computer-sensed components shall be monitored continuously for **proper range of values and** circuit continuity. **For rationality monitoring (where applicable), engine manufacturers shall define appropriate operating conditions that are representative of typical in-use operation and will result in the routine execution and completion of all diagnostics in-use. Rationality monitoring shall occur at least once per operating cycle during which the engine manufacturer-defined monitoring conditions are met.**

~~(ii) Output components: Monitoring for circuit continuity **and proper range of values (if applicable)** shall be conducted continuously. **For functional monitoring, engine manufacturers shall define appropriate operating conditions that are representative of typical in-use operation and will result in the routine execution and completion of all diagnostics in-use. Functional monitoring shall occur at least once per operating cycle during which the engine manufacturer-defined monitoring conditions are met.**~~

(D) Malfunction notification and diagnostic trouble code storage:

~~(i)~~ Upon detecting a malfunction, the diagnostic system shall store a diagnostic trouble code and activate the audio/visual alert device no later than the end of the next operating cycle during which monitoring occurs provided the malfunction is again detected.

~~(ii) In conjunction with storing a diagnostic trouble code, engine manufacturers shall activate the audio/visual alert device for malfunctions of components/systems for which either of the following occurs:~~

~~a. when malfunctioning, the component or system could cause engine emissions to increase by 15 percent or more of the $HC+NO_x$ standard, or~~

~~b. the component/system is used as part of the diagnostic strategy for any other monitored system or component.~~

~~(E) Component determination: The engine manufacturer shall determine whether an engine input or output component not otherwise covered can affect emissions. If the Executive Officer reasonably believes that an engine manufacturer has incorrectly determined that a component cannot affect emissions, the Executive Officer shall require the engine manufacturer to provide emission data showing that such a component, when faulty and installed in a suitable test engine, does not have an emission effect. Emission data may be requested for any reasonable driving condition.~~

(5) Misfire monitoring.

The provisions in this subsection shall be considered voluntary unless otherwise determined by the Executive Officer according to subsection (a)(2) above.

(A) Purpose and scope: The diagnostic system shall identify the occurrence of engine misfire that can result in damage to the catalyst system. Identification of the misfiring cylinder is not required, however all patterns of misfire must be identified regardless of whether it occurs in a single or multiple number of cylinders.

(B) Malfunctioning criteria: The diagnostic system shall identify a malfunction when the total number of misfires evaluated in 200 crankshaft-revolution increments for each engine speed and load condition exceeds a percentage (determined by the engine manufacturer to cause damage to the catalyst system) of the total number of firing events in each increment. These threshold percentages shall be provided in the certification documentation. Subject to Executive Officer approval, an interval longer than 200 crankshaft-revolutions may be used. The engine manufacturer

shall submit in the certification documentation catalyst temperature data versus percent misfire over the full range of engine speed and load conditions. Alternatively, catalyst temperature data may be submitted for every 500 rpm increment along the Propeller Law curve beginning at engine idle and continuing throughout the "Not to Exceed Zone" for marine propulsion engines with Fixed- and Variable-pitch propellers, as defined in 40 CFR, subpart B, section 94.106, which is incorporated by reference herein. The data shall be obtained from a representative cross section (from small to large displacements) of an engine manufacturer's production. Up to three such engine evaluations shall be documented per engine manufacturer, though an engine manufacturer may submit more data, if desired. An engineering evaluation shall be provided for establishing malfunction criteria for the remainder of engine families in the engine manufacturer's product line. The Executive Officer shall waive the evaluation requirement each year if, in the judgment of the Executive Officer, technological changes do not affect the previously determined malfunction criteria.

(C) Monitoring conditions:

(i) Monitoring for misfire shall be continuous from engine starting under all steady-state positive torque engine speeds and load conditions.

(ii) As an exception to monitoring misfire during all positive torque operating conditions, engine manufacturers may disable misfire monitoring in the engine operating region bound by the positive torque line (i.e., engine load with the transmission in neutral), and the two following engine operating points:

a. an engine speed of 3,000 rpm with the engine load at the positive torque line; and

b. the redline engine speed (defined in section 2441) with the engine's manifold vacuum at four inches of mercury lower than that at the positive torque line.

Misfire detection systems unable to detect all misfire patterns under all required conditions shall be evaluated for compliance by the Executive Officer based on, but not limited to, the following factors:

c. the magnitude of the region(s) in which misfire detection is limited,

d. the degree to which misfire detection is limited in the region(s) (i.e., the probability of detection of misfire events),

e. the frequency with which said region(s) are expected to be encountered in-use,

f. the type of misfire patterns for which misfire detection is troublesome, and

g. demonstration that the monitoring technology employed is not inherently incapable of detecting misfire under required conditions (i.e., compliance can be achieved on other engines).

The evaluation shall be based on the following misfire patterns:

h. equally spaced misfire occurring on randomly selected cylinders,

i. single cylinder continuous misfire; and

j. paired cylinder (cylinders firing at the same crank angle) continuous misfire,

Further, with Executive Officer approval, the engine manufacturer may disable misfire monitoring or employ higher malfunction criteria when misfire cannot be distinguished from other effects (e.g., turbulence causing the propeller to alternately emerge from then re-submerge into the water.) when using the best reasonably available monitoring technology. The engine manufacturer shall present data and/or an engineering evaluation to the Executive Officer to justify the proposed action. Executive Officer approval shall be based on the extent to which monitoring is expected to be disabled in relation to the capabilities of the best available monitoring technologies as applied to other engines. However, any such disablement occurring within the first 5 seconds after engine starting shall not require Executive Officer approval. Additionally, for engines with greater than eight cylinders, the Executive Officer shall waive the requirements of this section provided the engine manufacturer submits data and/or an engineering evaluation which adequately demonstrates that misfire detection throughout the required operating region cannot be achieved when employing proven monitoring technology (i.e., a technology that provides for compliance with these requirements on other engines) and provided misfire is detected to the fullest extent permitted by the technology.

(D) Malfunction notification and diagnostic trouble code storage:

(i) Upon detection of the level of misfire specified in subsection (b)(5)(B) above, the following criteria shall apply for audio/visual alert device activation and diagnostic trouble code storage:

a. A temporary diagnostic trouble code shall be stored no later than after the third exceedance of the specified misfire level when operating in the region bound by modes 2 through 5 of the spark-ignition marine engine test cycle and no later than after the first exceedance of the specified misfire level when operating at any other engine speed and load condition during a single operating cycle. If the level of misfire is exceeded again (a single exceedance) during the following operating cycle, or the next operating cycle in which similar conditions are encountered (manufacturer defined conditions), the audio/visual alert device shall activate, a diagnostic trouble code shall be stored, and the audio/visual alert device shall remain continuously activated, even if the misfire ceases. The initial temporary code and stored conditions may be erased if misfire is not detected during the following operating cycle and similar conditions have been encountered without an exceedance of the specified misfire level. The code and conditions may also be erased if similar operating conditions are not encountered during forty operating cycles subsequent to the initial detection of a malfunction.

b. Notwithstanding, in engines that provide fuel shutoff and default fuel control to prevent over fueling during misfire conditions, the audio/visual alert device need not activate provided that the fuel shutoff and default control shall be activated as soon as misfire is detected. Fuel shutoff and default fuel control may be deactivated only to permit fueling outside of the misfire range.

(c) Additional audio/visual alert device activation and diagnostic trouble code storage protocol.

(1) Audio/visual alert device activation: For all emission-related components/systems, upon final determination of a malfunction, the ~~audio/visual alert device shall remain continuously activated~~ **~~(except that it shall activate at one-second intervals as indicated previously for misfire detection). If any malfunctions are identified in addition to misfire, the misfire condition shall~~**

~~**take precedence, and the audio/visual alert device shall activate at one-second intervals accordingly.**~~OBD-M system shall activate an audio or visual alert device.

(A) If so equipped, visual alert devices shall remain activated continuously whenever a malfunction has been identified by the OBD-M system, and may be deactivated only according to the provisions in paragraph (2) below, or with a scan tool after appropriate repairs have been effected.

(B) If so equipped, audio alert devices may remain activated continuously when a malfunction has been identified by the OBD-M system; however, the Executive Officer shall consider alternative strategies in which the audio alert is activated on a discontinuous, but repetitive, basis. To be acceptable, discontinuous audio alert strategies must convey a sense of urgency to vessel operators regarding the presence of OBD-M malfunctions.

Upon fulfillment of the standardization processes referred to in subsection (g) below, a protocol for audio alert device activation shall be specified authorizing only discontinuous activation. A standardized notification format is necessary to facilitate consumer association of the audio alert pattern with the identification of an OBD-M malfunction independent of manufacturer or platform. OBD-M system designers are encouraged to cooperate fully with each other and the ARB early on in this endeavor to minimize the redesigning of OBD-M audio alert activation algorithms once a standardized protocol has been finalized.

(C) The diagnostic system shall store a diagnostic trouble code whenever the audio/visual alert device is activated. The diagnostic system shall activate the audio/visual alert device and shall store a diagnostic trouble code whenever the engine enters a default or "limp home" mode of operation. The diagnostic system shall activate the audio/visual alert device and shall store a diagnostic trouble code whenever the engine control system fails to enter closed-loop operation (if employed) within an engine manufacturer specified minimum time interval.

(2) Audio/visual alert device deactivation:

(A) **Misfire and** Fuel System Malfunctions: For **misfire or** fuel system malfunctions, the audio/visual alert device may be deactivated if the fault does not recur when monitored during three subsequent sequential operating cycles in which conditions are

similar to those under which the malfunction was first determined ~~(see paragraphs (b)(2)(D)(iii) and (b)(3)(D)(iii))~~.

* * * * *

(3) Erasing a diagnostic trouble code: The diagnostic system may erase a diagnostic trouble code if the same fault is not re-registered in at least forty (40) engine warm-up cycles, and the audio/visual alert device is not activated for that diagnostic trouble code.

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~~(e) Readiness/Function code: The on-board computer shall store a code upon first completing a full diagnostic check (i.e., the minimum number of checks necessary for audio/visual alert device activation) of all monitored components and systems (except as noted below) since the computer memory was last cleared (i.e., through the use of a scan tool or battery disconnect). The code shall be stored in the format specified by SAE J1979, September 1997, or alternatively as specified in ISO 15765-4, November 1999, and ISO 15031-5, December 1999. These documents are incorporated by reference in paragraphs (i)(2) and (i)(5). The diagnostic system check for comprehensive component monitoring and continuous monitoring of **misfire and** fuel system faults shall be considered complete for purposes of determining the readiness indication if malfunctions are not detected in these areas by the time all other diagnostic system checks are complete. Subject to Executive Officer approval, if monitoring is disabled for a multiple number of operating cycles due to the continued presence of extreme operating conditions (e.g., cold ambient temperatures, high altitudes, etc.), readiness for the subject monitoring system may be set without monitoring having been completed. Executive Officer approval shall be based on the conditions for monitoring system disablement and the number of operating cycles specified without completion of monitoring before readiness is indicated.~~

~~(f) Stored engine conditions: Upon detection of the first malfunction of any component or system, "freeze frame" engine conditions present at the time shall be stored in computer memory. Should a subsequent fuel system or misfire malfunction occur, any previously stored freeze frame conditions shall be replaced by the fuel system or misfire conditions (whichever occurs first). Stored engine conditions shall include, but are not limited to, calculated load value, engine rpm, fuel trim value(s) (if available), fuel pressure (if available), engine speed (if available), coolant temperature, intake manifold pressure (if available), closed- or open-loop operation (if available), and the diagnostic trouble code which caused the data to be stored. The engine manufacturer shall choose the most appropriate set of conditions facilitating effective repairs for freeze frame storage. Only one~~

~~frame of data is required. Engine manufacturers may at their discretion choose to store additional frames provided that at least the required frame can be read by a generic scan tool meeting SAE specifications established in SAE J1978, Recommended Practices on "OBD II Scan Tool," February 1998, and SAE J1979, "E/E Diagnostic Test Modes," September 1997, which are incorporated by reference herein. If the diagnostic trouble code causing the conditions to be stored is erased in accordance with paragraph (c)(3), the stored engine conditions may be cleared as well.~~

~~(g)~~(e) Certification documentation: The engine manufacturer shall submit the following documentation for each engine family at the time of certification. With Executive Officer approval, one or more of the documentation requirements specified in this section may be waived or altered if the information required would be redundant or unnecessarily burdensome to generate:

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~~(G) criteria for storing diagnostic trouble code~~

~~(H)~~(G) criteria for activating the audio/visual alert device

~~(I) criteria used for determining out of range values and input component rationality checks~~

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~~(5) A scale drawing of the audio/visual alert device specifying location in the instrument panel, wording, color, and intensity.~~

~~(6) Data supporting the selected degree of misfire which can be tolerated without damaging the catalyst. Representative data demonstrating the capability of the misfire monitoring system (i.e., probability of detection of misfire events) to detect misfire over the full engine speed and load operating range for selected misfire patterns (i.e., random cylinders, one cylinder out, paired cylinders out).~~

~~(7) Data supporting the limit for the time between engine starting and attaining the designated heating temperature for artificially heated catalyst systems.~~

~~(8) Data supporting the criteria used to indicate a malfunction when catalyst deterioration causes emissions to exceed the applicable HC+NO_x threshold specified in paragraph (b)(1)(B)(i).~~

~~(9) If applicable, data supporting the criteria used by the diagnostic system for establishing a 60 to 80 percent catalyst efficiency level to determine a malfunction in accordance with paragraph (b)(1)(B)(ii).~~

~~(10) A listing of all electronic engine input and output signals.~~

~~(11)~~(5) Any other information determined by the Executive Officer to be necessary to demonstrate compliance with the requirements of this section.

~~(h)~~(f) Confirmatory testing: The ARB may perform confirmatory testing of engine manufacturers' diagnostic systems for compliance with requirements of this section in accordance with malfunction criteria submitted in the engine manufacturer's approved certification documentation. The ARB or its designee may install appropriately deteriorated or malfunctioning components in an otherwise properly functioning test engine (or simulate a deteriorated or malfunctioning component response) in order to test the fuel system, ~~**misfire detection system,**~~ oxygen sensor, ~~and~~ catalyst ~~efficiency~~ system, and misfire (if applicable) monitors for compliance with the applicable ~~emission~~ constraints in this section. Diagnostic systems of a representative sample of engines that uniformly fail to meet the requirements of this section may be recalled for correction.

~~(i) Standardization: Standardized access to emission-related diagnostic trouble codes, emission-related engine test information (i.e., parameter values) as outlined in subsection (j), emission-related diagnostic procedures, and stored freeze frame data shall be incorporated based on the industry specifications referenced in this regulation.~~

(g) Standardization: The spark-ignition inboard and sterndrive marine industry, in cooperation with ARB, will develop and adhere to standardized specifications for the implementation of OBD-M, including diagnostics trouble code formats, communication, and scan tool protocols.

~~(1) Either SAE Recommended Practice J1850, "Class B Data Communication Network Interface", March 1998, or ISO 9141-2, "Road engines - Diagnostic Systems - CARB Requirements for Interchange of Digital Information," February 1994, or ISO 14230-4, "Road engines - Diagnostic systems - KWP 2000 requirements for Emission-related systems," April 1996, which are incorporated by reference, shall be used as the on-board to off-board network communications protocol. All SAE J1979 emission related messages sent to the J1978 scan tool over a J1850 data link shall use the Cyclic Redundancy Check and the three-byte header, and shall not use inter-byte separation or checksums.~~

(2) (A) J1978 & J1979: Standardization of the message content (including test modes and test messages) as well as standardization of the downloading protocol for diagnostic trouble codes, parameter values and their units, and freeze frame data are set forth in SAE J1978, Recommended Practices on "OBD II Scan Tool," February 1998, and SAE J1979, "E/E Diagnostic Test Modes," September 1997, which have been incorporated by reference. Diagnostic trouble codes, parameter values, and freeze frame data shall be capable of being downloaded to a generic scan tool meeting these SAE specifications.

(B) The J1978 scan tool shall be capable of notifying the user when one or more of the required monitoring systems are not included as part of the IMDN system.

(3) J2012 Part C: Uniform diagnostic trouble codes based on SAE specifications shall be employed. SAE J 2012, "Recommended Format and Messages for Diagnostic Trouble Codes," October 1996, is incorporated by reference.

(4) J1962: A standard data link connector in each engine shall be incorporated. The location of the connector shall be easily identified by a technician viewing the engine from above. Any pins in the standard connector that provide any electrical power shall be properly fused to protect the integrity and usefulness of the diagnostic connector for diagnostic purposes. The SAE J1962 Recommended Practice "Diagnostic Connector," February 1998, is incorporated by reference.

(i) Signal access.

(1)The following signals in addition to the required freeze frame information shall be made available on demand through the serial port on the standardized data link connector: calculated load value, diagnostic trouble codes, engine coolant temperature (if available), fuel control system status (open loop, closed loop, other; if equipped with closed loop fuel control), fuel trim (if equipped), fuel pressure (if available), ignition timing advance (if equipped), intake air temperature (if equipped), manifold air pressure (if equipped), air flow rate from mass air flow meter (if equipped), engine rpm, throttle position sensor output value (if equipped), and engine speed (if equipped). The signals shall be provided in standard units based on the SAE specifications incorporated by reference in this regulation, and actual signals shall be clearly identified separately from default value or limp home signals.

(2) Oxygen sensor data (including current oxygen sensor output voltages) allowing the diagnosis of malfunctioning oxygen sensors shall be provided

~~through serial data port on the standardized data link. In addition, for all monitored components and systems, except misfire detection, fuel system monitoring, and comprehensive component monitoring, results of the most recent test performed by the engine, and the limits to which the system is compared shall be available through the data link. For the monitored components and systems excepted above, a pass/fail indication for the most recent test results shall be available through the data link. Such data shall be transmitted in accordance with SAE J1979 (or SAE J1939, whichever applies). Engine manufacturers shall report the test results such that properly functioning systems do not indicate a failure (e.g., a test value that is outside of the test limits). Alternative methods shall be approved by the Executive Officer if, in the judgment of the Executive Officer, they provide for equivalent off-board evaluation.~~

~~(3) Calibration Verification Number: Engine manufacturers shall provide for verification of the on-board computer software integrity in electronically reprogrammable control units through the standardized engine data connector in a standardized format to be adopted by SAE. Such verification shall be capable of being used to determine if the emission-related software and/or calibration data are valid and applicable for that engine.~~

~~(k)~~(h) Implementation schedule.

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(3) (A)(i) The specified fines shall apply to the ~~second~~third and subsequently identified deficiencies, with the exception that fines shall apply to all monitoring system deficiencies wherein a required monitoring strategy is completely absent from the ~~IM~~DNOBD-M system; and

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(B) For the ~~second~~third deficiency and every deficiency thereafter identified in an engine model, the fines shall be in the amount of $~~50~~25 per deficiency per engine for non-compliance with any of the monitoring requirements specified in ~~subsections (b)(1) through (b)(4), and $25 per deficiency per engine for non-compliance with any other requirement~~this section. ~~In determining the identified order of deficiencies, deficiencies of subsections (b)(1) through (b)(4) shall be identified first.~~ Total fines per engine under this section shall not exceed $~~500~~250 per engine and shall be payable to the State Treasurer for deposit in the Air Pollution Control Fund.

NOTE: Authority cited: Sections 39515, 39600, 39601, 43006, 43013, 43018, 43104, and 44036.2, Health and Safety Code; Sections 27156 and 38395 Engine Code.
Reference: Sections 39002, 39003, 39667, 43000, 43004, 43006, 43008.6, 43013, 43018, 43100, 43101, 43101.5, 43102, 43104, 43105, 43106, 43204, and 44036.2, Health and Safety Code; Sections 27156, 38391, and 38395, Engine Code.

13. Amend section 2446, Title 13, California Code of Regulations, to read as follows:

§ 2446. 2001 and ~~Subsequent~~ Later Model Year Production-Line Test Procedures and Selective Enforcement Auditing Regulations for Spark-Ignition Marine Engines.

(a) Applicability. This section applies to 2001 and ~~subsequent~~ later spark-ignition personal watercraft and outboard marine engines. The allowable methods of production-line testing are specified in ~~paragraphs~~subsections (b) and (c), unless the engine manufacturer can satisfactorily provide an alternate method that shows an equivalent assurance of compliance to that of ~~paragraph~~subsection (b). The engine manufacturer must choose only one method for each model year and submit its method of production-line testing to the Executive Officer for approval no later than 90 days prior to the start of the subject model year production. ~~Only subsections (d) and (e) apply to 2003 and later spark-ignition inboard and sterndrive marine engines~~The 2003 and later spark-ignition inboard and sterndrive marine engines are only subject to the selective enforcement audit requirements specified within subsections (d) and (e) of this section.

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(d) Test Procedures Applicable to All Production-Line and Selective Enforcement Audit Testing.

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(3) Engine Preparation and Preconditioning.

(A) No emissions tests may be performed on an engine before the first production-line test or selective enforcement audit test on that engine.

(B) The engine or watercraft must be tested after the engine manufacturer's recommended break-in period. The engine manufacturer must submit to the Executive Officer the schedule for engine break-in and any changes to the schedule with each quarterly report. This schedule must be adhered to for all production-line testing, or as required by the Executive Officer for selective enforcement audit testing, within an engine family and subgroup or engine family and assembly plant as appropriate.

(C) If an engine or watercraft is shipped to a remote facility for production-line or selective enforcement audit testing, and

adjustment or repair is necessary because of such shipment, the engine manufacturer must perform the necessary adjustments or repairs only after the initial test of the engine or watercraft. Engine manufacturers must report to the Executive Officer in the quarterly report for all production-line testing, or as required by the Executive Officer for selective enforcement audit testing, all adjustments or repairs performed on engines or watercraft prior to each test. In the event a retest is performed, a request may be made to the Executive Officer, within ten days of the production quarter, for permission to substitute the after-repair test results for the original test results. The Executive Officer will either affirm or deny the request by the engine manufacturer within ten working days from receipt of the request.

(D) If an engine manufacturer determines that the emission test results of an engine or watercraft are invalid, the engine or equipment must be retested. Emission results from all tests must be reported. The engine manufacturer must include a detailed report on the reasons for each invalidated test in the quarterly report for all production-line testing, or as required by the Executive Officer for selective enforcement audit testing.

* * * * *

(5) (A) The Executive Order is automatically suspended with respect to any engine failing pursuant to paragraph (b)(3)(D) or (c)(2)(A)(iv) or whose test results for a regulated pollutant exceed the emission standards effective from the time that testing of that engine is completed.

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(e)(5) (B) A failed engine is one whose final test results for $HC+NO_x$ pursuant to paragraph (b)(3)(D) or (c)(2)(iv), as applicable, exceed the applicable family emission level or whose test results for a regulated pollutant exceed the emission standards.

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NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43102 and 43104, Health and Safety Code.
Reference: Sections 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43150-43154, 43205.5 and 43210-43212, Health and Safety Code.

14. Amend California Exhaust Emission Standards and Test Procedures for 2001 Model Year and Later Spark-Ignition Marine Engines, to read as follows:

Part I. Emission Regulations for 2001 and Later New Spark-Ignition Marine Engines, General Provisions.

1. General Applicability.

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(3) Spark-ignition inboard and sterndrive marine engines produced by the engine manufacturer ~~specifically~~to be used solely for competition are exempt from the requirements of this document, provided that the marine watercraft in which the engine is installed is designed, built, and used solely for competition. Marine watercraft used for amateur or occasional competition do not meet the competition exemption criteria.

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9. Exhaust Emission Standards for 2001 and Later Spark-Ignition Marine Engines.

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(b) Exhaust emissions from new model year 2003 and later spark-ignition ~~sterndrive and~~ inboard and sterndrive marine engines must not exceed the exhaust emission standards listed in Table 2 ~~or Table 3, as applicable,~~ for the designated emission durability test period.

Table 2.

Inboard and Sterndrive Exhaust Emission Standards (by Implementation Date)		
Model Year	**$HC+NO_x$** (grams per kilowatt-hour)	**Durability Test Period** (hours)
2003-2008[1]	~~15.0~~16.0[2]	—
2007 and Later[3]~~,4~~	5.0	480

1. Engines with a maximum rated power exceeding 373 kilowatts (500 horsepower) are not required to comply with these standards.
2. Compliance ~~to~~with the $HC+NO_x$ standard may be averaged on a sales-weighted basis, across the engine manufacturers' California production, based on projected California sales or the projected California percentage of national sales.
3. For model year 2007, engine manufacturers shall certify a minimum of ~~10~~45% of their California production (projected California sales or projected California percentage of national sales) to the ~~2009 model year emission~~ standard.~~s and other requirements.~~4. For model year 2008, engine manufacturers shall certify a minimum of ~~50~~75% of their California production (projected California sales or projected California percentage of national sales) to the ~~2009 model year emission~~ standard.~~s and other requirements.~~

~~**Table 3.**~~

~~Small Volume Manufacturers Inboard and Sterndrive Exhaust Emission Standards~~		
~~**Model Year**~~	~~**$HC+NO_x$** (grams per kilowatt-hour)~~	~~**Durability Test Period** (hours)~~
~~2009 and Later~~	~~5.0~~	~~480~~

* * * * *